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A Study of Visitor Bicycle Use in Yosemite Valley

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Executive Summary

This study of visitor bicycle use is part of a larger data collection effort conducted in Yosemite National Park during the summer of 1999. In addition to this study, the Institute of Transportation Studies at the University of California, Davis (ITS-Davis) also studied employees' of the National Park Service (NPS), Yosemite Concessions Services (YCS) and park partners travel to and in Yosemite National Park. Operations Research Consulting Associates (ORCA) inventoried vehicles and visitors in Yosemite Valley. The University of Vermont conducted a study for Visitor Experience and Resource Protection (VERP). Park personnel and BRW, Inc. conducted a number of vehicle traffic counts.

This document reports on the first comprehensive study of visitor bicycle use in Yosemite. It establishes several important baselines about cyclists during typical busy summer days, for example, the number of cyclists, the locations they visit, what proportion rent bicycles as compared to bringing their own, the distribution of the size of groups of cyclists, and the presence of children among groups of cyclists. Further, we asked a number of questions of cyclists about cycling infrastructure.

Many of the obstacles that urban areas face in promoting bicycle use are less prevalent in Yosemite Valley. (Cycling in Yosemite National Park is virtually synonymous with cycling in Yosemite Valley, especially for visitors.) Traffic congestion occurs during the busy summer months. During this time, the bicycle is the quickest, most convenient way for many people to experience the Valley. It is during the summer months when the weather is warm and pleasant for bicycle riding. The flat terrain of the Valley makes bicycling easy for many groups of people with varying ability levels. Yosemite Valley also has a dedicated bikeway system that covers a large portion of the Valley. Distances to locations in the seven mile by one mile Valley are short, allowing short travel times to destinations.

Cyclist Interviews

In total, 212 completed interviews of cyclists were collected between September 3, 1999 and September 6, 1999 during peak visitation hours (10:00 a.m. to 4:45 p.m.). Cyclists were intercepted at several points, including:

- Curry Village
- Camp 6/Yosemite Village intersection
- Mirror Lake
- Village Visitor Center
- Sugarpine Bridge
- Swinging Bridge.

Observed data was recorded for all groups who were approached for an interview. This information included the size of the group, the presence or absence of children, and whether the bikes were rented or privately owned. This data is used to determine whether groups that declined to be interviewed were systematically different from those who participated. In total, 212 completed interviews were collected and 50 refused. No systematic differences in the observed data are found between these two groups.

Cyclists in Yosemite Valley

- People cycling in Yosemite Valley were likely to be staying overnight in the Valley—61% of bicycling visitors were staying overnight in Valley locations including hotel and lodge accommodations, tent cabins and campgrounds
- Only 6% of the cyclists interviewed were riding alone. The average size of the group that was cycling together was 3.1 people.
- Yosemite Valley bicycle riders are experienced Yosemite visitors. Only 10% were either first time visitors or had been to Yosemite only once before. The median number of previous visits was 7. These trips represent the maximum number of prior journeys to Yosemite Valley by anyone in the group, whether that person was on the specific bike trip during which the interview was conducted or not.
- Despite the high number of cyclists who had made previous journeys to Yosemite Valley, when asked if anyone in their group had previously cycled in Yosemite Valley, only 50% said yes.
- In many other ways, the sample of cyclists in the Valley appears similar to more general samples of visitors to the Valley. Cyclists tend to have high incomes. They are most likely to be traveling in groups of 2 to 4 people. They are neither more nor less likely to be traveling with children than are visitors in general.
- Cycling in the Valley is an activity in which cyclists include children—44% of the interviewees had journeyed to Yosemite Valley in a group which contained children, and 98% of these interviewees had children in the group of cyclists that was interviewed.
- Foreign visitors were under-represented in the cyclist sample compared to other more general samples. This might be because interviews were conducted in English (and all approaches for interviews were in English. It may also be that foreign visitors are participating in cycling on *rented* bicycles at the same rate as U.S. residents, but that they are not at all likely to bring their own bikes with them. That is, among groups of cyclists riding only rented bikes, the proportion who are foreigners more closely matches the proportion measured in more general samples of Yosemite visitors.

Knowledge of Cycling in Yosemite

In order to determine how cyclists first learned that they could ride in Yosemite Valley, visitors were asked to cite all the information sources that helped them learn either about riding their own bicycles or renting bicycles.

- The most frequently cited source of information was observing other bike riders during a previous trip and seeing bicycle rentals in the Valley (57%). The next most frequently cited source was word of mouth (19%).
- Despite other means of advertising (including internet, print media and the Valley Guide), 76% of visitors gained knowledge about cycling by actually being in the park themselves or relying upon information provided by another party that had been to Yosemite Valley before.

Reasons for Cycling In the Valley

- When asked what their main reason for riding in Yosemite Valley, 59% said that it was the most convenient way to get around the Valley. Another 17% responded that they used their bicycle to travel to activities around the Valley.

During typical busy summer days, many cyclists can be seen riding in Yosemite Valley. Cyclists can be riding simply as a form of recreation itself, or using bicycles primarily as transportation—moving from one point to another, where the destination, not the trip itself, is the objective. Many repeat visitors are aware of the traffic congestion that occurs in the Valley and as a result seek modes other than their own motorized vehicle to travel to destinations in the Valley. In fact, this “practical” application of the bicycle appears to predominate, though some interview subjects expressed astonishment that the interviewer appeared not to appreciate that riding a bike was simply fun.

Rental Bicycles vs. Privately Owned Bicycles

The concessioner, Yosemite Concession Services Corporation (YCS), rents bicycles at two locations in Yosemite Valley—the Curry Bike Stand and Yosemite Lodge Bike Stand. Many visitors bring their own bicycle to ride in the Valley.

- 50% of groups were riding only private bicycle; 42% were riding only rental bicycles; and, 8% consisted of groups that had both rental and privately owned bicycles.

Bicycle Riders’ Shuttle and Vehicle Use

The shuttle buses may be a complementary mode of travel to bicycles—more so than the car or truck most visitors drove to the Valley. Compared to the average park visitor, Valley cyclists have a higher shuttle ridership.

- 60% of bicycle riders said they have ridden the Valley shuttle buses at least once during their trip.
- 39% of park visitors reported in the 1996 Yosemite Area Traveller Information (YATI) survey reported riding the Valley shuttle at least once.
- 57% of cyclists reported that they did not use or plan to use their motor vehicle for travel within the park.

Locations Visited by Bicycle

Many of the popular locations that cyclists visited by bicycle are the same as the locations visited by the general visitor population. There are however some locations popular with cyclists that are only accessible by walking or cycling, and therefore not visited by automobile or shuttle based visitors.

- Yosemite Village and the Village Visitor Center were the most popular locations. Sixty-one percent of cyclists visiting these locations at some point in their visit.
- Mirror Lake (58%) and Happy Isles (46%) were the next most popular destinations.

When asked whether they thought there were bicycle paths and routes to all the places they wished to cycle, 37% said no. The vast majority of these cyclists wanted bicycle

infrastructure extended to mid-Valley and west-Valley destinations such as El Capitan Meadow and Bridalveil Fall.

Total number of cyclists in the Valley

Estimates of the total number of cyclists in the Valley were made using YCS bicycle rental data from both the Curry Bike Stand the Lodge Bike Stand and the split between private and rental bikes obtained from the bike interviews.

- Based on the average number of bicycles rented over a 4-year period, the total number of bicycles in circulation on a typically busy summer day is estimated to be between 605 and 657.

This estimate is not synonymous with the number of people who ride bicycles. Some “cyclists” will be people who ride a bike one day, but not another. This estimate also excludes employee cyclists. We were not able to estimate the daily number of employee cyclists at this time. However, based on the employee travel study, we estimate that 268 employees who both live and work in the Valley commute to work by bicycle at least sometimes. Of these, 168 only report cycling to work, the rest sometimes walk or take the Valley shuttle.

Cyclist Counts

In addition to interviews, counts of cyclists and pedestrians were made at Curry Village, Camp 6, Mirror Lake, Village Visitor Center, an intersection near the Park Service Administration Building, and Swinging Bridge. The bicyclist and pedestrian counts taken at these locations were not traffic volume or flow counts, rather they measures of the pedestrian and bicycle activity levels at these locations during select points in the day. Two measures of cyclist activity were collected. The first we have called “pseudo-traffic counts.” They are distinct from traditional traffic counts in that they do not distinguish bicycles by their direction of travel, but simply count all bicycles moving past a point, and the counts were not recorded continuously, but as sums of cyclists every 15 minutes. The second we have called “level of activity.” These are counts of all the cyclists in the specified field of view at a moment in time. One count or the other was typically made between noon and 5:00PM at a total of 15 locations.

In general, most locations show a distinct peak in cyclist activity in both the early and mid-afternoon. The single highest count at any given location/date is most frequently recorded in the hour between noon and 1:00PM (6 of 15 peaks); 3 more of the peak counts occur in the previous hour; another 3 occur in the following hour. The (typically smaller) mid-afternoon peak typically occurs during the hour between 2:30PM and 3:30PM.

Further, we speculate that on days when there are more visitors in the Valley, cycling activity both increases and fills in the troughs between the peaks that are observed on days when there are fewer total visitors. That is, on days of higher visitation, cycling activity may be uniformly high; on days of lower visitation,

The largest counts of bicycle activity counts were at Curry Village. The proximity of the count location to the Curry Village Bike Rental Stand undoubtedly influenced these counts. The location with the next highest counts was the intersection near Camp 6.

Recommendations for Further Research

Bicycle rental behavior

Regarding cyclists themselves, it may be of interest, to the concessioner in particular, to know the incidence of repeat bike rentals across several different journeys to Yosemite Valley. That is, our data suggests that once visitors learn about cycling in the Valley, they are likely to bring their own bikes on subsequent journeys rather than rent bicycles once they arrive.

Supplementing Pseudo-traffic and LOA Counts with Traditional Traffic Counts

While the bicycle counts collected during the summer of 1999 give us a measure of the level of cycling activity at various locations, these counts may not be representative of the LOA for typically busy summer days (or for any other day). Counts were taken only once or twice per location. In addition, while the counts were conducted at locations of observed high bicycle activity, activity at a number of other areas was not counted. “Weekday” counts were made on a Friday, but Fridays may not give an accurate representation of weekday travel behavior. Some vacation trips may begin on a Friday so visitors can enjoy three consecutive days for the weekend. To accurately observe weekday counts, Tuesday through Thursday days may be more appropriate. In addition some of the counts were taken during the Labor Day weekend which is typically a high visitation weekend, and therefor may not be characteristic of a “typical” summer day.

In order to get a better picture of the bicycle movements in the Valley, we would recommend the following additions and changes to the activity counts:

- Counts at a wider variety of locations, including Ahwanee Bridge, the path south of Southside Drive past the Chapel, and any extension to mid-Valley or the western end
- Counts on more occasions at the locations at the locations counts were made in 1999
- Counts during consistent time periods across locations and days
- Counts should to be taken for longer period each day. Specifically, the count period should begin prior to noon, and extend past 5PM
- Counts should be made on “true” weekdays, such as Tuesday or Wednesday.

Further, it may not be necessary to conduct actual traffic flow counts (rather than pseudo-traffic or LOA counts) at all locations, but certain busy places, such as the Camp 6 intersection, could be characterized better if continuous and directional traffic counts were made. Infrastructure improvements, suggestions for routes, and other cycling related actions may well hinge on not simply how many cyclists are in an area, but whether most are headed in one direction or the other.

Cyclists Travel Modes

We know that Valley cyclists had a higher shuttle ridership than the general population of Valley visitors. In addition, 57% of cyclists interviewed said they did not use or plan to use their motor vehicle for travel within the park. Despite these statistics, it is difficult to determine if Valley cyclists are using the bicycle as a replacement for another mode. That is, it is difficult to determine to what extent bike trips are an activity undertaken for their

own sake, or whether bicycles simply substitute for walking, riding a shuttle bus, or driving to locations the visitors wished to visit. Fifty-nine percent of Valley visitors reported that the bicycle was the most convenient way to get around the Valley. Yet, in the interview it was difficult to distinguish between recreation trips and trips to accomplish non-recreation purposes.

Seasonal Variation in Cycling

All data in this report was collected during summer months. If cycling is perceived to be an important activity—either as recreation or transportation—it would be desirable to characterize cycling and cyclists at different times of the year. If the primary motivation for cycling is convenience and speed, then the percentage of cyclists should drop during the cooler, wetter non-summer seasons since vehicle traffic is lower. The destinations cyclists wish to reach may also change seasonally.

Comprehensive Study of Travel Behavior—Travel Diaries

Longer, more detailed interviews or surveys might be possible if alternative sampling frames were considered. In particular, travel diaries of Valley visitors would give a clearer picture of the actual travel patterns and incorporate the bicycle as a mode of travel in relation to the other modes that the visitor uses while in the Valley. Detailed information such as the purpose, location, and duration of the trip could be taken from the diaries. Information on trip chaining on bicycles could determine how the bicycle is used in relation to other modes of travel. Alternative sampling frames could also address visitors who were not riding bicycles, to ascertain reasons why some people do not cycling and what, if anything could be done to encourage them.

Introduction

As part of a number of 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 (ITS-Davis) conducted a survey of cycling visitors in Yosemite Valley. This survey provides a description of cyclists including demographics, bike trip destinations, perceptions of cycling infrastructure, use of other travel modes, estimates of the total number of cyclists in the Valley, and measures of level of cycling activity in key locations.

There are three types of groups of cyclists in Yosemite Valley according to the ownership of bicycles. Some groups consist solely of people riding bicycles rented from either the Curry Bike Stand and/or the Yosemite Lodge Bike Stand. Some groups consist solely of people riding their own bicycles. And some groups consist of some people riding their own bikes and some riding rented bikes. These distinctions will be shown to be important in terms of prior experience cycling in the Valley and knowledge of cycling in the Valley.

There are two primary data sets for this analysis—interviews and counts of cyclists. Cyclists were interviewed at six sampling sites: Curry Village, Camp 6/Yosemite Village intersection, Mirror Lake, Village Visitor Center, Sugarpine Bridge, and Swinging Bridge. The interviews were conducted on September 3 through September 6, 1999 between the hours of 10:00AM to 5:00PM. The total number of completed interviews was 212. The questionnaire is included as Appendix A of this report. The cyclist interview research was undertaken by ITS-Davis, with assistance from National Park Service (NPS) personnel. Bicycle and pedestrian counts were also made at several locations prior to and during the interview period. These counts were made from August 13 to 22, and September 4 to 5, 1999. Counts were not made on all days at all locations. The cyclist counts were undertaken by Operations Research Consulting Associates (ORCA), again, with assistance from NPS personnel. These counts are described in more detail below in the section on interview and count locations. ITS-Davis, in order to organize a single comprehensive document on visitor cycling in Yosemite, undertook the analysis of the bicycle count data.

Throughout this report we will distinguish between bicycle “trips” and the “journey” to Yosemite National Park. The concept of a journey includes the entire excursion made from home to the park, and is inclusive of all days spent in the park. A bike trip refers to any specific trip made on a bike. Thus, our respondents were interviewed during a bike trip that was part of their overall journey to the park. Their current journey may include several bike trips. They may have made previous bike trips in the Valley, either on this journey or a prior journey.

Survey Methodology

In situ interviews of cyclists were chosen as the best, most realistic context for the interview subjects—notably, cyclists in Yosemite Valley. The respondent’s own current behavior, rather than recalled behavior, becomes their primary response context. Travel surveys have consistently under-represented cycling (and walking) trips. This is partly due to question construction that biases respondents away from thinking of short trips as

being trips at all and sampling frameworks that systematically under-represent less frequent behaviors such as cycling and walking.

Cyclists were interviewed at locations along the popular Yosemite Valley Bikeway. The interviews were conducted during peak bicycle times of 10:00AM to 4:45PM. Cyclists were intercepted during a bike trip. A series of questions were asked about their past, present and future bike trips during this particular visit to Yosemite Valley.

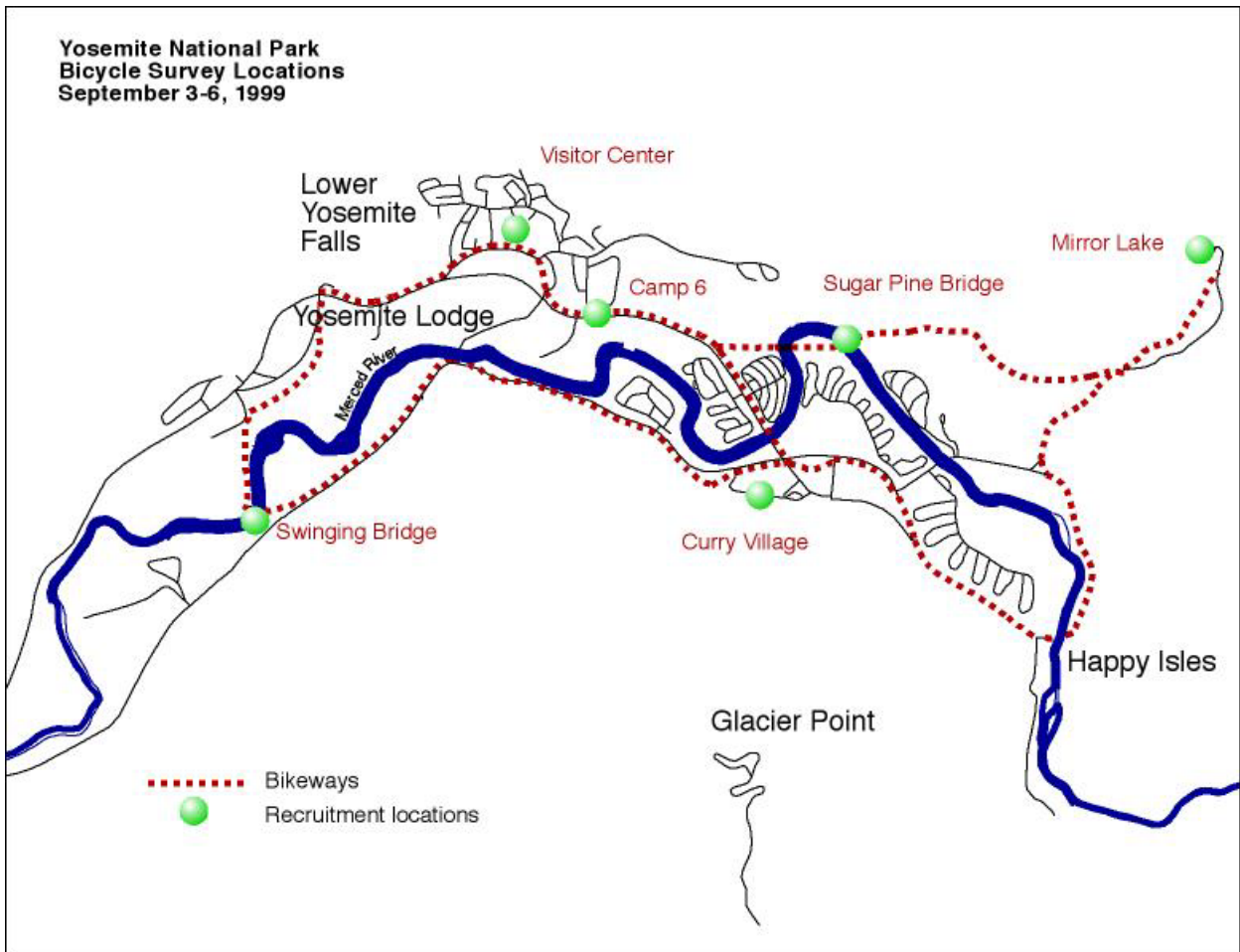
Interviewers used a standard script to recruit cyclists. The visitor was asked if they were willing to participate in a short interview. If they agreed, the visitor moved over to the side of the path to conduct the interview. Visitors who refused were thanked for their time and waved on. Observed data about all cyclists who were approached—including refusals—were recorded. This information included: group size, whether they were riding rental or privately owned bicycles, the presence of children in the group, and basic bicycle equipment and accessories.

Cyclist Interview Locations

Cyclists were recruited at six sampling sites: Curry Village, Camp 6/Yosemite Village intersection, Mirror Lake, Village Visitor Center, Sugarpine Bridge, and Swinging Bridge. These locations are major destinations or high cycling traffic areas in Yosemite Valley. These locations are shown on Map 1 Bicycle Interview Locations. Cyclists were flagged to a stop by interviewers who were wearing an orange National Park Service Traffic Management Team T-shirt. Some recruitment areas had “natural” stopping points. Mirror Lake, for example, has a bike rack to which visitors must secure their bicycles before walking the remainder of the trail to Mirror Lake. Cyclists were intercepted at the bike rack as they dismounted their bicycles. Visitors at Sugar Pine Bridge were recruited as they dismounted their bicycles and walked along the bridge.

Bicycle Count Locations

Bicycle and pedestrian counts were also made at several locations prior to and during the interview period. These locations correspond to the bicycle recruitment locations or other major points along the route. These locations included Curry Village, Camp 6, Mirror Lake, Village Visitor Center, an intersection near the Park Service Administration Building, and Swinging Bridge. These locations are shown on Map 2 Bicycle Count Locations. These counts were made by National Park Service Traffic Management Team personnel.



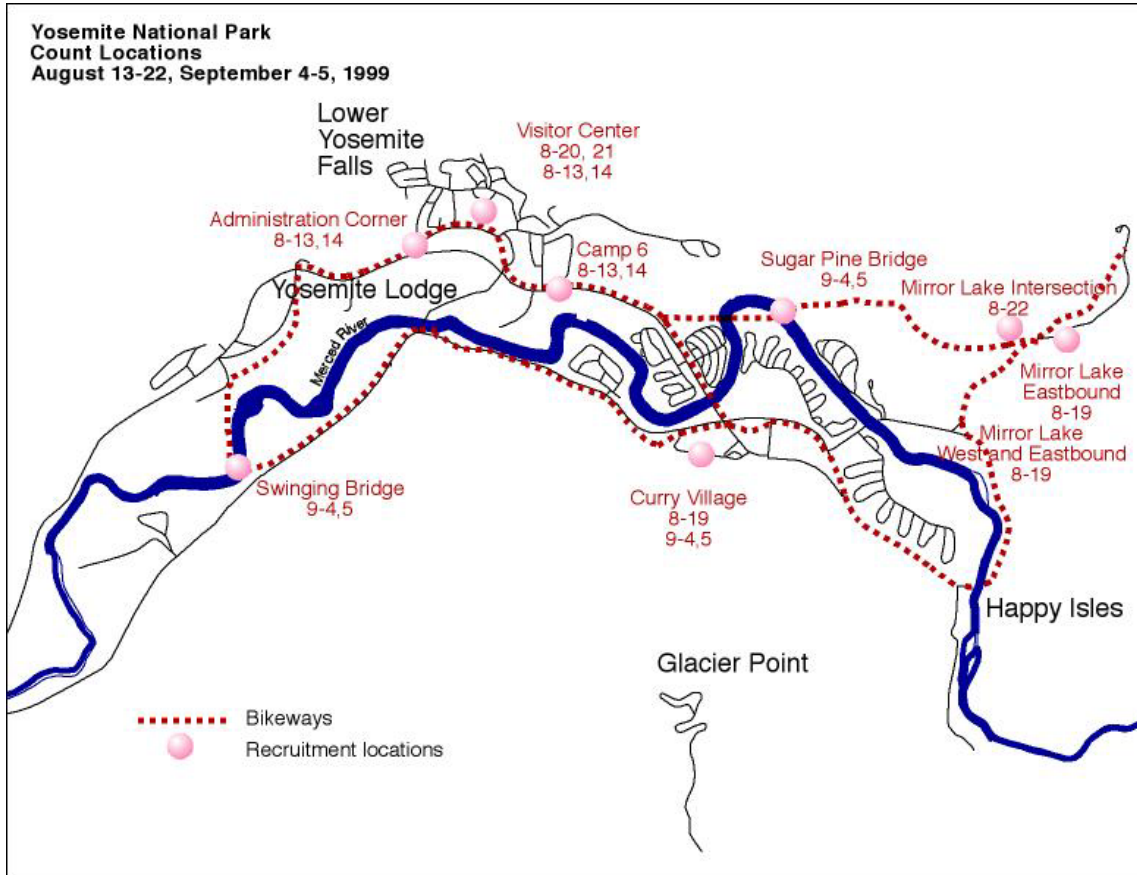
Map 1 Bicycle Interview Locations

Types of Counts

The bicyclist and pedestrian counts taken at these locations were not traffic volumes or flows, rather they were a measure of the pedestrian and bicycle activity level during select points in the day. The counts do not identify the direction of movement, nor were they recorded continuously through time. Some of the counts might be characterized as pseudo-traffic counts. They do count bicycles moving past a point, but they don't differentiate direction and the data are recorded in 15-minute intervals. Thus the pseudo-traffic counts are the number of bikes passing a point, in any direction, per 15 minutes. Other counts we characterize as "level of activity" or LOA counts. These counts record the number of cyclists and pedestrians within a defined area at a moment in time. Cyclists may be riding in any direction, or may be parking their bikes. Pedestrians need not be traversing the defined area either, they simply need to be in the area at the moment the count is taken. The LOA counts are repeated every 15 minutes. The type of count made at each location is indicated in Table 1.

Since these counts—both the pseudo-traffic and LOA counts—were conducted during different periods of the day at different locations, the best comparison across locations of

total bicycle activity is made for the time from 12:00PM to 4:00PM when counts were made for most locations. These data are shown in Table 1: Average and Peak Bike Counts from 12:00PM to 4:00PM by Location.



Map 2: Bicycle Count Locations

The counts at Curry Village were intended to capture visitors renting bicycles from the Curry Bike Stand. Counts taken near the bicycle rental facility show this location to be the busiest area in the bicycle network. Across the period 12:00 p.m. to 4:00 p.m. on September 4, 1999 an average of 44 cyclists were counted during each 15 minute interval. An interviewer was stationed outside the bike rental area to intercept riders either leaving the rental area or returning their rental bikes. On subsequent days, the interviewer changed locations at Curry Village to a location closer to both the motor vehicle parking lot and the path to the Curry Store.

Table 1: Average and Peak Bike Counts from 12:00PM to 4:00PM by Location

Location	Date	Count Type	Average “15 minute” counts from 12-4PM	Peak count at this location and date
Administration corner	8/13/1999	p-t	33.50	61
Administration corner	8/14/1999	p-t	35.00	52
Camp6 Intersection	8/13/1999	p-t	40.25	76
Camp6 Intersection	8/14/1999	p-t	41.50	58
Curry & Housekeeping	8/19/1999	p-t	22.00	36
Mirror Lake Eastbound	8/19/1999	p-t	8.50	27
Swinging Bridge	9/4/1999	p-t	13.50	31
Swinging Bridge	9/5/1999	p-t	15.25	28
Average of p-t counts			26.31	
Curry Village	9/4/1999	LOA	44.00	136
Mirror Lake E&W	8/19/1999	LOA	15.00	37
Mirror Lake Intersection	8/22/1999	LOA	19.25	53
Village Visitor Center	8/13/1999	LOA	21.00	50
Village Visitor Center	8/14/1999	LOA	40.50	62
Village Visitor Center	8/20/1999	LOA	37.75	64
Village Visitor Center	8/21/1999	LOA	38.50	72
Average of LOA counts			30.86	—

Note: p-t = pseudo-traffic counts; LOA = level of activity counts. See text for description.
Counts for Curry Village on 9/5/99 are not shown since counts were made only from 10:00AM to 1:00PM.

Camp 6/Village intersection is one of the most heavily trafficked areas in the Valley. The motor vehicle traffic in and out of the Camp 6 day use parking lot as well as the Yosemite Village area make the intersection heavily congested during peak times. During the weekend of August 14, 1999, the 12:00PM to 4:00PM counts averaged 40.25 one day, and 41.50 the next. These average counts are second only to those near the bike rental facility at Curry Village. Yet, these counts differ from the Curry Village counts in that traffic at this intersection was heavy in both the eastbound and westbound directions. In addition to heavy bicycle traffic, large numbers of pedestrians travel from the Camp 6 lot to Yosemite Village and the Village Visitor Center. This path also serves bicycle traffic to and from the eastern end of the Valley including destinations such as Mirror Lake, The Ahwahnee, and Curry Village. Westbound, cyclists travel through this intersection on their way from Yosemite Falls, the Village Visitor Center, and Yosemite Village. Because of the high level of cyclist traffic, we positioned two interviewers at this location.

This heavy traffic, coupled with a lack of a shoulder for cyclists to pull out of the flow of traffic, contributed to the highest interview refusal rate of any location. Interviewers also noted that the Camp 6 area contained major destinations including activities that were time dependent (activities at the Village Visitor Center), and dining locations where

potential subjects were interrupted while on their way to a meal. Despite the presence of stop signs for both the east and westbound direction at the Camp 6 intersection, stopping cyclists was also difficult.

Refusal rates for all interview locations are shown in Table 2. Of the cyclists approached at Camp 6, 69% agreed to be interviewed. The next lowest participation rate was at the Village Visitor Center, where 80% of those approached agreed to be interviewed.

Table 2: Refusals by Locations

Location	%Completed	Total Attempted Interviews
Row Percent		
Curry Village ¹	100	41
Sugar Pine Bridge	88	8
Mirror Lake	86	43
Swinging Bridge	85	66
Village Visitor Center	80	10
Camp 6	69	92
Total		260

1. All interviewers were instructed to record refusals to the survey. It appears that the interviewer stationed at Curry Village for the duration of the study did not record the refusals.

While seemingly ideal, Sugar Pine Bridge proved to also be a problematical location to conduct interviews. Sugar Pine Bridge is located at the east end of the Valley on the bike and pedestrian path between Yosemite Village and Mirror Lake. The only means of access to the bridge is either by bicycle or walking. The interviewer was stationed on the westbound side of the path. Cyclists who stopped on the bridge to enjoy the view were approached for interviews. These interviewees were very cooperative and friendly as they had already stopped on the bridge and did not have to dismount their bicycles for the sole purpose of the interview.

However, only a few interviews were conducted at this location because the majority of the cyclists in the westbound direction traveled through the Camp 6 intersection where they had already encountered an interviewer. Some refusals at Camp 6 were due to the fact that visitors had just completed an interview at the Sugar Pine Bridge location. It was decided to discontinue interviews at Sugar Pine Bridge due to the low volume of cyclists and increase the interviews at Camp 6 for the remainder of the study period. The interviewer stationed at this location was moved to Camp 6 to assist the other interviewer.

The area near the Village Visitor Center was believed to be an important recruitment location. This area contains four sets of bike racks to accommodate numerous cyclists. The bicyclist activity count on August 14, 1999 week averaged 40.50. But this was nearly double that of the day before. As the 14th was a Saturday, it could be that an influx of day use visitors on the weekend accounts for the tremendous increase over the counts from Friday the 13th. Counts at this location included all visitors moving in the eastbound and

westbound direction as well as those within the entire quadrangle area in front of the Village Visitor Center.

Interviews were conducted at the bike racks. However, low traffic in this area during the interview period in early September resulted in low numbers of completed interviews. Interviewers moved from the bike racks to the bike path further south of the Village Visitor Center. This second location proved problematic too. It was difficult to intercept bicyclists as there was no place for cyclists to stop out of the flow of traffic, nor was there any reason, such as an intersection or stop sign, for cyclists to be stopping or slowing. As a result of all these issues, only 10 interviews were conducted at the Village Visitor Center. The interviewers at this location later moved to the Camp 6 intersection.

Swinging Bridge is an important area in the bicycle path network. It is at the western end of the current dedicated cyclist/pedestrian path. There is a beach and picnic area near the bridge. Somewhat secluded from motor vehicle traffic, Swinging Bridge is a popular location for cyclists and pedestrians who go there. Still, during the study period, the average of bicyclist activity counts ranged only from 13.5 to 15.25.

In the summer, the picnic area at the south end of the bridge is a popular destination away from crowded locations further east in the Valley. A small motor vehicle parking area with restrooms and picnic tables enables visitors to access the area by car. At the north end of the bridge, a small beach area gives visitors a location to swim and sunbathe. From the north, a bicycle path that leads to the Yosemite Lodge is the only route to the bridge.

The response rate at Swinging Bridge was 85%. This area had the second highest amount of attempted interviews—66 contacts were made during the interview period. An interviewer was required for both the southbound and northbound direction. Initially, one interviewer was stationed at this location. But as happened initially at Camp 6, a significant number of potential interviews were missed while the interviewer was engaged in an interview.

Cyclists were interviewed while they were stopped on the bridge to enjoy the view or intercepted at the bottom of the bridge. A short turn in the bike path just before the bridge at the north end provided the ideal location to stop cyclists. Groups of cyclists were traveling slowly as they approached the bridge in the southbound direction and were flagged to a stop. Cyclists were also intercepted as they parked their bicycles at the north end of the bridge in the small beach area. Large shoulders along the path in both the northbound and southbound direction also provided a good location to pull groups over and out of traffic. Since many groups were either stopped at the bridge or traveling slowly, cooperation was high among groups.

Interview Subjects

One person was asked to represent the group that was cycling together. For questions dealing with number of previous visits or bike experience, the spokesperson would state their own experience level, and ask other group members. The highest level of experience was recorded. In some questions, where multiple responses were accepted, group members other than the spokesperson would voice their responses. The interviewer recorded these responses as well as those of the spokesperson.

Excluding Park Employees

Employees of the National Park Service, Yosemite Concessions Service, or any park partners were not stopped for interviews. Park employees were excluded for two reasons. Park employees' travel behavior including bicycle travel were recorded by a more detailed mail survey of park employees conducted during August and September, 1999 (Kurani, Turrentine, and Co, 2000). Employees have detailed knowledge of the Park and use bicycles differently than park visitors. Park employees may use their bicycle for travel within the Park to such locations as employment centers, rather than a recreational use such as a park visitor. To distinguish Park employees from visitors, the trained interviewers visually screened oncoming cyclists. Several visual clues made Park employees distinguishable from other visitors. Employees usually traveled alone compared to park visitors who traveled in groups. Some employees were easily identified through either with a NPS uniform or YCS uniform.

Hypotheses: Experience level on bicycling behavior

In addition to providing basic empirical benchmarks regarding the level of bicycling in Yosemite Valley, we were interested in a number of specific hypotheses. We hypothesized that if respondents had prior experience traveling to Yosemite Valley and prior bicycle use in Yosemite Valley, these would affect cyclist behavior in a number of ways. For example, experienced Valley visitors might be more apt to be cyclists given their knowledge of vehicle congestion and limited parking spaces at popular Valley destinations. Also, people who had previously cycled in Yosemite Valley might be more likely to have brought their own bicycles than to rent.

Results and Analysis

Overview of Cyclists in Yosemite Valley

Yosemite bicycle riders tend to be experienced Yosemite Valley visitors—only 4% were first time visitors. The median number of previous visits to Yosemite was seven. Recall, that this is the largest number of previous trips to the Valley by anyone in the group. Despite the high number of groups of cyclists who had a member who had been to Yosemite Valley previously, only 50% of the groups responded that anyone in their group had previously ridden a bike in Yosemite Valley.

Cyclists in Yosemite Valley were not likely to make a bicycle trip alone. Only 6% of interviews were of cyclists riding alone. The median group size was 3 people. As calculated by the data in Table 3, 43% of groups included children. Children were counted as anyone under 18 years of age. This also included children on their own bikes, or small children being towed in a trailer, or children riding in a children’s bicycle seat attached to another rider’s bicycle.

Table 3: Presence of children in interview group

Children present in the interviewed group	Number
Children not present	118
Children present	89
Total	207

Private and Rented Bikes

Tourists who want to ride bicycles in Yosemite Valley can either rent bikes from the Yosemite Concessions Services Corporation (YCS) or bring their own. Rental bicycles are easy to distinguish from private bicycles. Rental bicycles were either red and black Schwinn single speed cruisers or multi-gear Schwinn mountain bikes. These bikes all had prominent identification numbers on the top tubes. As shown by the data in Table 4, half of all groups were riding their own bikes; 42% were riding rented bikes; and 8% of groups included some people riding their own bikes and some riding rented bikes.

Table 4: Private vs. Rented Bicycles

Private or rented bikes	Number	Percent
Private	104	50
Rented	88	42
Some rented, some private	17	8
Total	209	100

Lodging

Subjects were asked if they were staying overnight in the Valley. Sixty-one percent of the cyclists groups were staying overnight in the Valley. The remaining 39% could have been staying overnight at lodging facilities outside the Valley (but in the park) or in nearby gateway communities such as El Portal. In comparison to data collected on Valley visitors in 1996, bicyclists interviewed in 1999 were more likely to stay overnight in the park. The 1996 data indicates that only 40% of summer visitors who visit the park in a private vehicle (whether owned or rented) stayed at least one night in the park (Kurani et al. 1997).

Curry Village was the most likely location for cyclists to stay overnight—28% of the cyclists who stayed overnight in the Valley stayed there. The next most frequent lodging location was Upper Pines Campground (22%). Another 22% of the overnight guests stayed at hotel accommodations in either Yosemite Lodge or The Ahwahnee. The distribution of the lodging locations in the Valley is shown in the Table 5: Lodging locations of Cyclists who stayed Overnight in Yosemite Valley.

Lodging and Bike Rental Locations

Data on overnight lodging location and bike rental location are shown cross-tabulated in Table 6. The data are limited, so we offer the following conclusions with some caution. Yosemite Valley overnight guests who rented bicycles tended to rent them at their lodging location or the rental location closest to their camping location. That is, people who stayed at Yosemite Lodge tended to rent from the rental facility near the lodge; those who stayed overnight in Curry Village rent from that Curry Village location. A few (3) groups who stayed at the Lodge rented from the Curry Bike Stand. This may be due to the fact that the Curry rental location is more visible than the Lodge location. By itself, this fact may not seem remarkable, but it is consistent with our characterization of information sources below. Specifically, most people learn about cycling in Yosemite Valley by observing cycling in Yosemite Valley.

Table 5: Lodging locations of Cyclists who stayed Overnight in Yosemite Valley

Location	Number	Percent
Lower Pines	7	6
Camp 4 (Sunnyside)	6	5
Curry Village	35	28
Upper Pines	27	22
Housekeeping	18	14
Yosemite Lodge	17	14
The Ahwahnee	10	8
Backpacker Camp	1	1
Total	125	100

Table 6: Lodging Locations by Rental Locations

Location	Curry Rental	Lodge Rental	Totals
Ahwahnee	5 71	2 29	7
Curry Village	19 100	0 0	19
Housekeeping	5 83	1 17	6
Lower Pines	2 100	0 0	2
North Pines	1 100	0 0	2
Camp 4	0 0	2 100	2
Upper Pines	8 100	0 0	8
Yosemite Lodge	3 30	7 70	10
Backpacker Camp	1 100	0 0	1
Total Number	44	12	56

Note: The top number in each cell is the number of people who stayed at, and rented a bike from, the locations specified by the row and column label. The bottom number is the percentage of the people in each row that the top number represents.

Demographics

Income

Bicycle riders in Yosemite were asked to indicate their annual household income from all sources. Respondents were either read the income category or were shown the income categories on the interview sheet and asked to point to the most appropriate one. The income distribution is shown in Table 7.

Cyclists appear to belong to higher income households. In this way, they appear to be similar to the general population of visitors to Yosemite. Twenty-nine percent of the visitors belong to households earning more than \$100,000 per year. This is consistent to the YARTS survey data collected in summer 1998 as well as with data collected by ITS-Davis in 1996. In all three studies, the highest income category is the one most frequently selected by respondents. Nelson/Nygaard Consulting Associates report 28% of Yosemite visitors indicate their household earns \$100,000 or more per year. ITS-Davis reported that 25% of park visitors were in this highest income category. While the UCD survey was conducted during the summer months, Nelson/Nygaard reports little seasonal variation in visitor income (Nelson/Nygaard, September, 1998).

Table 7: Income Distribution of Valley Cyclists and of General Park Visitor Samples, percent

Income Levels	Bicycle riders, 1999	Nelson/Nygaard, 1998¹	YATI, 1996²
Less than \$20,000	7	5	6
\$20,000 - \$39,999	12	14	15
\$40,000 – \$59,999	18	21	20
\$60,000 - \$79,999	20	19	21
\$80,000 - \$99,999	14	14	14
\$100,000 or greater	29	26	25

1. Nelson/Nygaard, September, 1998

2. Kurani et al. 1997

Group Type and Size

The composition of the group of people who journeyed together to Yosemite Valley is shown in Figure 1. These data refer to the total group who journeyed together to Yosemite, not just those members of any group that were on the specific bicycle trip during which a group member was interviewed. Groups made up of immediate family members only accounted for over two-thirds of all groups. The distribution of group sizes is shown in Table 8. The most common group was composed of 2 people (34%). The next most frequent group size was 3 (17%). The median group size was 3 and the mean group size was 4.4.

In order to provide a profile of the group composition, we used categories similar to the Nationwide Personal Transportation Survey (NPTS) household definitions. Cycling groups were asked to report the number of people who were traveling with them by age categories. These included people who were not on their current bicycle trip but were traveling with them on their trip to Yosemite. Since we did not ask marital status or retirement status, the categories we provide are not exact matches to the NPTS categories. Adults that were age 65 years or older were assumed to be retired.

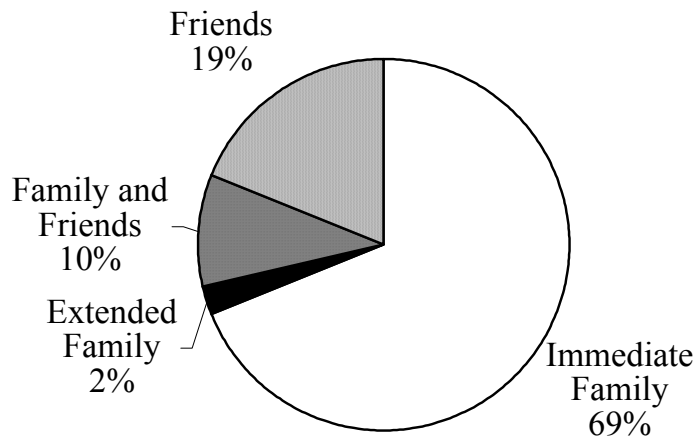


Figure 1: Type of Group Traveling Together

Table 8: Group Size

Group Size	Count	Percentage
1	17	8
2	72	34
3	35	17
4	31	14
5	16	8
6	10	5
7	6	2
8	5	2
9	2	1
10+	18	8.5
Total	212	100

The group categories we used are as follows:

1. One adult, no child.
2. Two or more adults, no children.
3. One adult, youngest child under age 5.
4. Two or more adults, youngest child under age 5.

5. One adult, youngest child age 6 to 15.
6. Two or more adults, youngest child age 6 to 15.
7. One adult, youngest child age 16 or older.
8. Two or more adults, youngest child age 16 or older.
9. One adult, retired, no children.
10. Two or more adults, retired, no children.

The distribution of group types is shown in Table 9. Overall the most common group types consisted of two or more adults and no other group members—89 groups, or 45% of the sample is composed of such groups. This is consistent with the group size variable showing groups of 2 as the most common group size. The second most common type of group was composed of two or more adults with children between the ages of 6 and 15 years old. This group accounted for 20% of the sample.

Cycling does not appear to be an activity that has a stronger attraction for groups traveling with children than for groups traveling without children. Nelson-Nygaard (September 1998) report that 58% of automobile based visitors to Yosemite in 1997/8 were traveling without children. They report very little seasonal variation in this figure, though we would interpolate from their Figure 17 that among summer visitors, the percentage of groups traveling without children falls to about 56%. This is even closer to the 53% of cyclists in this study who were traveling without children.

Table 9: Household Categories

Household categories	Number	Percent
One adult, no child	16	8
Two or more adults, no children	89	45
One adult, child under 6	3	2
Two or more adults, child under 6	35	18
One adult, child 6 to 15	12	6
Two or more adults, child 6 to 15	39	20
One adult, child 16 or older	2	1
Two or more adults, child 16 or older	4	2
Total	200	100

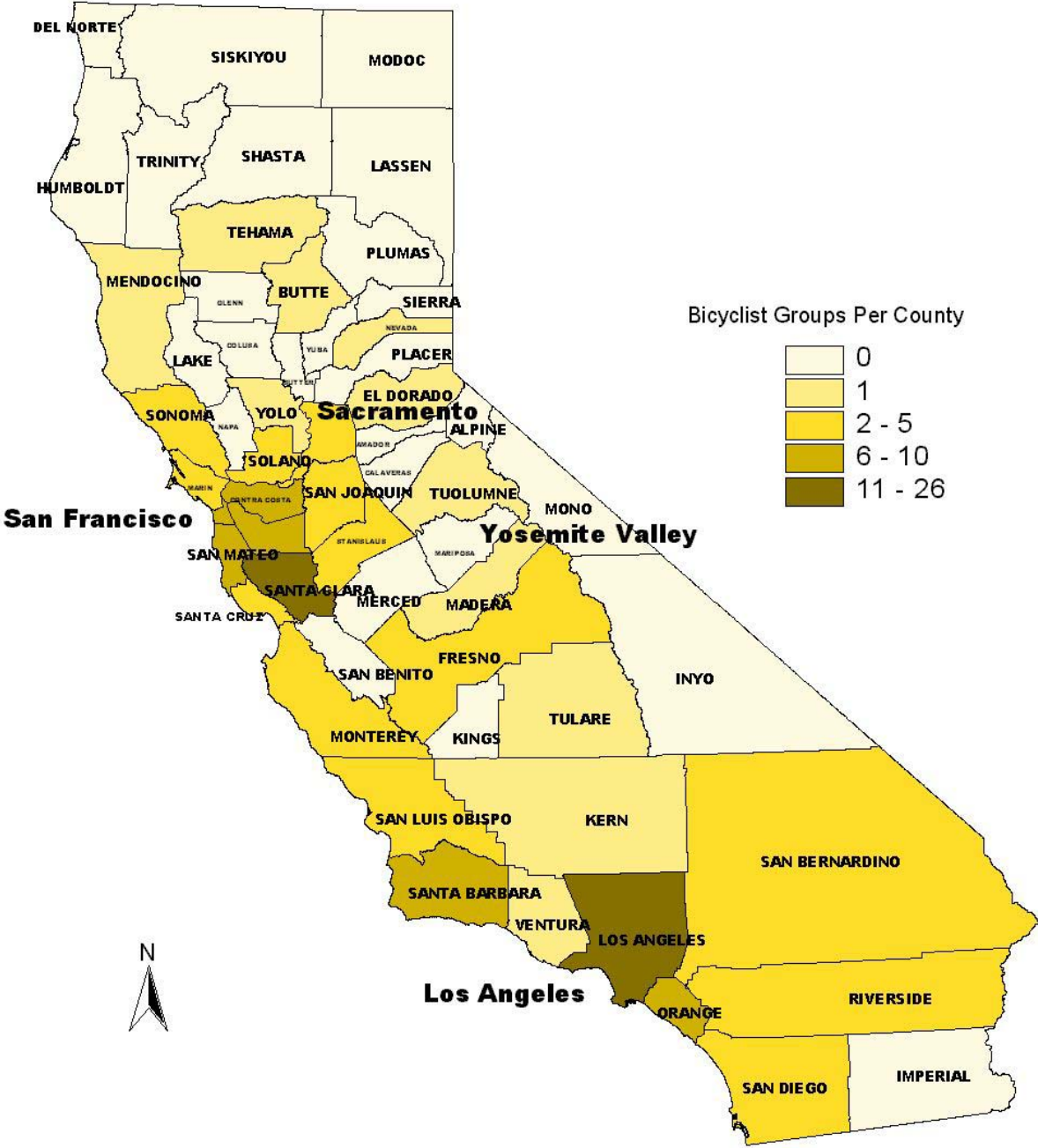
Residence of Bicyclists

Cyclists were asked to identify the country of their residence. If they were residents of the United States, they were then asked to provide their home zip code. Ninety percent of the Valley bike riders were U.S. residents. This is slightly higher than measured in year-round samples of all visitors to Yosemite. Seventy-eight percent of year-round visitors and 86% of summer visitors in the YARTS data were U.S. residents, (Nelson/Nygaard, December 1998, September 1998).

Among cyclists who were U. S. residents, 86% were California residents. This is much higher geographic concentration than measured for all Yosemite Valley visitors during

the summer months by other sources. California visitors constituted only 55% of the total visitors in the YARTS data (Nelson/Nygaard, December 1998). The county of residence for California visitors is shown on Map 3: Origins of Yosemite Cyclists. California visitors' residences were concentrated in the San Francisco Bay Area, with a lesser concentration in southern California. This agrees with the general distribution of home locations reported by Nelson-Nygaard for visitors to Yosemite who are California residents.

Origins of Yosemite Bicyclists



Map 3: Origins of Yosemite Cyclists

Only 22 groups of international visitors were interviewed. These international visitors constituted 10% of the sample of Yosemite Valley bike riders. This is half the 19%

foreign visitors reported by Nelson-Nygaard for the summer of 1998. Their sampling frame was different, as they intercepted travelers in automobiles at the park entrances. Further, they did distribute their survey. The foreign visitors who were interviewed for the cycling study represented 12 different countries. In the sample of cyclists, foreign visitors were most likely to be from Germany or Great Britain. While this is consistent with other studies of all visitors, there are too few foreign visitors in the cyclist sample to make strong conclusions about national origins of foreign visitors.

Table 10: Country of Valley Cyclists

Country	Count of International visitors' groups
Belgium	1
Canada	1
Germany	6
Great Britain	3
India	1
Israel	2
Japan	1
Malaysia	1
Mexico	1
Netherlands	2
Singapore	1
Switzerland	2

Characteristics of the Bicycle Trip

Bicycle Trip Start Locations

The interview sites in the Valley were located along networks of paths and routes that allowed us to intercept cyclists riders at a variety of different points in their bicycle journeys. Visitors could have started their bike trip at any number of locations including a bike rental facility, lodging location or the location of their parked vehicle. The single most frequent bike trip origin was the Curry rental location. Thirty-five percent of the cyclists started their bike trip there. In aggregate though, the wide variety of lodging and camping locations were listed as the most common starting location. Nearly half of all bike groups started their bike trip at their camping or lodging location. Twenty-seven percent of visitors started their bicycle trip from the location where their vehicle was parked. These were parking locations that were neither lodging/camping locations nor a bicycle rental facility. These vehicle locations are included in the start locations in Table 11: Bicycle Trip Start Locations.

Table 11: Bicycle Trip Start Locations

Start Location	Number	Percent
Curry Rental	68	35
Respondent's lodging/camping location	48	24
Lodge Rental	34	17
Curry Village	14	7
Camp 6	6	3
Swinging Bridge	6	3
Yosemite Lodge	5	3
Ahwahnee	2	1
Camp 4 (Sunnyside)	2	1
North Pines	2	1
Sentinel Bridge	2	1
Upper Pines	2	1
Yosemite Village	2	1
Chapel	1	0
Garage	1	0
Housekeeping	1	0
Lower Pines	1	0
Total	197	100

Locations Visited by Bicycle

Since cyclists could be at the beginning, in the middle, or at the end of a bicycle trip when they were interviewed, a series of questions dealing with the past, present, and future destinations was asked. Cyclists were asked to report the location or locations of the places they previously had visited, or were planning to visit, during the specific bike trip during which they were being interviewed. Table 12: Locations Visited by Bicycle summarizes these locations. The data intentionally exclude known trip start and end locations as “destinations.” Since Curry Village and Yosemite Lodge have bicycle rental facilities and large parking areas, removing the start and lodging/camping locations gives a better estimate of the places most often visited by bicycle. The percentages represent the numbers of people who visited the locations. The percentages sum to more than 100 because groups visit more than one destination.

Table 12: Locations Visited by Bicycle

Locations visited by Bicycle	Percentage of Cyclist Groups visiting this Location by Bike
Yosemite Village and Visitor Center	61
Mirror Lake	58
Happy Isles	46
Yosemite Falls	43
Curry Village	34
Yosemite Lodge	28
The Ahwahnee	23
El Capitan Meadow	17
Lower Pines	13
Housekeeping Camp	12
Upper Pines	11
North Pines	11
Camp 4 (Sunnyside)	6

The location most visited was Yosemite Village and the Village Visitor Center. Sixty-one percent of the respondents had visited, or were planning to visit, this location by bicycle. As shown by the bicycle counts (discussed below) at the Camp 6 intersection—which leads to the Village and the Village Visitor Center—some of the highest bicycle activity in the Valley is near the Village and the Village Visitor Center. Many popular destinations are located in the Village including stores, restaurants, The Ansel Adams Gallery, the Wilderness Center, the Post Office, and others. To the extent this is a very busy location in the Valley, bicyclists are drawn here too.

The next most popular location was Mirror Lake. The Mirror Lake location is a popular location for many reasons. Many bike trips started at Curry Village (34%). The Curry bicycle rental staff recommend to renters that they ride eastward towards Mirror Lake, a location accessible by bicycle and walking. Happy Isles is the third most likely destination for cyclists to visit. Happy Isles lies on the route between Curry Village and Mirror Lake. In addition to the close proximity to Curry, Mirror Lake is a popular destination for many cyclists in the whole Valley. Other popular destinations included Yosemite Falls, The Ahwahnee, and Yosemite Lodge. These locations are located along the bicycle network or are easily accessible by bicycle. Less frequently visited locations such as El Capitan Meadow are not accessible via a dedicated bike route.

Cyclists Perceptions of the Adequacy of the Bike Network

While the bicycle network in Yosemite provides access to most of the eastern end of the Valley floor and offers access to locations not served by other modes, there are areas that the bicycle network does not serve. For example, El Capitan Meadow is a popular visitor destination to view rock climbers and to enjoy the view of the monolith. The meadow is currently only accessible by car or by cycling on Northside Drive. To reach El Capitan or any other destination in mid-Valley or the western end of the Valley, cyclists would have

to travel on this one-way road. The road has a narrow shoulder and no bicycle lane. Southside Drive near El Capitan crossover is one-way in the eastbound direction, cyclists traveling to El Capitan or Bridalveil Falls on this road would have to ride against traffic. Further, like Northside Drive, Southside Drive has no striped bike lane. Travel by bicycle in the westbound direction on either Northside or Southside Drive puts cyclists into proximity and conflict with motor vehicle traffic. This discourages cyclists from riding to these areas.

We asked visitors if they thought there were enough bicycle paths going to places where they wanted to go to determine if many cyclists were excluded from taking trips to areas such as the western end of the Valley. Most of the survey respondents agreed with the statement that there were enough bike paths going to places they wanted to go (53%); 37% disagreed with the statement. Responses are summarized in Table 13. If they disagreed, we asked where they would like to see additional bicycle paths. We summarize the results of this open-ended response in Table 14.

The largest category of places people wished they could access by bicycle was the western end of Yosemite Valley. Locations on the western end of the Valley included El Capitan and Bridalveil Falls. The latter was the second most frequently cited destination bicyclists wished to go (14%). Some respondents who wished to visit the west area included both El Capitan and Bridalveil Falls as destinations. The category of Bridalveil Falls was a destination that visitors explicitly stated as where they wanted to go. The differentiation between El Capitan and El Capitan Meadow may be between the meadow to the south of Northside Drive and the base of El Capitan.

Table 13: Response of Adequacy of Bike Trails

There are enough bike paths going to places I to go.	Number	Percent
Agree	111	53
Disagree	78	37
Don't know	21	10
Total	210	100

Table 14: Desired Locations to be Served by Additional Bike Paths

Locations	Number	Percent
West end of Valley	36	72
Bridalveil Falls	7	14
El Capitan	1	2
El Capitan Meadow	1	2
Emerald Pool	1	2
Glacier Point	1	2
Half Dome	1	2
Outside the Valley	1	2
Picnic areas	1	2
Total	50	100

Cyclists who were near the end of their bicycle journey or had already completed bicycle trips in the Valley were more likely to know that destinations in the western end of the Valley were not readily accessible to cyclists. Some knew that the bike path network did not extend in this direction, while others had tried to ride to these locations and encountered difficulties with vehicles or lack of bike lanes.

Finally, 10% of respondents stated they did not know whether there were bike paths going to the places they wished to visit by bicycle. For some, they didn't know due to lack of information about the bicycle path network, others had just begun their bicycle journey. Had this group been asked at the end of their bicycle trip, their opinion about the bicycle paths may have been different.

Bicycle Locking Facilities

The other question about bicycle infrastructure dealt with bicycle locking facilities. Specifically, visitors were asked if they agreed with the following statement, "There are enough places to lock bicycles in Yosemite Valley." Responses are summarized in Table 15. The majority of the respondents (53%) agreed with the statement. But many (27%) stated they did not know.

Table 15: Response to Adequacy of Bike Locking Locations

There are enough places to lock bicycles in Yosemite Valley.	Number	Percent
Agree	112	53
Disagree	42	20
Don't know	53	27
Totals	210	100

Neither the Lodge Bike Stand nor the Curry Bike Stand provide locks when renting bicycles. The salespeople simply tell the renters to leave their bicycle wherever they want without locking them. Therefore, for many of the groups on rental bicycles this question was not applicable. Private bicycles were usually unlocked as well. For residents of urban areas, this may seem quite unusual due to fears they may bring with them of bicycle theft.

The remaining 20% disagreed that there were enough places to lock bicycles. These people were asked where they would like to see more places to lock bikes. Responses to this open-ended question are shown in Table 16. Some of the locations cited as having too few places to lock bikes were Curry Village, currently “crowded locations,” and trail heads. Curry Village, one of the most crowded areas in the Valley, does not have many bike racks or other places to lock bicycles. During peak times, bicycles can be seen littering the paths within Curry Village. Since bicycle theft does not appear to be a large problem in Yosemite Valley, we can also interpret this statement to mean there are not adequate bike stands to store bicycles. Crowded locations may have neither stationary objects to which to lock bicycles nor bicycle parking places. The area around Degnan’s Deli is one such location where the existing bicycle rack is often filled to capacity during the lunch hour. Many bikes are “parked” near the bike rack or in the roped off area adjacent to the paths. In crowded locations people may feel less comfortable about leaving a bicycle unattended and unlocked. With many people around it would be more difficult to spot someone walking away with a bicycle. This fear of theft may also be felt at trailheads. At trailheads, people are gone for longer periods of time while on a day or overnight hike. People may not be comfortable leaving their bicycles for long periods without securing them.

Table 16: Bike Locking Locations

Locations	Count	Percent
Curry Village	6	24
Crowded locations	6	24
Trail heads	5	20
Campsites	2	8
Scenic points	2	8
Degnan's Deli	1	4
Yosemite Village	1	4
Existing racks	1	4
Picnic areas	1	4
Totals	25	100

Comments Regarding Bicycling in Yosemite Valley

We also asked visitors if there was anything else that would make it easier for them to ride bikes or more likely to ride a bike in Yosemite Valley. This was an open-ended question. The results of the responses are summarized in Table 17. Comments generally fell into three categories; comments about the rental bikes, bike paths, and bicycling

information. In total, 37% of the responses commented about the bike paths and bicycle network. Comments about the rental bicycles available at both rental locations accounted for 19 percent of the totals.

The most frequently volunteered suggestion—offered by 21% of respondents—was additional and improved maps and directions for the bicycle paths around the Valley. Many visitors commented that the directions they had for the network were not clear. The only bicycle trail information is a Yosemite Valley Bikeway map that is handed out when visitors rent bicycles. There are no maps located along the routes themselves. Many survey respondents commented they did not know if off-road (unpaved) trails are permitted for bicycle use in the park.

Table 17: Comments About Bike Use

Comments	Count	Percent
Maps, directions	26	21
Pedestrian separated paths	18	14
More paths	11	9
Off road trails	10	8
West Trails	10	8
Free bikes	9	7
No cars	8	6
Geared bikes	7	6
Bike lanes	6	5
Better bikes	5	4
Bike repair facilities	5	4
Bike lockers	4	3
Drinking fountains	2	2
Tandem bikes for rent	2	2
Better paths	1	1
Bike rentals at Visitor Center	1	1
Bike trailers for cars	1	1
Village Visitor Center rentals	1	1
Totals	126	100

Many of the responses dealt with facilities such as pedestrian separated trails—14% of the cyclists favoring such trails. While the bikeway network in Yosemite does not have large enough volumes of cyclists to cause widespread congestion, specific areas of the trail network have both large cyclist and pedestrian traffic volumes. Areas such as the Camp 6 intersection leading to the Village Visitor Center have high pedestrian traffic that is shared on the same paths as bicycles. The bike paths in Yosemite are single lanes per direction with a center line separating traffic in each direction. Pedestrians can either share the path with cyclists or walk in the dirt shoulder. Pedestrian separated paths have

either a striped lane on the same path designated for pedestrians only or a grade separated path with a physical barrier separating the bicycle path from the pedestrian path.

Bicycling information

All visitors traveling to Yosemite can receive travel planning information from a variety of sources. These sources help the visitor to plan their trip and to schedule activities while they are on their vacation. Since many cyclists were riding private bicycles, they had to have formed some prior expectation about cycling in Yosemite Valley.

To determine how Valley visitors receive cycling-related information, we asked them how they first learned of cycling in Yosemite Valley. This question was phrased so as to encourage them to think about the first time they learned about cycling in Yosemite Valley, not to refer to any sources they may have used for this journey. Specifically, we wanted to know what source of information made them aware that cycling was an activity they could participate in while on a journey to Yosemite. Their responses are summarized in Table 18.

The most frequent source of information was observing other bike riders during a previous trip and seeing bicycle rentals in the Valley (57%). Since nearly everyone interviewed had been to Yosemite at least once before, most of the knowledge about bicycling was based upon previous experience in the park. This previous experience came by the visitors' own experience or the experience of others in their group. The second largest category of information (19%) was from hearing about bicycle riding from someone else such as friends or family. Some visitors bring their bicycle everywhere with them, and thus brought their bike with them without prior specific knowledge of cycling in the Valley. This group accounted for 12% of the sample.

Table 18: Sources of Bicycling Information

Information Sources	Count	Percent
Observation of cyclists	106	57
Word of mouth	37	19
Bring bicycle everywhere	23	12
Advertising	19	10
Bike sources	1	1
Totals	186	100

Other information sources included print media, the Yosemite Guide and travel magazines, internet, bicycle-specific information sources, and word of mouth. But even combined, these sources are not commonly cited as direct observation of cyclists in the Valley. Advertising, the Yosemite Guide, and the internet together account for only 10% of responses. Similarly, bicycle-specific sources including bicycle magazines and recommendations from bike shops, only account for 1% of responses.

Most visitors gained knowledge about cycling by actually being in the Valley or relying upon information provided by another party that had been to the Valley. These two

sources accounted for 76% of the total means of information about cycling. First hand experience in the Valley proved more important for learning about bike riding as an activity than any other means of information.

Cyclist Characteristics: How experience level affects use.

Do Cyclists with Previous Experience Bring their Own Bikes or Rent?

As we have seen, Yosemite Valley cyclists are experienced Valley visitors. We expect that the experience level of the visitor affects their travel behavior in Yosemite Valley. Experienced Valley cyclists, who both had prior knowledge of cycling in the Valley and who were cycling in the Valley on this current journey, might be expected to use their own bicycles if they judged any hassle associated with bringing their own bikes to be preferable to the cost or hassle of renting. Since such a visitor knew about cycling, bringing private bicycles to the Valley would save them the cost of rentals and allow them to keep the bicycles overnight, giving them more flexibility in their trip (YCS does not allow visitors to keep rental bicycles overnight). While this may be a reasonable assumption, there are reasons why some experienced Valley visitors would choose to rent a bicycle. These include:

- Visitors traveling in groups with some members who did not own bikes or did not bring them on this trip
- Visitor who did not realize they could ride bicycles in the Valley until their current journey
- Visitors who did not want to travel with their bicycles, but enjoy the convenience of renting bicycles once in the Valley

Since 57% of the groups reported that they had first heard about cycling in Yosemite by seeing bicyclists and/or seeing rental bicycles, some groups may have gained this information during their current journey to Yosemite. We did not ask respondents if the first time they had heard about cycling was on the current journey, however, many of the cyclists were repeat visitors who had not biked in the Valley prior to this journey. Some of the first time visitors may have observed bicycles during this journey and decided to ride bikes as part of this journey to Yosemite. While these visitors who desired to ride bicycles in Yosemite may have only heard about bicycling once they arrived in the Valley, they most likely did not have their own bicycles. Only 12% of the respondents brought their bikes everywhere. These visitors who were first time riders would have to rent bicycle at one of the two Valley rental stands.

Table 19: Ownership by Previous Bicycle Rides shows the split between bikes that are privately owned and those that are rented cross-classified by whether cyclists in the group had ridden bikes in Yosemite Valley on a prior journey to the park. Of the people who had ridden a bike in Yosemite Valley during a prior journey to the park, 61% were riding privately owned bikes. In contrast, only 39% of the respondents who had not biked before in Yosemite were riding privately owned bikes.

Table 19: Ownership by Previous Bicycle Rides

Ownership of bikes Count Column percent	Ridden before in Yosemite Valley?		Row Total Count
	No	Yes	
All Private	40 39	63 61	103
All Rented	57 55	30 29	87
Some rented, some private	6 6	11 11	17
Column Total Count	103	104	207

Test	Chi Square	Prob>ChiSq
Likelihood Ratio	15.186	0.0005
Pearson	14.981	0.0006

The visitors who had not ridden bikes in Yosemite Valley before were most likely to be riding in groups of consisting of only people riding rented bikes (55%). The differences between people who had, and had not, previously ridden bikes in Yosemite Valley are statistically significant. Prior experience riding bikes in Yosemite Valley is associated with a higher likeliness to be riding privately owned bikes.

Reasons for cycling

Visitors were asked the main reason they were riding bikes on this particular bike trip. Some of the possible answers were exercise/fitness, bike is the most convenient way to get around, bike is the quietest way to get around, to travel to activities around the Valley, and bike is the cleanest way to get around. “Exercise/fitness” trips were bike trips that were specifically for gaining physical fitness. “Travel to activities around the Valley” referred specifically to commuting to locations or using the bicycle as a means for travel. An example of this would be using the bicycle to go to the Valley Store from a lodging location. The statement “bike is the most convenient way to get around” referred to using the bicycle as a means to access areas of the Valley not accessible by other modes. This could also mean using the bicycle for trip chaining where another mode might have longer travel times. Vehicle congestion in the Valley during peak times makes the bicycle a time saving alternative to the automobile. Responses are summarized in Table 20.

The most frequent reason to ride was using the bicycle as the most convenient way to get around with 59% of the cyclists choosing this category. Second to this was using the bicycle to travel to activities around the Valley (17%). Both of these categories are using the bicycle as a travel mode within the Valley. These two modes account for 76% for the reasons to ride.

Table 20: Reasons to Ride Bikes

Reason to Ride	Count	Percent
Most convenient way to get around	122	59
To travel to activities	36	17
Exercise/fitness	25	12
Fun	12	6
Quietest mode	5	2
Enjoy scenic views	3	1
Cleanest mode	1	0
Least crowds	1	0
Unable to walk	1	0
Total	206	100

Cyclists Use of Other Travel Modes

To examine cyclists use of other modes of travel in the Valley, cyclists were asked if they had used a shuttle bus at least once during the current journey to Yosemite. Sixty percent of the respondents responded that they had used the shuttle bus system at least once. The proportion of cyclists who report using the shuttle is much higher than the proportion measured for all Valley visitors in another study. In the 1996 YATI survey, only 39% of Valley visitors reported using the shuttle bus system at least once.

Table 21: Shuttle Use

Shuttle use	Count	Percent
No, have not used a shuttle	83	40
Yes, have used a shuttle	125	60
Total	209	100

Bike riders were also asked if they had used, or planned to use, their motor vehicle for travel within the Valley. The majority reported that they had not and would not use their motor vehicle for travel within the Valley.

Table 22: Statement for Vehicle Travel

Statement for vehicle travel	Count	Percent
No, did not drive	8	4
No, will not use motor vehicle	119	57
Yes	82	39
Totals	209	100

For many Valley bicycle riders, their bikes, the Valley shuttle system, and walking may be complementary modes of travel. That is, the three modes may not directly compete with each other, but may be used in concert to accomplish all travel in Yosemite Valley. Many cyclists clearly feel no great need to use their own motor vehicles once they have arrived in the Valley.

Total Number of Bicycle Riders in Yosemite Valley

From our sample and data on YCS bicycle rentals, the total number of bicyclists in Yosemite Valley on any given day during the summer can be estimated. Since the bicycle activity counts reported earlier were not taken for the whole summer, the only counts of bicycles that are taken on a consistent basis are the YCS Bike Rental data.

The estimates of total cyclists are based on these assumptions and definitions.

- The proportion of rental to privately owned bicycles is the same for every month of the summer, as well as weekends and weekdays.
- By definition, groups containing both private and rental bicycles, must have at least one rented bicycle and one private bicycle in the group. Recall that among the interviewed groups, 50% were riding only private bicycles; 42% were riding only rented bicycles; and, 8% of groups had at least one private and one rental bicycle.

The YCS bike rental data for the month of August for the past few years are shown in Table 23. Based on these data, we calculate that on average, 307 bikes were rented from YCS every day during August over the past four years.

Table 23: YCS Monthly Bike Rentals

Year	1996	1997	1998	1999	Average
Total rentals	8,742	9,388	9,267	10,708	9,526

The split for owned versus rented bicycles is for groups, and thus must be converted to individual bikes. Since we do not know the actual split of private and rented bikes in groups containing both, we make two further assumptions which define a low and high boundary. In the first case, we assume that there was exactly one rental bicycle in all groups that have both rental and privately owned bikes. In the second, we assume that there was exactly one private bicycle in those groups. In groups containing both private and rental bikes, the average group size was 4.8; in groups containing only private bikes and in those containing only rental bikes, average group size was 3.1. The calculation of the estimates of total daily bicycles, based on these data and assumptions, are shown in Appendix B.

Under the first assumption, the total number of bicycles in circulation on a summer day is estimated to be 605. Under the second assumption, the estimate is 657. This is not the same as the number of cyclists in the Valley on any given day, since some cyclists may

not ride their bikes everyday. The numbers for the YCS data are the numbers of bicycles rented from both the Yosemite Lodge and Curry Village during their hours of operation (10:00 a.m. to 5:00 p.m. from March through December). As a result the estimates for the total number of cyclists in the Valley represent the number of bicycles in circulation during these hours. Finally, this estimate does not include park employees' bicycles. We were not able to estimate the daily number of employee cyclists at this time. However, based on the employee travel study, we estimate that 330 employees who both live and work in the Valley commute to work by bicycle at least sometimes. Of these, 168 only report cycling to work, the rest sometimes walk or take the Valley shuttle.

Bicycle Movements in Yosemite Valley

Bicycle and pedestrian activity counts were conducted between August 13, 1999 to September 5, 1999. Bicyclists were counted at locations throughout the Valley along major points in the bikeway network. Three types of counts were made.

1. The number of cyclists passing the counter in both the east/west or south/north direction. Depending upon the location, this included not only cyclists on the path, but also those in other areas within sight of the counter. For example, in the Curry Village location, the counters recorded the number of cyclists passing in the northbound and southbound direction, as well as cyclists in the Curry Bike Stand parking lot.
2. Pedestrians passing in both the east/west or south/north direction in “designated” areas. Depending upon the location this also included both pedestrians on the path, and additional areas within sight of the counter.
3. Pedestrians passing in both the east/west or south/north direction in “non-designated” areas. Non-designated areas were typically behind roped or fenced off paths or on locations off the trail. Depending upon the location this also included pedestrians not only on the path, but also within additional areas within sight of the counter.

Per the discussion under “Bicycle Count Locations” in the Introduction, these counts represent either pseudo-traffic counts or the level of activity (LOA) at each of the given locations. Since counts were not taken at all locations on the same days nor during the same time of day at all locations, the best comparison of LOA across locations can be made for the period between 12:00PM to 4:00PM.

Identifying Peak Bicycle Activity Counts

Table 24: Peak 15-Minute Counts shows the highest number of cyclists counted at each one location, that is, the peak of the counts made every 15 minutes. (This table differs from Table 1 in that identical peak counts on the same day at Camp 6 and the time of the peak count are shown in Table 24.) The highest pseudo-traffic count—76 cyclists in 15 minutes—was recorded at the Camp 6 Intersection on August 13 at 12:45PM. The highest LOA count, i.e., the largest number of cyclist at any one place, at any one point in time, was recorded at Curry Village—136 cyclists were counted at 4:45PM on September 4.

Table 24: Peak 15-Minute Counts

Location	Time	Date	Count Type	peak 15 minute count
Administration corner	1:00-1:15	8/13/99	p-t	61
Administration corner	4:30-4:45	8/14/99	p-t	52
Camp6 intersection	12:45-1:00	8/13/99	p-t	76
Camp6 intersection	12:45-1:00	8/14/99	p-t	58
Camp6 intersection (2 nd peak)	2:30-2:45	8/14/99	p-t	58
Curry & Housekeeping Camp	4:15-4:30	8/19/99	p-t	36
Mirror Lake Eastbound	1:00-1:15	8/19/99	p-t	27
Swinging Bridge	12:15-12:30	9/4/99	p-t	31
Swinging Bridge	11:15-11:30	9/5/99	p-t	28
Curry Village	4:45-5:00	9/4/99	LOA	136
Curry Village ¹	11:15-11:30	9/5/99	LOA	60
Mirror Lake East and Westbound	2:30-2:45	8/19/99	LOA	37
Mirror Lake Intersection	12:45-1:00	8/22/99	LOA	53
Visitor Center	1:00-1:15	8/13/99	LOA	50
Visitor Center	12:45-1:00	8/14/99	LOA	62
Visitor Center	11:45-12:00	8/20/99	LOA	64
Visitor Center	12:45-1:00	8/21/99	LOA	72

Note: p-t = pseudo-traffic counts; LOA = level of activity counts. See the section “Types of Counts” in the Introduction for description.

1. Counts for Curry Village on 9/5/99 were made only from 10:00AM to 1:00PM.

For most of the locations, the peak period for cycling traffic or activity occurred at some point between noon and 1:00PM. This corresponds to the lunch hour, when many visitors are on their way to dining locations at Curry Village or Yosemite Village. Some peaks are observed later time in the day, close to 4:00PM. These later peaks may be due to visitors returning rental bicycles to the Curry Bike Stand and the Lodge Bike Stand. Peaks from 4:15PM to 5:00PM were observed at Curry Village and the Curry Village Housekeeping Camp intersection. Another late afternoon peak occurred at Administration Corner from 4:30PM to 4:45PM. In the westbound direction, this path leads to Yosemite Lodge and the Lodge Bike Stand.

Moving One Hour Totals

Pseudo-traffic data was recorded in 15-minute intervals and LOA bicycle counts were made every 15 minutes throughout the data collection period for each location and day. This “15-minute” data shows a high level of variation from count to count. In order to provide a better picture of trends in the level of activity, a moving one-hour average count is generated from all the counts.

Three different measures of these activity counts are plotted in Figure 2—the 15-minute counts, an average calculated by simply averaging over each clock hour (i.e., from 12:00

to 1:00 PM, 1:00 to 2:00 PM, etc.), and a moving hour average. The actual observed maximum and minimum counts can only be observed by looking at the 15-minute counts.

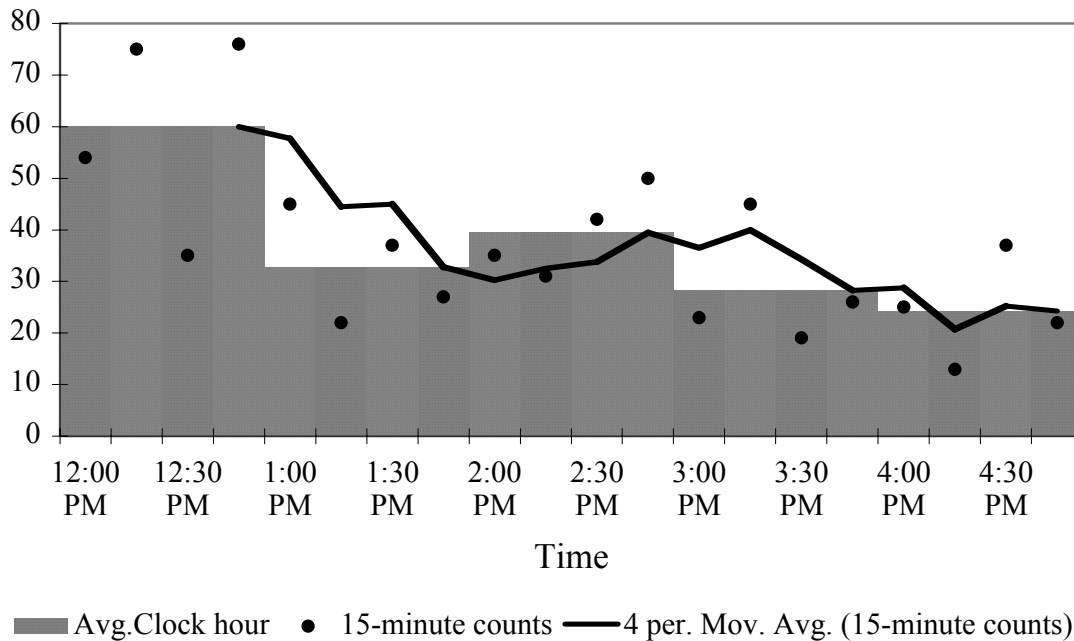


Figure 2: Level of Activity at Camp 6 Intersection, August 13, 1999

The calculations of a moving hour average are summarized in Table 25 for the Camp 6 intersection. The first point of the moving average is calculated by summing the first four 15-minute counts and dividing by four. The second point of the moving average is calculated by dropping the first 15-minute count, adding the next one, and again, dividing by four. Continuing this process, we produce a set of data that always represents the average of one hour of data, but which hour is being averaged is indexed by 15 minutes, not one hour. The 15-minute intervals are numbered consecutively starting at 12:00PM. The “sum time number” corresponds to the period for which the 15-minute counts are summed and averaged. For example, in the fourth row, the sum time 1-4 is the sum of the four 15 minute intervals in the 12:00PM to 1:00PM hour. The total for this time period is shown as 240 bikes, the average is then $240 \div 4 = 60$. For the next time period—12:15PM to 1:15PM—the sum of the 4 15-minute counts starting at 12:15PM are represented by the “sum time number” labeled “2-5.”

But as we noted above, these data are so highly variable, it is difficult to make judgements about trends throughout the day. The moving hour average provides a better picture of the level of activity over the course of time. Thus we can easily see that while the peak activity does occur during the hour ending at 1:00PM, there is another peak in the half-hour ending at 3:15PM.

The moving average (or moving total) is preferred to the simple hour average for two reasons. First, the clock hour averages would only be meaningful if the majority of people in an area where counts were taken were on their way to activities that were

strictly linked to clock time. That is, if most activities in the vicinity of the Camp 6 Intersection could only be accessed at specific times, only then would clock time be most relevant. Second, the moving hour average (or total) allows us to more precisely estimate when peaks (and lows) in the activity counts occur. For example, the moving hour average narrows our measure of the occurrence of the mid-afternoon peak to the half hour ending at 3:15PM, while the simple clock hour averages indicate that the secondary afternoon peak occurs sometime in the hour ending at 3:00PM. In the rest of this section, we will show moving one hour totals rather than moving one hour averages. We chose to show averages in Figure 2 simply because it was easier to illustrate the relationship to the 15-minute counts. We note it is not possible to obtain the total number of cyclists in the Valley using these counts. These data can help to identify busy cycling areas and to assess when peak cycling activity occurred on the dates for which there are data.

Table 25: Calculating Moving 1-Hour Totals, Camp 6 Intersection, August 13, 1999

Time, PM	Time No.	Raw Count	Time numbers summed	Time Period	Moving 1-Hour Count
12:00-12:15	1	54			
12:15-12:30	2	75			
12:30-12:45	3	35			
12:45-1:00	4	76	1-4	12:00-1:00	240
1:00-1:15	5	45	2-5	12:15-1:15	231
1:15-1:30	6	22	3-6	12:30-1:30	178
1:30-1:45	7	37	4-7	12:45-1:45	180
1:45-2:00	8	27	5-8	1:00-2:00	131
2:00-2:15	9	35	6-9	1:15-2:15	121
2:15-2:30	10	31	7-10	1:30-2:30	130
2:30-2:45	11	42	8-11	1:45-2:45	135
2:45-3:00	12	50	9-12	2:00-3:00	158
3:00-3:15	13	23	10-13	2:15-3:15	146
3:15-3:30	14	45	11-14	2:30-3:30	160
3:30-3:45	15	19	12-15	2:45-3:45	137
3:45-4:00	16	26	13-16	3:00-4:00	113
4:00-4:15	17	25	14-17	3:15-4:15	115
4:15-4:30	18	13	15-18	3:30-4:30	83
4:30-4:45	19	37	16-19	3:45-4:45	101
4:45-5:00	20	22	17-20	4:00-5:00	97

Bicycle Pseudo-Traffic and LOA Counts by Location

This section is organized so that locations where pseudo-traffic counts were made are discussed first, then locations where LOA counts were made. We do so because despite

the fact both counts conceptually address the level of bicycling at a location, they measure that activity differently. Further, while we will refer to the sum of four sequential LOA counts as the “one-hour total” or as the “number of cyclists counted over an hour,” it should be made clear that this total is not derived from continuously counting cyclists for one hour, but rather from summing four counts made over the course of one hour. Totals based on continuous counts would certainly be higher.

Administration Corner

Pseudo-traffic counts at the location known as the Administration Building Corner were taken from the south side of the road directly in front of the Park Service Administration Building. Bicyclists were counted in the eastbound direction (traffic going towards the Village) and in the westbound direction (towards Yosemite Falls). Counts were taken on Friday, August 13 and Saturday, August 14. The data are illustrated in Figure 3. (Recall that all count locations are shown on Map 2.) On both days, counting began at 12:00PM and continued until 5:00 PM.

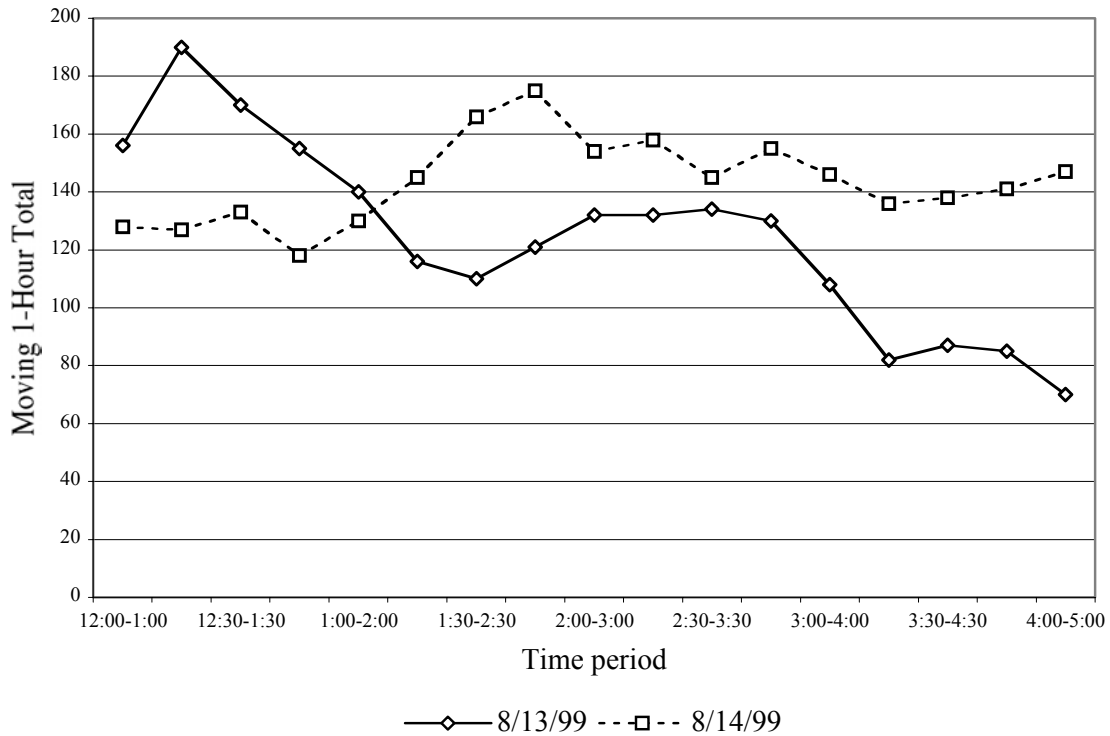


Figure 3: Moving 1-Hour Total, Administration Corner

The observed moving-hour peak on Friday was 190 vehicles per hour. This peak occurred in the hour that ends at 1:15PM. The peak 15-minute count was 61 vehicles. This occurred during the peak moving-hour, between 12:45PM and 1:00PM. Since the counts were not taken prior to 12:00PM it is not possible to see any trends prior to this time, however subsequent counts in nearby locations show peaks near the noon hour. After the peak

hour ending at 1:15PM, the activity counts decline to 110 bicycles for the hour ending at 2:30PM. At this point, the counts rise again to a broad peak of about 130 that lasts from the hour ending at 3:00PM until the hour ending at 4:00PM. From this time, the level of activity generally declines until the counts stop at 5:00PM. During the interval from noon to 4:00PM, the average rate at which bicycles moved passed the counter was 134 bicycles per hour.

Counts taken on Saturday, August 14, 1999 were intended to represent a weekend day. Bicycle pseudo-traffic counts remains fairly constant around the noon hour, then climb to a peak of 175 bicycles per hour for the hour ending at 2:45PM. Later in the afternoon, bicycle traffic remained higher than it had been at the same time on Friday, August 13, 1999. Traffic declined slightly around 4:00PM but climbed again towards 5:00PM. In fact, the peak 15-minute count of 52 vehicles per 15-minutes occurred between 4:30 and 4:45PM. Since the counts ended at 5:00PM, the peak of this late afternoon rise may have occurred even later. Overall, the number of bicycles at this location did not reach as high a peak on Saturday as it did on Friday, but it was uniformly higher for most of the day on Saturday. This is also shown by the fact that the average rate at which bicycles passed the counter was higher on Saturday—140 bicycles per hour.

Camp 6 Intersection

The Camp 6 Intersection is on the same path as the Administration Corner and provides access in both the westbound or eastbound directions to locations such as Yosemite Falls or Sugar Pine Bridge. The bicycle counts for Camp 6 Intersection were conducted in the same location as the bicycle interviews. These counts were taken at the bicycle path across from Camp 6 and Yosemite Village intersection. Counts were taken on both August 13 and 14. However, while counts were made from noon until 5:00 PM on the 13th, there is 15-minute count data only until 4:00 PM on the 14th. The data for both days are illustrated in Figure 4.

The general trend on Friday at the Camp 6 Intersection is similar to the Administration Corner on the same day, showing a peak around the noon hour, a slight increase from 2:45PM to 3:30PM. Differences between the two locations include the following. The number of cyclists passing the counter at the Camp 6 Intersection is higher at every count interval except one than at Administration corner. This results in a higher average count per hour during the interval from noon to 4:00PM. The average was 161 bicycles per hour—higher than at Administration Corner by 30 bicycles per hour. The peak one-hour count occurs fifteen minutes earlier—during the hour ending at 1:00PM. This peak-hour count was 240 bicycles per hour, as compared to 190 at Administration Corner. The peak 15-minute count was also 15 minutes earlier and larger—76 bicycles per 15 minutes during the interval of 12:45 to 1:00PM. The mid-afternoon peak occurred later at the Camp 6 Intersection—during the hour ending at 3:30PM compared to 2:45PM at Administration corner. The count level was much higher at Camp 6 Intersection—150 bicycles per hour, compared to 131.

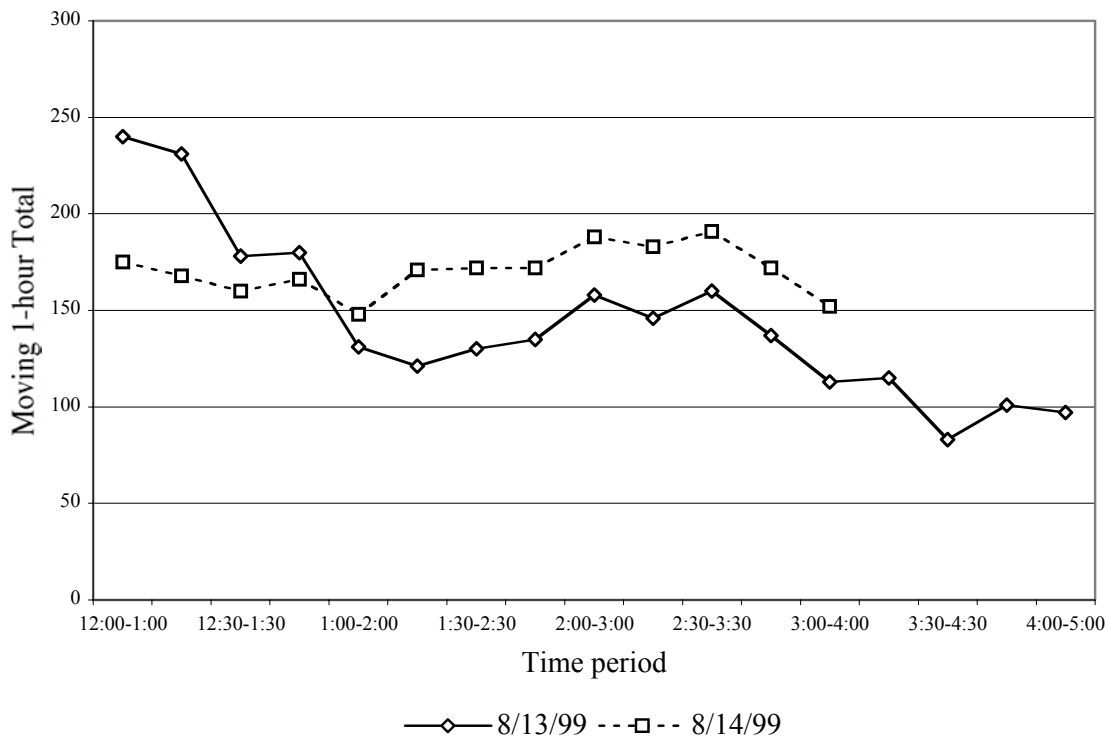


Figure 4: Moving-1 Hour Total, Camp 6 Intersection

The weekend day counts (August 14) for Camp 6 Intersection are considerably different from the weekday counts (August 13). Rather than a peak that occurs at noon, there is a generally high and uniform level of bicycles moving passed the counter throughout the day. What peak there is occurs between the hour ending at 3:00PM and the hour ending at 3:30P.M. The highest one-hour count during this period is 191 bicycles per hour. After this peak, traffic begins to decline towards the end of the observation period. The activity counts stays above 150 cyclists per hour for the majority of the day, and was equal to 166 bicycles per hour during the interval from noon to 4:00PM.

This trend throughout the day is roughly similar to the trends seen at Administration Corner on the same day. And as we saw for Friday, though the trends are similar at the two locations, more cyclists move past the counter at the Camp 6 Intersection than at Administration Corner during every 15-minute interval except one. As expected then, the average count per hour was higher—166 as compared to 140.

Curry and Housekeeping Camp Intersection

The counts for Curry and Housekeeping intersection shown in Figure 5 were taken at the 4-way intersection before Stoneman Bridge between Camp Curry and Housekeeping camp on Southside Drive. Cyclists were counted in both the east and westbound directions. Counts at this location did not start until after 1:00PM, so any earlier peaks that may have occurred near the noon hour were not observed. That is, we cannot be certain that these counts, like those for September 5 at Swinging Bridge we will discuss below,

break a “peak near noon” generalization. We do observe a steady increase throughout the day until counting stopped at 4:45PM. The peak-hour count was 114 cyclists per hour. The average across the interval of 1:00PM to 4:00PM was 88 bicycles per hour.

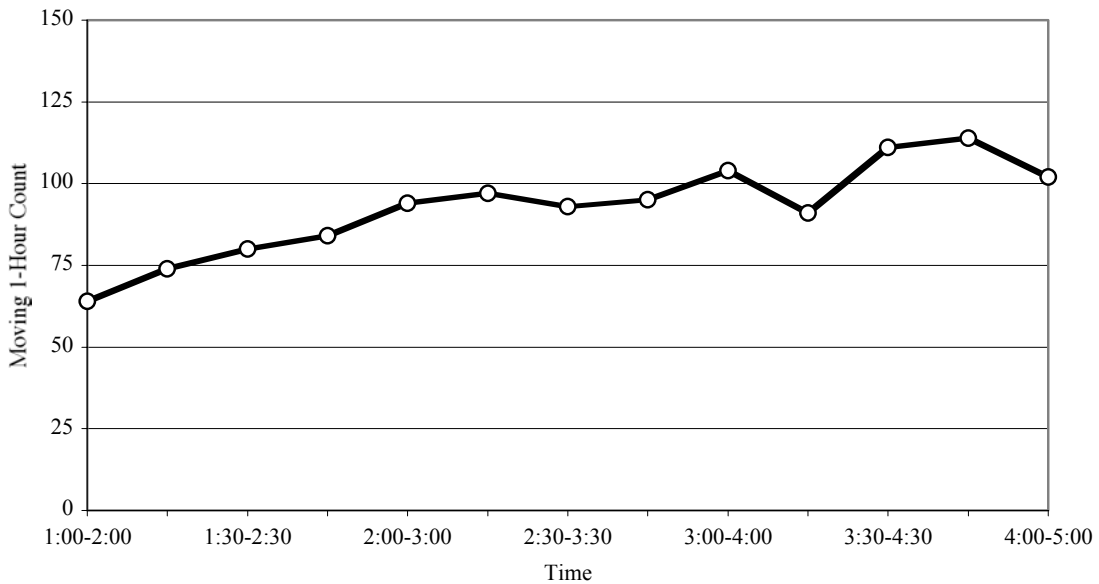


Figure 5: Moving 1-Hour Total Curry and Housekeeping Intersection, 8-19-1999

Mirror Lake (pseudo-traffic counts)

Counts intended to capture the amount of cycling in the Mirror Lake area were made at three different locations on two different days. Further, one of these was a set of pseudo-traffic counts, the other two were LOA counts. We will discuss the pseudo-traffic counts here and return to the LOA counts below.

The counts for Mirror Lake in Figure 6 include only bicycles moving past a counter on the east-west trail leading to Mirror Lake. These counts are the closest to actual traffic counts as they are only of bicycles moving eastbound on this trail to Mirror Lake. This however makes them difficult to compare to the other pseudo-traffic counts and even more difficult to compare to the LOA counts. Additionally, these counts were taken only from 1:00PM to 5:00PM. So that as was the case with the Curry and Housekeeping counts, we cannot be sure whether the “peak near noon” generalization holds at this location.

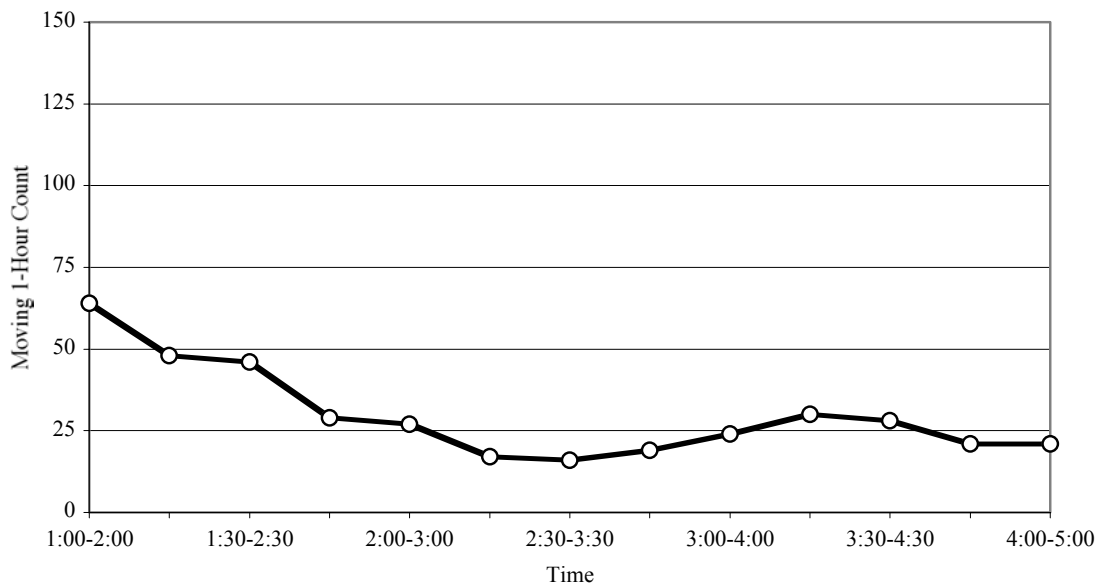


Figure 6: Moving 1-Hour Total to Mirror Lake, 8-19-1999

The data starts at its high point in the first hour, which ends at 2:0PM. The peak count was 64 bicycles per hour. The peak 15-minute count, which occurs during this hour, was 27 bicycles. The number of cyclists per hour then declines throughout the afternoon, albeit with a slight rise around 4:00PM. The average across the interval of 1:00PM to 4:00PM was 34 bicycles per hour.

Swinging Bridge

The counts for Swinging Bridge were made on September 4 and 5. These days were the Saturday and Sunday of the Labor Day weekend. These counts were made on the same days the cyclist interviews were conducted at this location. The pseudo-traffic count data for both days are shown Figure 7. On Saturday the 4th, there is a peak of 73 bicycles per hour during the hour ending at 1:15PM, another lesser peak during the middle of the afternoon, and a small increase near 5:00PM. The peak 15-minute count of 31 bicycles per 15 minutes occurs during the peak one-hour count, between 1:00PM and 1:15PM. Bicycles passed the counter at an average rate of 54 bicycles per hour for the period from noon to 4:00PM.

The counts for Sunday, September 5 at Swinging Bridge are the first to question the general pattern of a peak near the noon hour. Rather than a distinct peak near noon, the bicycle activity counts show a generally upward trend all day. The peak hour is the hour ending at 4:45, during which 91 bicycles passed the counter. This is also one of the few locations where the peak 15-minute count did not occur during the peak hour. The peak 15-minute count (28 bicycles per 15 minutes) was recorded between 11:15 and 11:30AM. The counts for Sunday are generally higher than the Saturday counts. The afternoon average is 61 bicycles per hour, compared to 54 on Saturday. In this last sense, the number of bicycles passing the counter at Swinging Bridge mimics the trends in the pseudo-traffic counts at the Administration Corner, Camp 6 Intersection, and the LOA

counts at the Village Visitor Center. This pattern is one in which one day has distinct noon and mid-afternoon peaks, and the next day has uniformly high activity. The difference between Swinging Bridge and other locations is that both days at Swinging Bridge are weekend days, not a Friday and a Saturday.

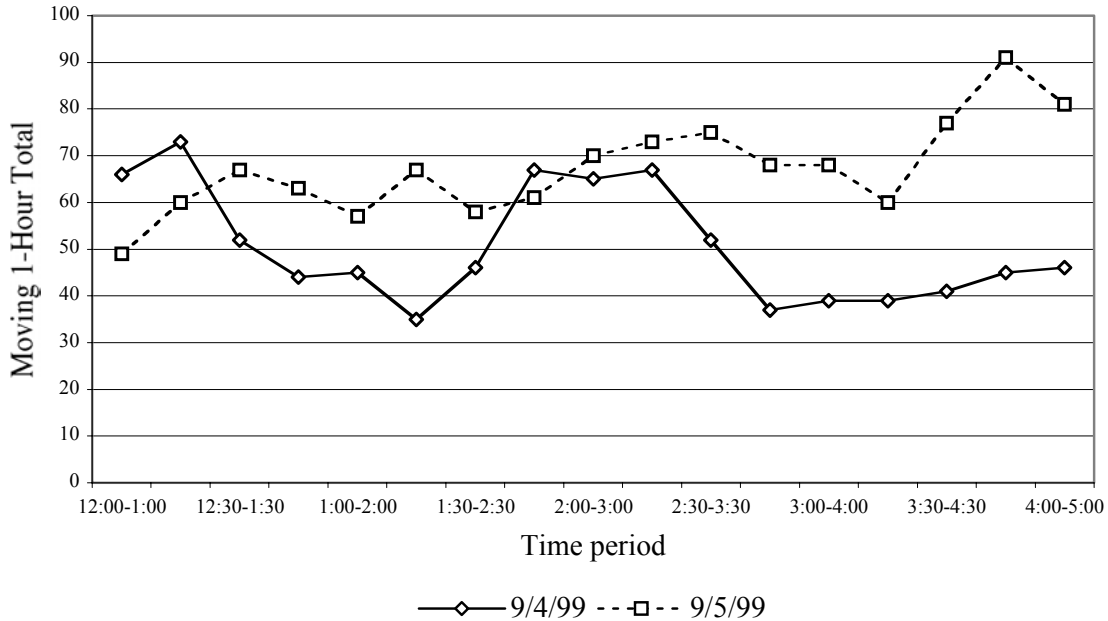


Figure 7: Moving 1-Hour Total Swinging Bridge, 9-4-1999 and 9-5-99

Village Visitor Center

We now move on to those locations where LOA counts were made at the Village Visitor Center during two different two-day periods—August 13 and 14, and August 20 and 21. The bicycle activity counts for the area in front of the Village Visitor Center on August 13 and 14 are illustrated in Figure 8; the data for August 20 and 21 are shown in Figure 9.

The Village Visitor Center path is much smaller than at the other locations and it is less of a thoroughfare. The specific places cyclists can most easily access along this path are the Village Visitor Center, The Ansel Adams Gallery, the Wilderness Center, and the Post Office.

The LOA counts at this location on Friday, August 13 show slightly different trends in cycling activity than indicated by the pseudo-traffic counts at the Administration Corner and Camp 6 Intersection on the same day. While the peak number of cyclists in the area in front of the Village Visitor Center is recorded in the hour ending at 1:30PM, there is no mid-afternoon peak. A total of 188 cyclists were recorded during the four counts taken during the peak hour. The peak 15-minute count of 50 cyclists was recorded during this hour. Activity counts steadily decline after the peak such that from about 3:00PM the

counts are steady at a level of 25 to 30 bicycles at each count. The average number of bicyclists counted every 15 minutes during the interval of noon to 4:00PM was 88.

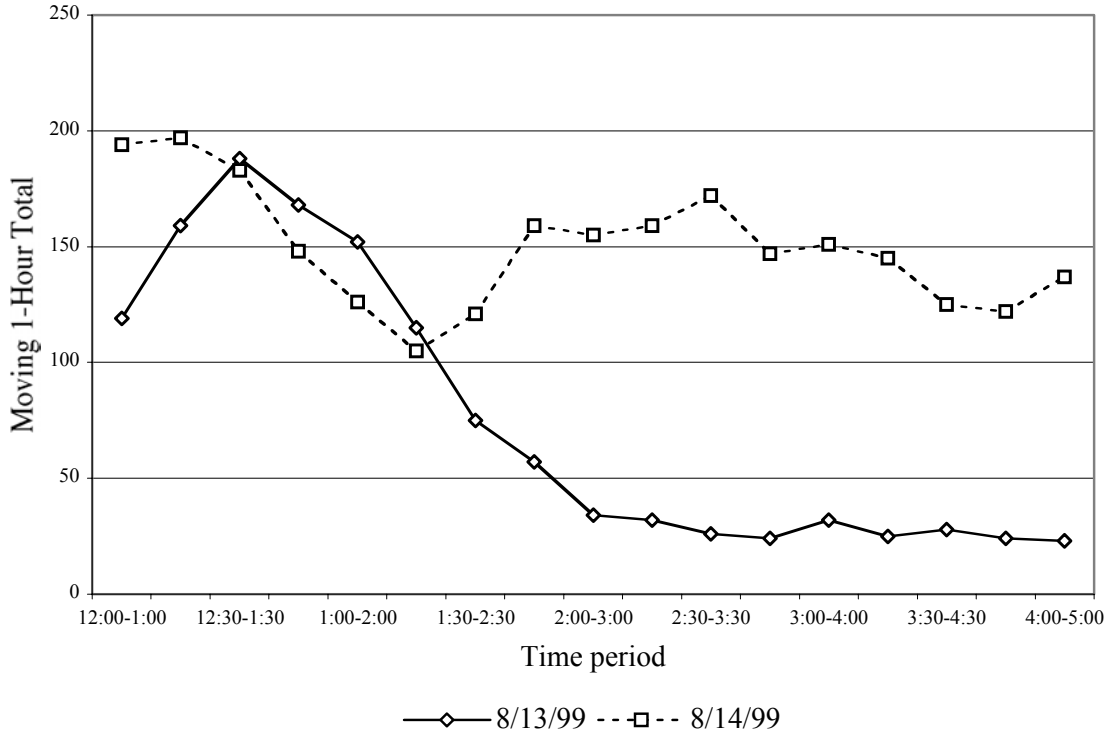


Figure 8: Moving 1-Hour Total Village Visitor Center, 8-13-1999 and 8-14-99

The August 14 LOA counts for the Village Visitor Center shows a peak count of nearly 215 in the hour ending at 1:15PM. Counts then decline sharply (to about half the peak level). The low point occurs during the hour ending at 2:15PM. Then activity rises to a broad afternoon peak. Bicycle activity counts stay between 150 and 170 from the hour ending at 2:45PM to the hour ending at 4:15PM. Except for the early afternoon decrease in activity, the overall pattern is similar to that seen at Administration Corner and the Camp 6 Intersection in that the counts made on Saturday tend to show a generally high, sustained level of activity as compared to Friday. The peak count is higher on Saturday (197 bicycles counted across four occasions in one hour compared to 188), as is the hourly average across the interval of noon to 4:00pm (162 compared to 88).

The counts for the Village Visitor Center on Friday, August 20 (Figure 9) are different from the counts one week earlier at the same location. There is a peak near noon, but the peak on the 20th is not pronounced compared to activity throughout the rest of the afternoon. This peak may not be as pronounced in part because the peak 15 minute count of 64 cyclists, recorded during the interval of 11:45AM to noon, does not occur during the peak hour. The peak hour count of 172 occurs during the hour ending at 1:00PM. Though there is a less distinctive noon peak, bicycle activity in the vicinity of the Village Visitor Center on Friday, August 20 is generally higher than on the previous Friday. The average of the counts made from noon to 4:00PM on the 20th is 151, compared to 88 on the 13th.

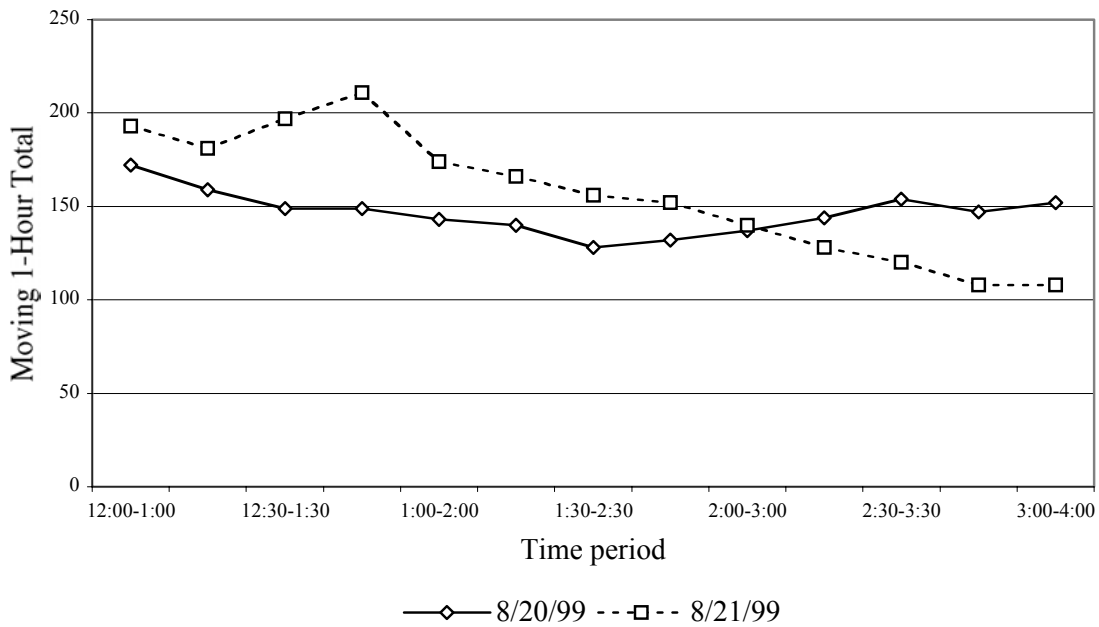


Figure 9: Moving 1-Hour Total Village Visitor Center, 8-20-1999 and 8-21-99

The counts for Saturday, August, 21 are also dissimilar to those from the previous Saturday. The peak hour on the 21st occurred during the hour ending at 1:45PM (211 cyclists) after which activity steady declined until counting stopped at 3:45PM. That is, on the 21st, the number of cyclists in the area in front of the Village Visitor Center was peaking at about the same time the count was decreasing from a noon peak on the 14th. After the early afternoon peak on the 21st, cyclist activity declined throughout the rest of the afternoon, showing no signs of the broad mid-afternoon peak seen the previous Saturday. The average LOA was slightly lower on the 20th than on the 14th (154 compared to 166). The highest single 15-minute count at the Village Visitor Center—72 cyclists—was recorded on this day in the interval from 12:45 to 1:00PM.

Mirror Lake (LOA counts)

The bicycle activity counts intended to represent weekend activity at the Mirror Lake Intersection were taken on Sunday, August 22. Counts were taken at the intersection of the paths leading eastbound to Mirror Lake, westbound to Sugar Pine Bridge, north-east to Mirror Lake, and south to Curry Village. This location is a popular destination for bicyclists and pedestrians. The moving hour counts are illustrated in Figure 10. There is a broad peak in the bicycle activity counts—at about 140 cyclists—during the time from the hour ending at 1:15PM to the hour ending at 1:45PM. After this, bicycle activity steadily declines throughout the afternoon.

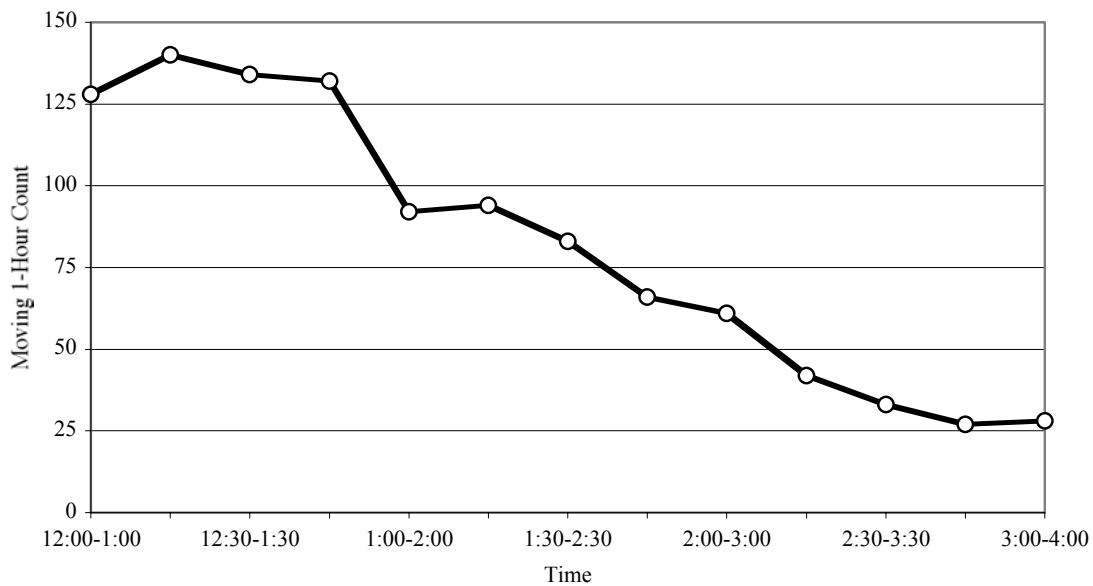


Figure 10: Moving 1-Hour Total Mirror Lake Intersection, 8-22-1999

The peak 15-minute count of 53 cyclists was recorded during the interval of 12:45 to 1:00PM. This is during the peak hour. The average number of cyclists counted per hour during the interval of noon to 4:00PM was 77.

The activity counts shown in Figure 11 are of cyclists on the east-west pedestrian/bike trail leading to Mirror Lake. Activity counts are lower here due to traffic only counted in one direction. Though these counts were made near the same location as the counts shown in above in Figure 6, the data are not comparable. The data in Figure 11 include cyclists moving in both directions (and possibly even some who were not moving at all) and are counts of all cyclists within a proscribed viewing area at one time, not the number moving past a point.

The counts show a moving 1-hour peak of 121 during the hour ending at 2:45PM. The peak 15-minute count of 37 cyclists occurs at the end of this hour too. Since counts at this location did not start until 1:00PM, a higher peak might have occurred much earlier, as seen at most other locations. From the mid-afternoon peak, activity decreases throughout the day, but with a small increase in the hour ending at 4:15PM. Across the shortened afternoon interval of 1:00PM (rather than noon) to 4:00PM, the average hourly total was 60 cyclists.

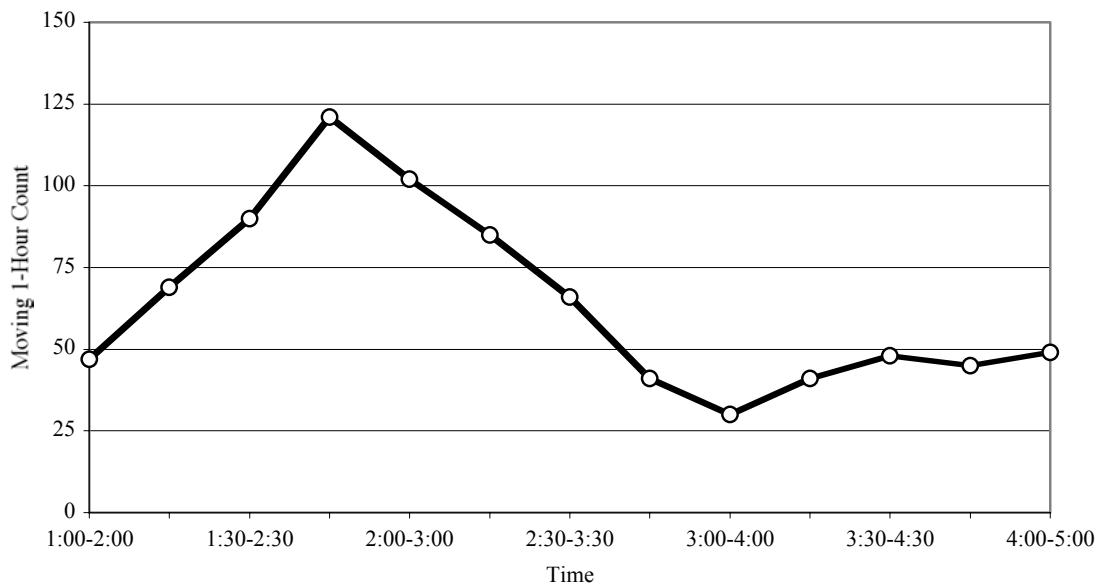


Figure 11: Moving 1-Hour Total Mirror Lake East- and Westbound, 8-19-1999

Curry Village

The LOA counts at Curry Village were taken in front of the Curry Bike Stand. Counts included cyclists on both the north-south route, as well as bike riders in the parking lot in front of the bicycle rental stand. These data are illustrated in Figure 12. Similar to other areas, a large peak occurs near noon, in this case, during the hour ending at 1:15PM. The total of the four counts in this hour was 256 cyclists. A mid-afternoon moving 1-hour peak of about 210 was recorded during the hour ending at 3:00PM. There is another peak, nearly as large as the mid-day peak, at the end of the count period. The later peak may be due to visitors returning rental bikes at this time since the Curry Bike Stand closes at 5:00PM and bicycles cannot be kept overnight. In fact the single largest 15-minute LOA count was recorded here at the end of the day. This count, equal to 136, is larger than any other single count anywhere by a factor of nearly 2. The next largest 1-hour total was 72, recorded at the Village Visitor Center on Saturday, August 21. This location was also the busiest, on average, throughout the afternoon period. The one-hour average was 176 cyclists in the area around the bike rental stand or on the north-south trail near the stand throughout the period from noon to 4:00PM.

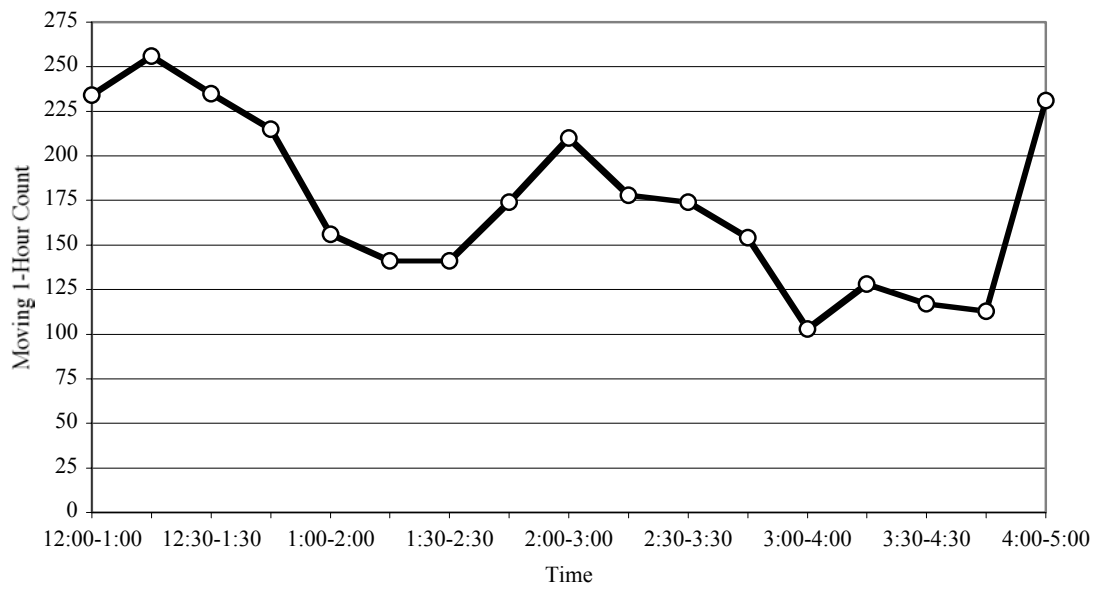


Figure 12: Moving 1-Hour Total Curry Village, 9-4-1999

Conclusions

Who are Cyclists in Yosemite Valley?

Yosemite bicycle riders are experienced Yosemite Valley visitors. Yosemite Valley bicycle riders are experienced Yosemite visitors. Only 10% were either first time visitors or had been to Yosemite only once before. The median number of previous visits was 7. These trips represent the maximum number of prior journeys to Yosemite Valley by anyone in the group, whether that person was on the specific bike trip during which the interview was conducted or not. Despite the high number of cyclists who had made previous journeys to Yosemite Valley, when asked if anyone in their group had previously cycled in Yosemite Valley, only 50% said yes.

Cyclists are more likely than not to be staying overnight in Yosemite Valley. They also appear to be more likely to stay in Yosemite Valley than are more general samples of visitors to the park. About half of cyclists in the Valley rent bikes at one of the two YCS-operated bike rental facilities. The other half bring their own bikes. It is of some interest that bring one's own bike or renting a bike very nearly divides cyclists into two exclusive groups. Only 8% of the groups of cyclists interviewed contained some people riding their own bikes and some people riding rented bikes. Half the groups were made up solely of people riding their own bicycles; 42% of groups were made up solely of people riding rented bicycles.

In many other ways, the sample of cyclists in the Valley appears similar to more general samples of visitors to the Valley. Like other visitors, cyclists tend to have high incomes. They are most likely to be traveling in groups of 2 to 4 people. They are neither more nor less likely to be traveling with children than are visitors in general.

Cycling in the Valley is an activity in which cyclists include children—44% of the interviewees had journeyed to Yosemite Valley in a group which contained children, and 98% of these interviewees had children in the group of cyclists that was interviewed.

Foreign visitors were under-represented in the cyclist sample compared to other more general samples. This might be because all interviews were conducted in English (and all approaches for interviews were in English). However, it may be that foreign visitors are participating in cycling on *rented* bicycles at the same rate as U.S. residents, but are not at all likely to bring their own bikes with them. Among those groups riding solely on rented bicycles, 19% were represented by a foreign visitor, 68% by a California resident, and 13% by a non-Californian, U.S. resident. In particular, the 19% foreign visitor percentage matches other data on automobile-based, summer-time visitors to Yosemite National Park.

This hypothesis is also supported by the fact that among U.S. residents, cyclists were more likely to be California residents than we would estimate from other studies of Valley visitors. Opportunity, represented by the relatively lower level of hassle involved in bringing bikes for a weekend trip rather than a cross-country journey, may mean that many of the cyclists who ride their own bikes are California residents. Of all interviewees who were California residents, 63% were riding in groups either of people riding solely

their own bikes or some privately owned and some rented bikes. In contrast, only 43% of interviewees who were not California residents were riding in either such group.

In keeping with the observation above that cyclists tended to travel to Yosemite in groups of at least two people, cycling in the Valley is typically not a solitary activity—only 6% of interview subjects were cycling alone. Median size of the groups who were intercepted to be interviewed was 3; mean group size was 4.4. The most typical group consisted of two adults cycling together (45%), but nearly as many groups consisted of two adults and children of varying ages (40%). These latter groups are typically immediate families.

Where do Cyclists get Information about Cycling in the Valley?

Personal experience from previous visits or word-of-mouth from other Valley visitors provides valuable knowledge to planning activities and travel while in Yosemite Valley. Despite the many different means for advertising bicycles in the Valley, such as print media including the Yosemite Guide, the majority of visitors learn about bicycling in the Valley through direct observation of cyclists during a journey to Yosemite National Park.

To Where do Cyclists Ride, and To Where do They Want to Ride?

Many of the popular locations that cyclists visited by bicycle are the same as the locations visited by the general visitor population. For example, Yosemite Village and the Village Visitor Center were the most frequently cited destinations that cyclists said they would be traveling to on bicycle. Sixty-one percent of cyclists said they had, or would be traveling to these locations by bike. However, there are some locations popular with cyclists that are only accessible by walking or cycling, and therefore not visited by automobile or shuttle based visitors. For example, Mirror Lake (58%) and Happy Isles (46%) were the next most frequently visited destinations of cyclists.

While most cyclists cite few complaints with the number of places available to lock bicycles (with the exception perhaps of those who wish to secure their bikes at trailheads), many cyclists indicated a desire for increased bicycle trails and paths. Over a third of cyclists disagreed with the statement “There are enough bike paths going to places I to go.” When asked where they would like additional paths to go, most replied they would like to be able to ride to mid-Valley and the western end of the Valley in general, or cited specific locations such as El Capitan Meadow and Bridalveil Falls located in the mid- and west-Valley areas.

Cycling and other Travel Modes in the Valley

A much higher percentage of people who cycle in the Valley also ride the Valley shuttle bus than reported by other studies of Valley visitors. While 60% of the cyclists interviewed said they had, or would, ride the shuttle at least once, other studies report that as low as 39% of Valley visitors in general will do so. Also, many cyclists report that once they have arrived in the Valley and parked their motor vehicle, they will not use it again until they depart the Valley,

Since many groups of cyclists did not use their motor vehicle for travel while in Yosemite Valley, walking, cycling and riding the shuttle appear to serve as many cyclists means of in-Valley transportation. The obstacles that cyclists in urban areas face when

attempting to use bicycles as a mode of transportation can be overcome in Yosemite Valley. In fact, on a typically busy summer day in the Valley, a bicycle can be the fastest, most convenient way to get around. Motor vehicle traffic congestion occurs more often during the summer months. It is also during the summer months when the weather is warm and pleasant for bicycle riding. The flat terrain of the Valley also makes bicycling easy for many people of varying ability levels. Yosemite Valley also has a dedicated bikeway system that covers a large portion of the Valley. Distances to locations within the seven mile long by one mile wide Valley are short, allowing short travel times to destinations.

The ease of cycling in the Valley makes the bicycle a viable mode of transportation for summertime park visitors. Rather than view the bicycle as a recreational activity, the bicycle could be observed as an integral part of the Valley transportation system, providing a complement to the shuttle bus system.

How many Cyclists are in the Valley on a Typical Summer Day?

We estimate there are 600 to 650 visitors riding bicycles on a typical day in August. This estimate does not include employees on bicycles. Nor is it strictly speaking a count of all the people in the Valley at any point in time who have ridden, or will ride, a bike during their journey to the park. Since not all visitors ride bikes everyday of their visit, the proportion of people who cycle will be higher than would be calculated by comparing our estimate to the total number of Valley visitors on any given day.

Not only does the bicycle provide a means of transportation for the park visitor but also for the many NPS, YCS, and park partners who work in Yosemite Valley. Of the total number of employees who both live and work in Yosemite Valley, 23% ride bicycles to work at least sometimes, and 17% only cycle to work (Kurani, Turrentine and Co, 2000). This amounts to another 170 to 270 cyclists per day.

Estimating Levels of Cycling Activity

Ignoring for now differences between pseudo-traffic counts and LOA counts, we address only the underlying concept of both—what is the level of cycling activity throughout the day at locations throughout the Valley. Counts of bicyclist activity reveal several similar trends at a variety of locations and dates. Of the sixteen sets of counts, 10 show a distinct peak at, or near, noon. Half of the counts show a second, typically smaller peak, in the mid-afternoon. However, only 6 of the count location/dates show both the noon and mid-afternoon peak. These increases in cycling activity near noon may be due to cyclists seeking lunch—either as a sole destination, or as one of a series of stops in a longer bike trip. The mid-afternoon peak typically occurs between the hour ending at 2:45PM and the hour ending at 3:30PM. The latest peak was recorded at the Curry Village site at 5:00PM. This most likely corresponds to renters returning their bikes to the rental stand located near the count location.

Two of the sets of counts which did not show distinct noon-hour or mid-afternoon were taken on the same Saturday at locations along the same bike path—Camp 6 intersection and the Administration Building intersection. These counts show uniformly high counts through out the count period (noon to 4:00PM at one location, noon to 5:00PM at the

other). Both sets of counts are higher on Saturday than on Friday, with the exception of the noon hour peak on Friday.

We have speculated that on days of high visitation, bicycle activity is uniformly high throughout the day, while on days of lower visitation, distinct peaks in bicycle activity can be observed near noon and during the mid-afternoon at many locations. Confirming this speculation, and establishing its significance will require more, and different, counts. We turn to future research directions next.

Recommendations for Further Research

Bicycle rental behavior

Regarding cyclists themselves, it may be of interest, to the concessioner in particular, to know the incidence of repeat bike rentals across several different journeys to Yosemite Valley. That is, our data suggests that once visitors learn about cycling in the Valley, they are likely to bring their own bikes on subsequent journeys rather than rent bicycles once they arrive.

Supplementing Pseudo-traffic and LOA Counts with Traditional Traffic Counts

While the bicycle counts collected during the summer of 1999 give us a measure of the level of cycling activity at various locations, these counts may not be representative of the LOA for typically busy summer days (or for any other day). Counts were taken only once or twice per location. In addition, while the counts were conducted at locations of observed high bicycle activity, activity at a number of other areas was not counted. “Weekday” counts were made on a Friday, but Fridays may not give an accurate representation of weekday travel behavior. Some vacation trips may begin on a Friday so visitors can enjoy three consecutive days for the weekend. To accurately observe weekday counts, Tuesday through Thursday days may be more appropriate. In addition some of the counts were taken during the Labor Day weekend which is typically a high visitation weekend, and therefor may not be characteristic of a “typical” summer day.

In order to get a better picture of the bicycle movements in the Valley, we would recommend the following additions and changes to the activity counts:

- Counts at a wider variety of locations including Ahwanee Bridge, the path south of Southside Drive past the Chapel, and any extension to mid-Valley or the western end
- Counts on more occasions at the locations at the locations counts were made in 1999
- Counts during consistent time periods across locations and days
- Counts should to be taken for longer period each day. Specifically, the count period should begin prior to noon, and extend past 5PM
- Counts should be made on “true” weekdays, such as Tuesday or Wednesday.

Further, it may not be necessary to conduct actual traffic flow counts (rather than pseudo-traffic or LOA counts) at all locations, but certain busy places, such as the Camp 6 intersection, could be characterized better if continuous and directional traffic counts were made. Infrastructure improvements, suggestions for routes, and other cycling related

actions may well hinge on not simply how many cyclists are in an area, but whether most are headed in one direction or the other.

Cyclists Travel Modes

We know that Valley cyclists had a higher shuttle ridership than the general population of Valley visitors. In addition, 57% of cyclists interviewed said they did not use or plan to use their motor vehicle for travel within the park. Despite these statistics, it is difficult to determine if Valley cyclists are using the bicycle as a replacement for another mode. That is, it is difficult to determine to what extent bike trips are an activity undertaken for their own sake, or whether bicycles simply substitute for walking, riding a shuttle bus, or driving to locations the visitors wished to visit. Fifty-nine percent of Valley visitors reported that the bicycle was the most convenient way to get around the Valley. Yet, in the interview it was difficult to distinguish between recreation trips and trips to accomplish non-recreation purposes.

Seasonal Variation in Cycling

All data in this report was collected during summer months. If cycling is perceived to be an important activity—either as recreation or transportation—it would be desirable to characterize cycling and cyclists at different times of the year. Based on apparent relationships between visitors' residences and the likeliness they bring their own cycles, and seasonal patterns in visitors' residences, it may be that a higher percentage of cyclists ride their own bikes during non-summer seasons. If the primary motivation for cycling is convenience and speed, then the percentage of cyclists should drop during the cooler, wetter non-summer seasons since vehicle traffic is lower. The destinations cyclists wish to reach may also change seasonally.

Comprehensive Study of Travel Behavior—Travel Diaries

Longer, more detailed interviews or surveys might be possible if alternative sampling frames were considered. In particular, travel diaries of Valley visitors would give a clearer picture of the actual travel patterns and incorporate the bicycle as a mode of travel in relation to the other modes that the visitor uses while in the Valley. Detailed information such as the purpose, location, and duration of the trip could be taken from the diaries. Information on trip chaining on bicycles could determine how the bicycle is used in relation to other modes of travel. Alternative sampling frames could also address visitors who were not riding bicycles, to ascertain reasons why some people do not cycle and what, if anything could be done to encourage them.

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Appendix A Bike Rider Interview Form



YOSEMITE VALLEY VISITOR SURVEY—BICYCLE RIDERS



Introduction: “Hi, my name is _____. I am conducting a survey for the University of California, Merced to better understand bicycle use in Yosemite Valley. Can you spend a few minutes to answer a few questions about bicycling during your visit here? I need one person to volunteer to be interviewed.”

If YES, “Thank you” (continue with survey)

If NO, “Thank you and enjoy the rest of your visit.”

Observed data

Record observed data for all groups that are approached for an interview, even if interview is refused. Interview begins with question 7.

Interview Location: _____

Interview start time (day, Hour:minute AM/PM) _____

1. Number of people in group. .

2. Children present. ₀ No ₁ Yes

3. Rental or private bikes.

- ₁ Rented
- ₂ Private (owned or borrowed)
- ₃ Some rented, some private

4. Type of bikes. (Check all that apply.)

- ₁ Road bike
- ₂ Mountain bike
- ₃ Cruiser (single gear)
- ₄ Tandem

5. Helmets for all riders?

- ₀ No
- ₁ Yes

6. Equipment on one or more bikes. (Check all that apply.)

- ₁ Racks
- ₂ Panniers
- ₃ Reflectors
- ₄ Lights
- ₅ Trailer
- ₆ Other: _____

Lodging

7. Are you staying overnight in Yosemite Valley during this trip to Yosemite National Park?

- ₀ No (Skip to question 10. For question 10, number of nights = 0.)

1 Yes (Continue with question 8.)

8. Where are you staying overnight in Yosemite Valley? (See Yosemite Valley map.)

Location: _____

9. In what type of lodging facility are you staying while in Yosemite Valley?

- 1 Campground, with or without a tent 2 Tent cabin
3 Lodge/hotel room 4 RV, trailer, or camper

10. When this trip to Yosemite National Park is over, how many days and nights will you have spent in Yosemite Valley during this trip?

Days _____ Nights _____ 99 Don't know

Travel to, and in, Yosemite Valley and Yosemite National Park

11. How did you travel to Yosemite Valley?

- 1 transit bus (VIA) 2 charter or tour bus
3 train and bus (Amtrak and VIA) 4 rented motor vehicle
5 personal motor vehicle 6 other: _____

12. Including this trip, what is the largest number of times that anyone in your group has visited Yosemite Valley?

Visited Yosemite Valley _____ times.

Bicycle Use

13. Has any one in this group ridden a bike in Yosemite Valley before this trip?

- 0 No.
1 Yes

14. How did you first hear about bike riding in Yosemite Valley? (Check all that apply.)

- 1 I heard from friends or family 2 I read about it in travel magazines
3 I heard from a bike shop 4 I read about it in bike magazines
5 From information off the internet 6 I saw bike rentals in Yosemite Valley
7 Saw others ride bikes here during a previous trip 8 The Yosemite Guide
9 I bring my bike everywhere. 10 Other: _____

15. What is the main reason you ride bicycles in Yosemite Valley? (Check one only.)

- | | |
|--|--|
| <input type="checkbox"/> 1 For exercise/fitness | <input type="checkbox"/> 2 To travel to activities around the Valley |
| <input type="checkbox"/> 3 Bike is most convenient way to get around | <input type="checkbox"/> 4 Bike is cleanest way to get around |
| <input type="checkbox"/> 5 Bike is quietest way to get around | <input type="checkbox"/> 6 Other: |
-

16. Where did you start this bike trip?

- | | |
|---|-----------------------------------|
| <input type="checkbox"/> 1 Our lodging/camping location | <input type="checkbox"/> 5 Other: |
| <input type="checkbox"/> 2 Bike rental facility at Curry Village | |
| <input type="checkbox"/> 3 Bike rental facility at Yosemite Lodge | |
| <input type="checkbox"/> 4 From where our vehicle is parked. | |
| If vehicle, where is your vehicle parked? | |
-

17. Where all are you going during this bike trip? (Check all the places they are going or have been on this trip. Show Yosemite Valley map. Probe for more than one destination.)

- | | |
|--|---|
| <input type="checkbox"/> 1 Yosemite Village and Visitor Center | <input type="checkbox"/> 2 Yosemite Falls |
| <input type="checkbox"/> 3 Happy Isles | <input type="checkbox"/> 4 Upper Pines Campground |
| <input type="checkbox"/> 5 Curry Village | <input type="checkbox"/> 6 The Ahwahnee |
| <input type="checkbox"/> 7 Yosemite Lodge | <input type="checkbox"/> 8 El Capitan Meadow |
| <input type="checkbox"/> 9 Lower Pines Campground | <input type="checkbox"/> 10 Mirror Lake |
| <input type="checkbox"/> 11 Sunnyside campground | <input type="checkbox"/> 12 North Pines |
| <input type="checkbox"/> 13 Housekeeping Camp | <input type="checkbox"/> 14 Other: |
-

18. What are all the places in Yosemite Valley you have been already on your bikes during this entire trip to Yosemite National Park (not including the bike trip you are now taking)? (Show Yosemite Valley map.)

- | | |
|--|---|
| <input type="checkbox"/> 1 Yosemite Village and Visitor Center | <input type="checkbox"/> 2 Yosemite Falls |
| <input type="checkbox"/> 3 Happy Isles | <input type="checkbox"/> 4 Upper Pines Campground |
| <input type="checkbox"/> 5 Curry Village | <input type="checkbox"/> 6 The Ahwahnee |
| <input type="checkbox"/> 7 Yosemite Lodge | <input type="checkbox"/> 8 El Capitan Meadow |
| <input type="checkbox"/> 9 Lower Pines Campground | <input type="checkbox"/> 10 Mirror Lake |
| <input type="checkbox"/> 11 Sunnyside campground | <input type="checkbox"/> 12 North Pines |
| <input type="checkbox"/> 13 Housekeeping Camp | <input type="checkbox"/> 14 Other: |
| <input type="checkbox"/> 15 No other bike trips | |
-

19. What are all the places in Yosemite Valley you may still go on your bicycle during your entire visit (not including the trip you are now taking)? (Show Yosemite Valley map.)

- | | |
|--|---|
| <input type="checkbox"/> 1 Yosemite Village and Visitor Center | <input type="checkbox"/> 2 Yosemite Falls |
| <input type="checkbox"/> 3 Happy Isles | <input type="checkbox"/> 4 Upper Pines Campground |
| <input type="checkbox"/> 5 Curry Village | <input type="checkbox"/> 6 The Ahwahnee |
| <input type="checkbox"/> 7 Yosemite Lodge | <input type="checkbox"/> 8 El Capitan Meadow |
| <input type="checkbox"/> 9 Lower Pines Campground | <input type="checkbox"/> 10 Mirror Lake |
| <input type="checkbox"/> 11 Sunnyside campground | <input type="checkbox"/> 12 North Pines |
| <input type="checkbox"/> 13 Housekeeping Camp | <input type="checkbox"/> 14 Other: |
| <input type="checkbox"/> 15 No other bike trips planned | |
-

Including yourself, how many people of each age group are traveling with you? (Include entire group, not just those on the bike trip. Enter ZERO for zero values, do not leave blank.)
Younger than 5 years 5 to 15 years 16 to 19 years 20 to 29 30 to 39 40 to 49 50 to 59 60 to 64 65 years or older

What is your household's annual gross income from all sources?
If income is not in \$US, ask for income in native currency. Indicate currency and amount below.
Currency: _____ Amount: _____

₁ Less than \$20,000

₂ \$20,000 - 39,999

₃ \$40,000 - 59,999

₄ \$60,000 - 79,999

₅ \$80,000 - 99,999

₆ \$100,000 or greater

₈ decline to answer

Thank You Again for Your Time.

Do you have any comments you would like to add? (Record below.)

Appendix B: Calculations for the total number of bicycles

The ownership split for bicycles was represented as groups. The group percentage needed to be converted to the total counts. Since we did not know the split of private and rented bikes in groups containing both, two equations were generated. In Equation 1, it was assumed that there was exactly one rental bicycle in groups with both private and rental bikes. In Equation 2 it was assumed that there was exactly one private bicycle in such groups. The true number lies between these two ranges. In groups containing both private and rental bikes the average group size was 4.8

Year	1996	1997	1998	1999	Average
Total rentals	8742	9388	9267	10708	9526

Since we only have YCS bike rental data since 1996, it was difficult to estimate a trend in the total number of bike rentals. An August average was generated for the 4 years of data. This average is 9,526. For the monthly totals this number was divided by the number of days in August (31). The average daily number of rented bicycles $9,526/31 = 307$.

Equation 1 Groups that have exactly one rental bike

Private split (0.50)*Private average group size (3.1) + Rental split (0.42)*Rental average group size (3.1) + Groups with both (0.08) + Group with one rental (1+3.8)=Total number of cyclist groups with all rental bikes/number of groups with both private and rental bikes = 0.42/0.08

rental percentage (0.42)/Both split (0.08) = 5.25

Total # of rental bikes = number of rental bikes in groups containing only rental bikes + number of rental bikes in groups containing both private and rental bikes.

$307 = (\# \text{All rental groups (bikes/all rental)}) + (\# \text{groups with both (bikes/both)})$

All rental = 5.25 (#both)

$307 = 5.25 (3.1) [\text{both}] + 3.8 [\# \text{both}]$

#Both = $307/20.1 = 15.3$

#All rental = $15.3(5.25) = 80.3$

Total number of private = $(0.5/0.42)*(80.3) = 96.3$ groups of cyclists

96.3* Average groups size (3.1) = 299

Total number of cyclists = 299 + 307 = 605

Equation 2 Groups that have exactly one private bike

Private split (0.50)*Private average group size (3.1) + Rental split (0.42)*Rental average group size (3.1) + Groups with both (0.08) + Group with one rental (3.8+1)

Total rental percentage (0.50)/Both split (0.08) = 6.25

307 = All rental (bikes/all rental) + both (bikes/both)

#All rental = 6.25 (both)

307 = 6.25 (3.1) + 1

#Both = 307/20.4 = 15.0

#All rental = 15.0(6.25) = 94.0

Total number of private = (0.5/0.42)*(94.0) = 112.8 groups of cyclists

112.8* Average groups size (3.1) = 350

Total number of cyclists = 350 + 307 = 657