Results of the 2009-10 Campus Travel Survey

July 2010

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RESULTS OF THE 2009-10 CAMPUS TRAVEL SURVEY

Institute of Transportation Studies

and

Transportation and Parking Services

University of California, Davis

Report prepared by

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About the Campus Travel Survey

The campus travel survey is a joint effort by the Transportation & Parking Services (TAPS) on campus and the Sustainable Transportation Center, part of the Institute of Transportation Studies at UC Davis, meant to be administered annually each fall by a graduate student at the Institute of Transportation Studies. The main purpose of the survey is to collect annual data on how the UC Davis community travels to campus, including mode choice, vehicle occupancy, distances traveled, and vehicle/bicycle parking. It also offers an opportunity for TAPS to assess awareness of campus transportation services and perceptions of mobility options. This year's survey is the fourth administration of the Campus Travel Survey, which was first administered in the spring of 2006-07 as a pilot effort.

The 2009-10 survey was administered online in October 2009, distributed by email to a stratified random sample of 13,322 students, faculty, and staff (out of a total population of about 40,200). About 32 percent (4,263 individuals) responded to this year's survey, with about 28 percent actually completing it. For the statistics we present throughout this report, we weight the responses by role group (freshmen, sophomore, junior, senior, master's student, PhD student, faculty, and staff) so that the proportion of respondents in each group reflects their proportion in the campus population.

Main findings

Residential location and distances traveled

About 77 percent of the (weighted) sample of respondents lives within Davis, including 14 percent who live on campus. This means that in the entire population of 40,200 campus affiliates, we estimate that about 4,800 live on campus, 25,000 live off campus in the city of Davis, and 9,400 live outside of Davis (see Figure 1).

Based on respondents' geocoded residential locations, we estimate that the average distance traveled to campus is 6.5 miles. Among those living within Davis (off campus), the average distance is just 2.1 miles, and the maximum is about 5 miles. Because of the agricultural belt surrounding the city of Davis, those living outside of Davis are likely to live more than 10 miles away. We find the average distance for those outside of Davis is about 23 miles. In total, we estimate that about 68 percent of the campus population lives within 3 miles of campus, 18 percent lives more than 10 miles away, and 7 percent lives more than 20 miles away.

Figure 1. Residential location, 2009-10

Sample n = 3,740
Projected N = 40,209

On campus 14%

Off campus in Davis 62%

Outside of Davis 23%
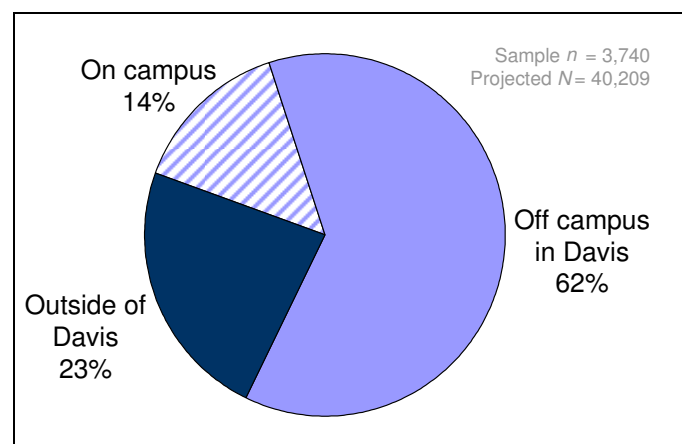
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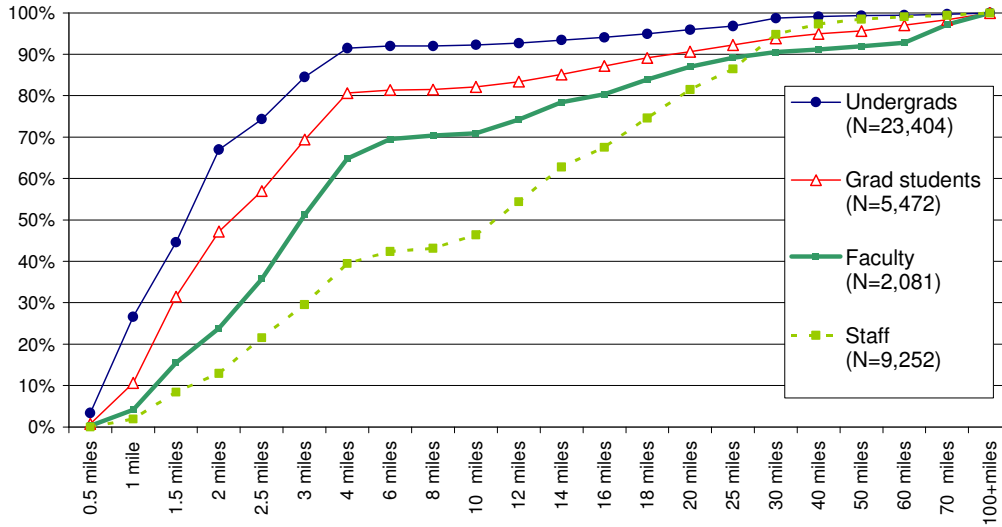
Students tend to live closer to campus than employees, and faculty tend to live closer than staff. Students are more likely to live within Davis, while employees, especially staff, are more likely to live outside of Davis (Figure 3). Almost all those living on campus are students, including 85 percent of freshmen. About 80 percent of the 25,000 people living off campus in the city of Davis are also students (Figure 4). As a result, about 82 percent of students live within 3 miles of Davis, compared with 51 percent of faculty and 30 percent of staff (Figure 2).

Figure 3. Where people in each role group live, and their percent of the total population
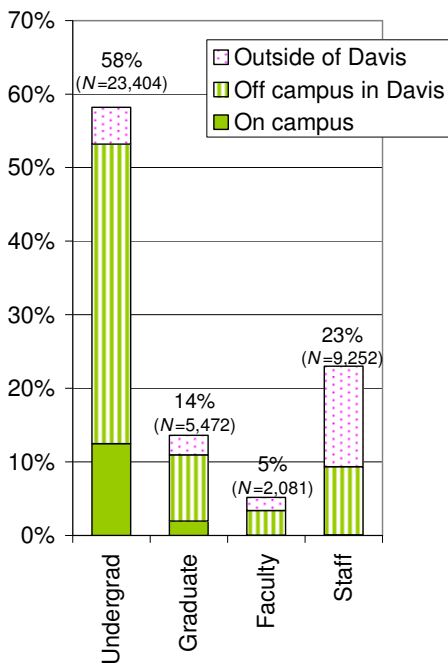
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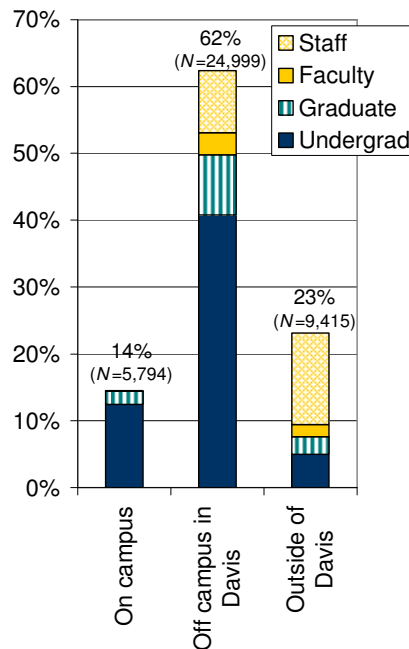
Overall mode split

We estimate that on an average weekday, about 89 percent of people are physically on campus (a projected 35,626 people, including those living on campus). Among these, about 39 percent bike to get there, 34 percent arrive in personal vehicles, 20 percent ride public transit, and 7 percent walk or skate. These figures represent the percent of people primarily using this means of transportation (that is, for most of the way, or for the greatest amount of time or distance) from wherever they live to their campus destination, on an average weekday.

Because some people use different modes on different days, the total number of regular bikers or transit-riders, for instance, is substantially larger than the number doing it on any given day. In particular, while 39 percent bike on an average day, 47 percent reported biking as their primary means at least once during the week. Similarly, about 19 percent carpooled once in the week, 27 percent rode the bus, and 1.2 percent rode the train at least once as their primary means to get to campus. An additional number of people use some of these modes in combination with other modes. For instance, while 35 percent bike as their primary mode of travel on an average weekday (or 39 percent of those physically traveling), we estimate that 45 percent of the campus population has a bike on campus on an average weekday, a projected 18,123 people with bikes (see

Figure 6). This includes about 5,383 people who store bikes on campus overnight on an average weekday, about 52 percent of them owned by people living on campus. Counts indicate that the actual number of bikes left permanently on campus (presumably abandoned) is about double this figure.

Figure 5. Overall mode split 2009-10
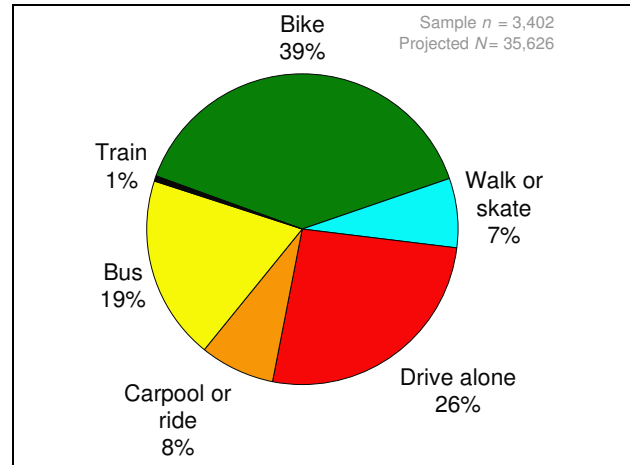
Figure 6. Breakdown of daily bikes on campus

Mode split among different groups

As found in previous years' surveys, the mode split varies substantially by residential location and role group. Most freshmen live on campus and therefore almost exclusively bike or walk to campus destinations. But these patterns do not persist when freshmen move off campus sophomore year. In general, anyone living off campus within the city of Davis has the most choice in transportation options, including biking, driving, riding the bus and (for some) walking.

Figure 7. Mode split among undergraduates from off campus within Davis, 2009-10

Sample n = 1,377
Projected N= 15,026

- Bike 40%
- Walk or skate 6%
- Drive alone 9%
- Carpool or ride 5%
- Bus 40%
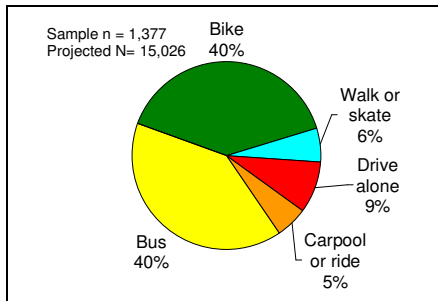
Figure 8. Mode split among grad students from off campus within Davis, 2009-10

Sample n = 306
Projected N= 3,316

- Bike 57%
- Bus 6%
- Carpool or ride 8%
- Drive alone 25%
- Walk or skate 4%
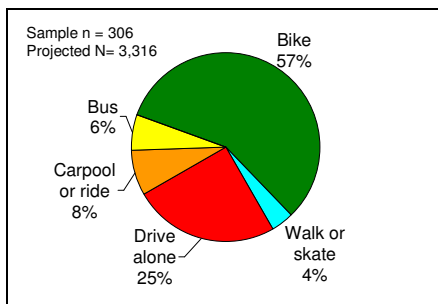
Figure 9. Mode split among employees from off campus within Davis, 2009-10

Sample n = 401
Projected N= 4,289

- Bike 47%
- Bus 4%
- Carpool or ride 10%
- Drive alone 33%
- Walk or skate 6%
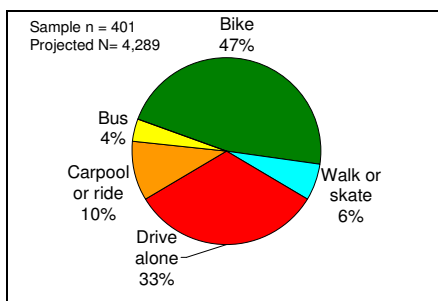
Figure 10. Mode split from outside Davis, 2009-10 (all role groups)

Sample n = 705
Projected N= 7,605

- Walk or skate 2%
- Bike 2%
- Train 3%
- Bus 4%
- Carpool or ride 15%
- Drive alone 74%
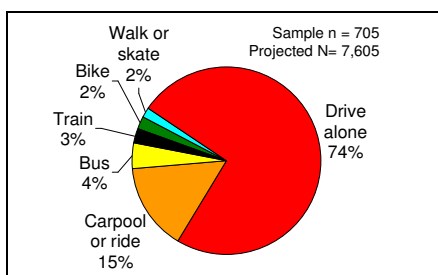
Among this group (totaling about 25,000 overall), we see different patterns within different role groups. Among faculty and grad students living in the city of Davis (4,967 people), the most common modes are biking and then driving; there is an even split between biking and driving among staff in Davis (3,708); and there is an even split between biking and riding the bus among undergrads living there (16,322).

Among all of those in the city of Davis, the group most likely to bike is grad students (57 percent on an average weekday; a projected 1,900 people), followed by faculty (53 percent; 593 people) and staff (45 percent; 1,415 people), with undergraduates least likely to bike (40 percent; 5,957 people). However, because there are so many undergraduates, there are still more undergrads biking to campus on an average weekday than all other role groups combined.

Again among those living in Davis, the group most likely to drive is staff (45 percent; 1,432 people), followed by faculty (37 percent; 414 people), grad students (33 percent; 1,083 people), and undergraduates (14 percent; 2,168 people). Again, although just 14 percent of undergrads living off campus in Davis come by car, because there are so many undergrads, this group comprises about 42 percent of those driving to campus from within Davis.

Bus use is only prevalent among undergrads, with 40 percent of undergrads living in Davis riding on an average weekday (6,004 people), compared with 6 percent of grad students (204 people) and 4 percent of employees (170 people) living in Davis. However, the percent of undergraduates riding the bus declines from sophomore through senior year, as the percent biking continues to decline and the percent driving increases. (See overall trends by role group, all residential locations, in Figure 11.)

Those living outside of Davis have substantially different patterns from those living within Davis. About 89 percent of them travel by personal vehicle (compared with 23 percent among those living within Davis), and 83 percent of these drive alone rather than carpool (compared with 70 percent among those within Davis). In part because a disproportionate share of staff live outside of Davis, staff are more likely to arrive by vehicle and to drive alone than other role groups. However, even among those living outside of Davis, staff are more likely to drive than are faculty (91 versus 81 percent, respectively) and faculty are more likely to ride the train (13 percent of faculty versus 1 percent of staff).

Figure 11. Bike, bus, and vehicle mode share, by role group, 2009-10
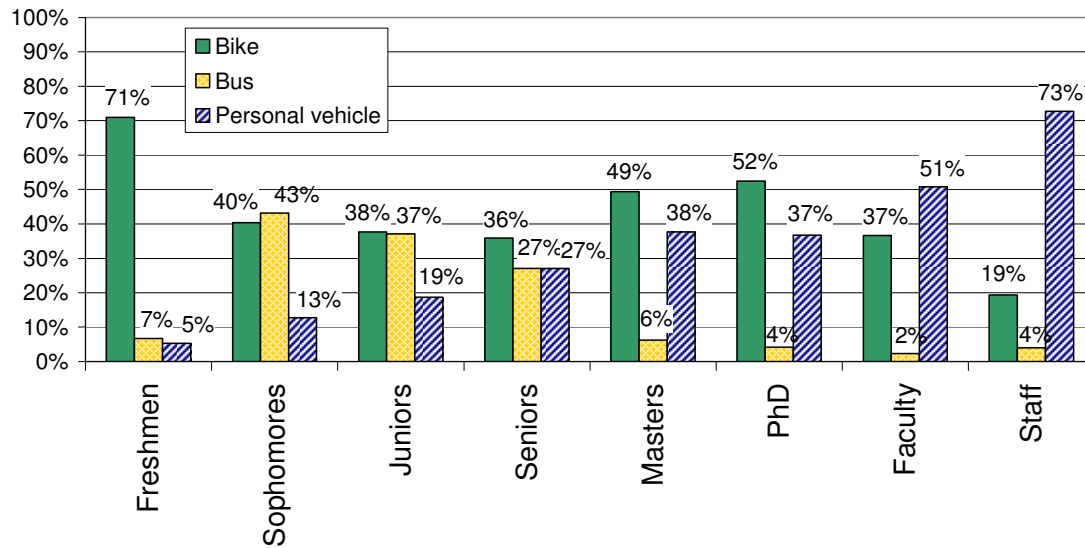
Change in mode split, 2007 through 2010

Between 2007-08 and 2008-09, there was some shift toward what are thought of as more environmentally friendly, sustainable modes, but that this trend slowed between 2008-09 and 2009-10. In particular, while the percent of people biking had increased and the percent using cars had decreased between 2007-08 and 2008-09, these percentages returned to 2007-08 levels in 2009-10. However, the percent carpooling is still up since 2007-08 (by about 2 percentage points, to 8 percent on an average weekday) and the percent driving alone is down (by about 3 percentage points, to 26 percent). There was also a small but statistically significant increase in walking (up by about 2 percentage points since 2007-08). There has been no change in the percent riding the bus or train over the last two years. (See Table 1 and Figure 12.)

Perhaps the most notable change, for its overall magnitude as well its potential environmental impact and implications for campus planning, is that the total percent of people physically traveling to campus on an average weekday decreased by about 4.5 percent over the last two years, representing about 1,800 fewer people. This trend is observed in all role groups, among undergraduate and grad students, faculty, and staff, but is most pronounced among faculty and staff, with about 83 percent coming to campus on an average weekday, down by about 9 percentage points since 2007-08.

Table 1. Change in mode split, 2007-08 through 2009-10

	Percentage-point change in those physically traveling	Among those physically traveling to campus, percentage-point change in those using:						
				Personal vehicle				
		Bike	Walk	Any	Drive alone	Carpool or ride	Bus	Train
2007-08 to 2008-09	-2.7% **	3.0% **	0.7%	-2.2% **	-4.3% **	2.1% **	1.1%	n/a
2008-09 to 2009-10	-1.8% **	-1.5%	1.1% *	1.6%	1.4%	0.2%	-1.0%	-0.2%
2007-08 to 2009-10	-4.5% **	1.5%	1.8% **	-0.6%	-2.9% **	2.3% **	0.1%	n/a

* Statistically significant difference with $p < 0.1$ in a two-category χ^2 test of the frequency of those using this mode versus those using any other mode in each year.
** Statistically significant at $p < 0.05$.

Vehicles on campus

Among those arriving by personal vehicle, about 77 percent drive alone, 17 percent carpool, and 6 percent get a ride with someone who drops them off before continuing on elsewhere. The average carpool size is 2.54 people (including the driver) and the average number of people dropped off by a driver continuing on elsewhere is 1.45 passengers (excluding the driver) per vehicle. Average vehicle ridership (AVR, as calculated by the South Coast Air Quality Management District) is roughly a ratio of the number of person-arrivals to vehicle-arrivals on campus over a five-day workweek, so higher AVR values (greater than 1.0) indicate more carpooling and/or use of alternative modes of transportation. We find the 2009-10 AVR for non-student employees living off-campus is 1.66, down slightly from 2008-09 and 2007-08. Overall AVR (among the entire campus community) is 3.30, down from 2008-09 but up from 2007-08 (see Table 2).

Figure 12. Change in mode split 2007-08 through 2009-10
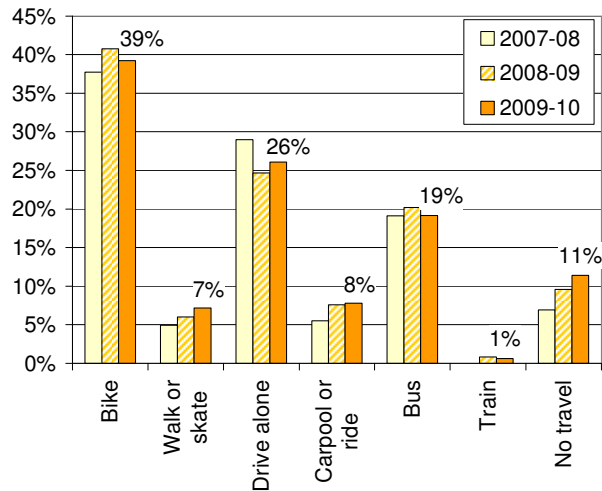
Table 2. AVR, 2007-08 through 2009-10

	2007-08	2008-09	2009-10
Overall	3.20	3.51	3.30
Employees and student employees	n/a	n/a	2.31
Employees (non-student only)	1.67	1.71	1.66
All off-campus residents	2.75	2.99	2.83
Off-campus employees and student employees	n/a	n/a	2.20
Off-campus employees (non-student only)	1.67	1.69	1.66

Counting one vehicle for each person driving alone and a partial vehicle proportionate to the number of occupants in vehicles with more than one person, we estimate that 10,891 vehicles travel

to UC Davis each day. This means there are about 3.69 people on campus for every one vehicle. Among the vehicles coming to campus, an estimated 82 percent (8,925 vehicles) park on campus, 12 percent (1,337 vehicles) park off campus, and 5 percent (525 vehicles) drop passengers off without parking.

VMT and carbon emissions
Based on distance from campus, mode choice, and vehicle occupancy, we generate rough estimates of the total number of vehicle-miles traveled (VMT) on the way to and from campus on an average weekday, as well as the carbon emissions associated with this travel. In particular, we estimate that the campus community covers about 418,300 miles per day roundtrip, generating about 274,600 vehicle-miles of travel in personal vehicles, and about 279,000 vehicle-miles travel overall (additionally including estimates of VMT by bus and train). Travel in personal vehicles generates an estimated 302,089 pounds-equivalent of CO_2 daily, or 25.0 per person arriving by vehicle, on average. We estimate a total of 346,854 pounds-equivalent of CO_2 generated daily by users of all modes, averaging 8.6 pounds per person campus-wide.

Awareness of TAPS and other transportation services
The GoClub was newly launched in the September 2009, as an overarching program for marketing alternative transportation options on campus. As of the October 2009 survey, about 3 percent of survey respondents reported having used it and an additional 14 percent reported that they had heard of it (Figure 13). More than half had heard of Zipcar, launched on campus in the fall as well. Less than half had heard of programs such as the discount bus passes with the purchase of a parking permit, of the lock-cutting service, and of the new ride-matching network Zimride.

Figure 13. Percent who have heard of each service, 2009-10
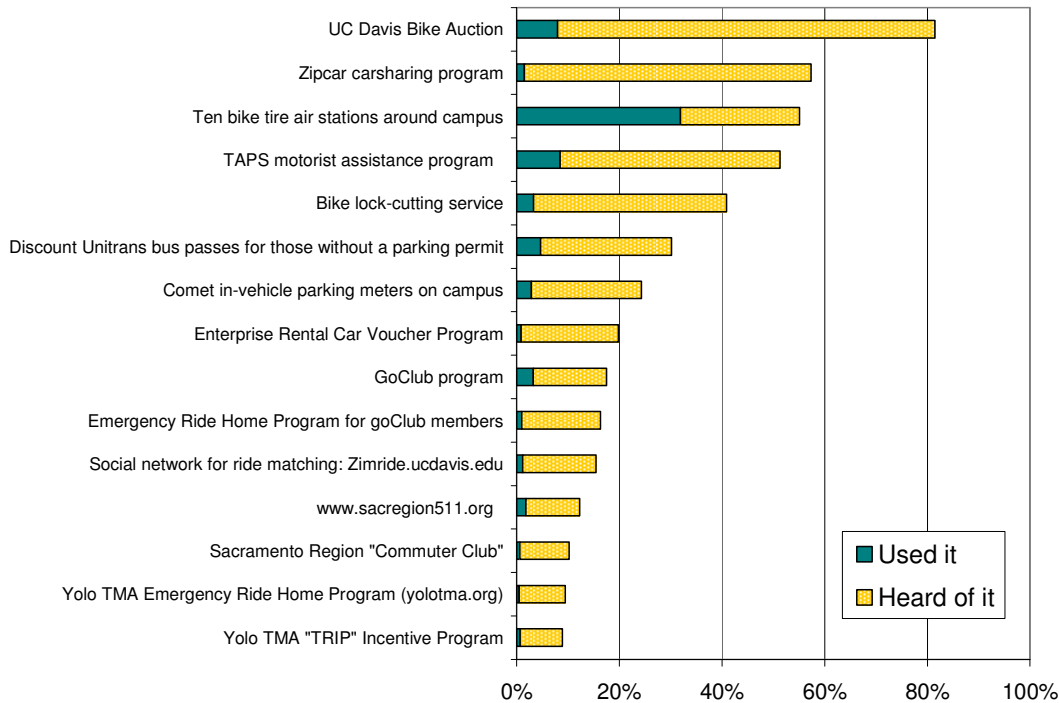
INTRODUCTION

About the campus travel survey

The campus travel survey is a joint effort by the Transportation & Parking Services (TAPS) on campus and the Sustainable Transportation Center, part of the Institute of Transportation Studies at UC Davis, meant to be administered annually each fall by a graduate student at the Institute of Transportation Studies. The main purpose of the survey is to collect annual data on how the UC Davis community travels to campus, including mode choice, vehicle occupancy, distances traveled, and vehicle/bicycle parking. It also offers an opportunity for TAPS to assess awareness of campus transportation services and perceptions of mobility options.

This year's survey is the fourth administration of the campus travel survey. The survey was first administered in the spring of 2006-07 as a pilot effort, with a second survey conducted in the fall of 2007-08 (see Congleton 2009) and a third conducted in the fall of 2008-09 (see Lovejoy, et al. 2009). The next administration of the survey is planned for October 2010.

Development of the survey instrument

The content of the survey was based on the previous year's survey, retaining key questions relating to mode choice and residential location, among others. An ongoing attempt to refine question wording has meant that some variables are not directly comparable across years. (See Appendix A for a full copy of the 2009-10 survey instrument. See Appendix B for a summary of changes in the 2009-10 survey compared to the 2008-09 and 2007-08 surveys, as well as suggestions for potential modifications to the survey in future years.) The online survey was prepared using the Lime Survey software (http://www.limesurvey.org/), hosted on a server at the Institute of Transportation Studies administered by Ning Wan (a sample screenshot of the online appearance of the survey is shown in Appendix A). Staff at TAPS, at the Office of Resource Management and Planning, at Student Affairs Research and Information, as well as faculty, staff, and students affiliated with the Institute of Transportation Studies provided feedback on survey content, and assisted with pre-testing the online survey.

Sampling procedure

The goal of the sampling procedure was to draw a sufficiently large sample for reliable statistical estimates within the following groups: freshmen, sophomores, juniors, seniors, master's/professional students, PhD students, faculty, and staff. We used standard statistical techniques to determine the minimum sample size needed for estimates with a +/- 5% margin of error, based on the assumed population size of each of the groups, shown in the first column of Table 3.[1] In past years, we assumed that we might expect 20 percent of those invited to complete

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[1]   For each strata, the minimum sample size, n, was calculated as $n = \dfrac{z_{\alpha/2}^2 S^2}{e^2 + \dfrac{z_{\alpha/2}^2 S^2}{N}}$, where N is the total

population, S^2 is the population variance, $z_{\alpha/2}$ is the $(1-\alpha/2)^{\text{th}}$ percentile of the standard normal distribution for degree of certainty $1-\alpha$, and e is the acceptable margin of error of the estimate (Lohr 1999, p. 40). This formula

the survey, but found that response was higher among some role groups (PhD students, faculty, and staff) and lower among others (seniors and masters'/professional students) (see Table 3). For the first time this year, we assumed varying response rates by strata to account for these differences, planning for just a 17-percent response among seniors and masters'/professional students and up to a 30-percent response among staff, as shown in Table 3. Overall, we invited 13,322 people to complete the 2009-10 survey, or about 33 percent of the overall campus population, which was about 700 fewer than were invited in 2008-09.

Table 3: Sampling plan for 2009-10, versus 2008-09 and 2007-08

Role group	2009-10				2008-09[b]			2007-08[c]	
	Assumed population[a]	Target response	Number invited	Percent invited	Invited	Response (*Q0001*)[b]	Response (*Q0084*)[b]	Invited	Response
Students	28,876	20%	10,792	37.4%	37.5%	25.8%	22.4%	36.1%	22.9%
Undergraduate	23,404	19%	7,515	32.1%	31.7%	23.5%	20.3%	30.5%	22.4%
Freshmen	4,335	20%	1,765	40.7%	38.6%	26.7%	22.3%	39.9%	26.3%
Sophomores	4,444	20%	1,770	39.8%	39.4%	23.3%	20.6%	36.1%	21.8%
Juniors	6,363	20%	1,815	28.5%	31.1%	24.4%	21.5%	31.7%	21.4%
Seniors	8,262	17%	2,165	26.2%	23.7%	19.7%	17.1%	21.4%	20.2%
Graduate	5,472	20%	3,277	59.9%	61.0%	30.7%	26.9%	60.2%	23.9%
Masters	1,926	17%	1,889	98.1%	86.0%	20.4%	18.0%	83.8%	19.1%
PhD	3,546	25%	1,388	39.1%	47.8%	40.5%	35.3%	48.1%	28.2%
Employees	11,333	27%	2,530	22.3%	30.5%	40.5%	34.7%	28.4%	44.5%
Faculty	2,081	25%	1,300	62.5%	78.0%	34.4%	29.6%	64.6%	37.0%
Staff	9,252	30%	1,230	13.3%	19.8%	45.8%	39.2%	20.3%	49.8%
Overall percent	100%	21%		33.1%	35.5%	29.5%	25.5%	33.9%	28.0%
Overall number	40,209	2,800	13,322		14,031	4,133	3,577	13,770	3,849

a Population figures are based on those provided by the Budget and Institutional Analysis department. For employees, this consisted of a tabulation they prepared at our request that included a breakdown of the total number of on-campus faculty (ladder faculty plus other faculty) and on-campus staff (including academic support, senior management, MSP, and SSP). For students, figures are based on the 2008-2009 student population summary three-quarter average (available online at http://budget.ucdavis.edu/data-reports/enrollment-reports). "Seniors" includes post-baccalaureate (teaching credential) students; "Masters" includes all academic-program masters students, plus professional-program students in Masters of Law, JD, MBA (full time and working professional program), Forensic Science, Masters of Advanced Study, and Master of Preventative Vet Med, and excluding all School of Medicine students; "PhD" includes all academic-program doctoral (D1 and D2) students, plus professional-program students in Veterinary Medicine (DVM), excluding all School of Medicine students.

b Includes valid responses to question *Q0001* (the first question in the 2008-09 survey) and to question *Q0084* (about respondents' gender, the first question in the final section of the 2008-09 survey, relating to sociodemographics), respectively. See Lovejoy, et al. (2009) for more information.

c As reported in Congleton (2009).

A stratified random sample of 13,322 was drawn from ostensibly complete lists of UC Davis email addresses maintained at two different departments within the university. The sampling of student email addresses was conducted by the Student Affairs Research and Information office.

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assumes a two-sided test and includes a finite population correction. We assumed $S^2=0.25$ (since a binary variable assuming a given value with probability p has maximum $S^2 \approx p(1-p)$ when $p=0.5$); we assumed acceptable margin of error of +/–5% ($e = 0.05$); and we aimed for 95% confidence level ($\alpha=0.05$ or $z_{\alpha/2} \approx 1.96$). Values of N used were those shown in Table 6.

Student addresses were screened based on students' level and departmental affiliation, including all academic and professional students except medical students, who are not based on the Davis campus. The sample of employee (faculty and staff) email addresses was drawn by Data Administration staff using the Campus Data Warehouse. Employees were screened to exclude those affiliated with the Medical Center or field stations, those without salary, Emeritus faculty, Extension School faculty, temporary employees, and employees without email addresses. In each case, the respective offices drew the sample and submitted to Kristin Lovejoy an Excel spreadsheet containing only those names and email addresses of individuals selected for inclusion in the sample.

Survey administration and recruitment of participants

We invited 13,322 randomly selected students, faculty, and staff to participate in the survey via email to their UC Davis addresses. In these emails, faculty and staff recipients were addressed "Dear UC Davis Employee" and students were addressed "Dear UC Davis Student." Everyone received two emails, an initial email inviting them to take survey and a reminder email approximately one week later, regardless of whether they had already completed it. Copies of these recruitment emails are shown in Appendix C.

In the 2008-09 administration of the survey, the initial email invitation was sent to all members of the sample at the same time, resulting in excess traffic to the web server hosting the survey in the minutes and hours immediately after the invitations were sent (see Lovejoy, et al. 2009). In an effort to spread this load, this year's email invitations were sent in batches of approximately 1,000 per hour over two days. In particular, we randomized the order of the email addresses and divided them into 14 batches of 1,000 or fewer (11 batches consisting of student email addresses and 3 consisting of employee email addresses). The UC Davis Postmaster sent one batch per hour as bulk mail from the address "travelsurvey@ucdavis.edu," starting at 9am on Wednesday, November 4, 2009, and continuing through 3pm on Thursday, November 5, 2009. Reminder emails were sent in a similar batched fashion on Monday and Tuesday of the following week (November 9 - 10, 2009).

Offering a chance to win a desirable prize is thought to increase overall response to a survey. This year, TAPS allocated $150 for incentives to participate in the 2009-10 survey, which is the same budget allocated for incentives in the 2008-09 survey. We opted to offer a drawing to win an 8GB iPod Nano, the same prize offered in 2008-09 and one of several prizes that were offered in the 2007-08 survey. Entry into a drawing for the iPod was mentioned in the initial and follow-up recruitment emails, as well as on the first welcome page of the online survey, where the mention of the iPod was hyperlinked to the section of Apple's website featuring this product. On the final page of the survey, respondents were asked to indicate whether it would be okay for us to contact them again (1) with questions about their survey or (2) if they win the drawing for the iPod nano, or if instead they preferred not to be contacted. There were 3,294 respondents who indicated they were willing to be contacted if they won the drawing. We assigned each of these respondents a random number and selected the one with the lowest value as the winner, who was notified via email on January 4, 2010 and issued the prize shortly thereafter.

Response rate

A total of 4,263 respondents at least commenced the survey (responding to question *Q0001*), which was about 32 percent of those invited. About 13 percent of those who started the survey did not continue through to the first question of the final section (question *Q0072*). This attrition is comparable to that observed in the 2008-09 survey, but because the initial response was somewhat higher this year, the final response rates are somewhat higher than in 2008-09 (e.g. 28 percent completing through question *Q0072* in 2009-10 versus 25 percent completing through question *Q0084* in 2008-09; compare Table 3 and Table 4). Table 4 also shows response rates for two other key points in the survey: question *Q0016* on mode choice and questions *Q0074-76* on residential location (and in particular whether the responses given were successfully geocoded). As shown, even in this most restricted set, target response rates were exceeded within all role groups. As in past years, response rates were highest among staff, PhD students, and faculty, and lowest among masters/professional students and seniors.

Table 4. Response rate, by role

Role group	Assumed population	Number invited	Target response rate	Actual response rate (number of valid responses as a percent of the total number invited to take the survey)			
				Question *Q0001*	Question *Q0016*	Question *Q0072*	Questions *Q0016* and *Q0074-76*
Students	28,876	10,792	20%	29.6%	26.9%	25.9%	25.0%
Undergraduate	23,404	7,515	19%	27.6%	25.6%	24.5%	23.8%
Freshmen	4,335	1,765	20%	34.8%	31.8%	29.7%	29.7%
Sophomores	4,444	1,770	20%	29.0%	27.5%	26.7%	25.5%
Juniors	6,363	1,815	20%	25.0%	23.0%	22.5%	21.5%
Seniors	8,262	2,165	17%	22.8%	21.2%	20.2%	19.4%
Graduate	5,472	3,277	20%	34.1%	29.7%	28.9%	27.8%
Masters	1,926	1,889	17%	25.7%	20.7%	20.1%	19.2%
PhD	3,546	1,388	25%	45.6%	42.0%	40.9%	39.6%
Employees	11,333	2,530	27%	41.1%	37.2%	36.6%	34.3%
Faculty	2,081	1,300	25%	32.4%	30.2%	29.5%	27.2%
Staff	9,252	1,230	30%	50.2%	44.6%	44.1%	41.9%
Overall percent	100%	33.1%	21%	32.0%	28.8%	27.9%	26.8%
Overall number	40,209	13,322	2,800	4,263	3,840	3,717	3,569

Staggering the email invitations seemed to successfully avoid server overload this year. The responses were substantially more spread over time than in 2008-09, with fewer than 200 respondents commencing the survey within any given hour, compared with 679 successfully accessing the survey in the first hour after the launch in 2008-09 and an unknown number attempting but unable to access the website during that time (see Figure 14). There was no evidence that traffic to the survey website slowed the server performance. Replies to the invitations sent from travelsurvey@ucdavis.edu were set to forward to Kristin Lovejoy's UC Davis email account. There were no replies reporting technical difficulties.

Figure 15 depicts how responses were spread over the 10 days after the initial launch on November 4. About 68 percent took the survey during the first two days (on the days the initial

email invitations were sent). The reminder emails sent on November 9 and 10 generated a substantial bump in responses, with 705 (17 percent of the overall sample) taking the survey on those days. Although we continued to collect responses through November 24, fewer than 2 percent of respondents took the survey after November 14, 2009.

Figure 14. Number of respondents taking the survey each hour, 2009-10 versus 2008-09
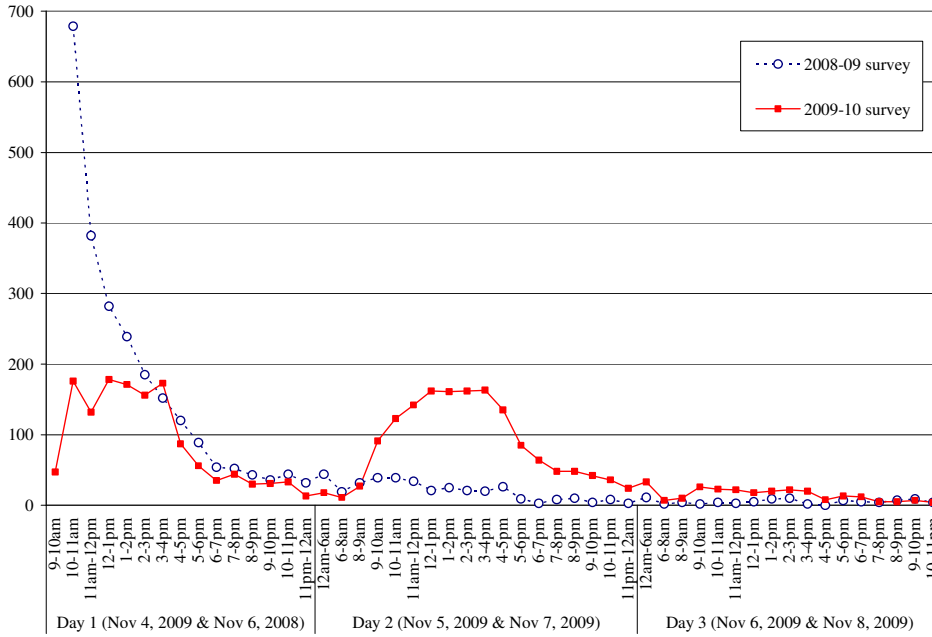
Figure 15. Number of respondents taking the survey each day, 2009-10
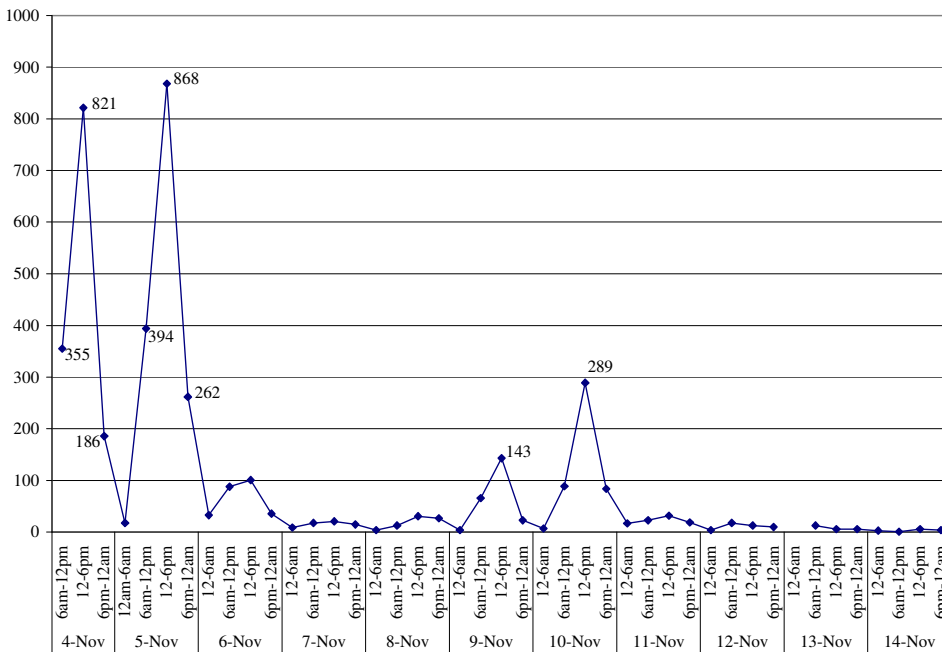
Screening respondents for eligibility

While incomplete survey responses were retained in the dataset, cases were excluded based on two criteria: role and office location. In particular, we wanted to include only respondents who are current students or employees affiliated with the campus in Davis (rather than in locations beyond the campus or city of Davis) and whose role at UC Davis is known. Although the sample frame was supposed to only include current students and employees affiliated with the main campus, we have learned that university records are not always accurate, either due to a student or employee's recent change in status or due to ambiguity about the geographic location associated with a nominal departmental affiliation. We attempted to improve our screening of these exceptions in this year's survey through more explicit questions about roles and office locations.

In particular, we offered more role categories in questions *Q0001* through *Q0003*, making an attempt to explicitly list some of the types of programs respondents wrote in as an "other" description on the previous year's survey, in addition to adding the option to indicate "recent graduate" in question *Q0001*. (As an oversight, we did not offer the option of "retiree," which we recommend adding as an option to question *Q0001* in the future.) As a result, we screened 3 recent graduates (who were then skipped to the end of the survey, see Appendix A) and received only 13 write-in descriptions of "other" roles (compared with 211 in 2008-09), all of which we were able to re-code into the standard categories. After recoding these as well as one respondent whose role was determined by her email address, there were still 17 respondents whose roles were unknown due to non-response to questions *Q0001* and/or *Q0002*. Because we planned to weight the results by role group (freshmen, sophomore, junior, etc.), we excluded these from the analysis.

Regarding office locations, we intended to include in the sample anyone who usually travels to campus regularly, even if temporarily stationed elsewhere -- such as for sabbatical, teaching abroad, field work, a joint appointment at another campus, or on leave (bereavement, maternity, etc.) -- but exclude those whose main work is elsewhere. We thought this was a potential issue for employees and grad students, and not undergraduates. Thus we screened graduate student and employee office locations in question *Q0004* ("Where is your office, lab, or department? That is, wherever you usually spend your time when you travel to work or school at UC Davis.") There were 129 respondents who indicated that their offices were located outside of Davis, including 98 graduate students and 31 employees. All but two of these wrote a description of their office location in question *Q0005*. These included the following locations:

- Bay Area
- Berkeley, CA
- Big Sur
- Biggs, CA
- Bodega Bay
- Del Norte County, CA
- Dublin, CA
- Eureka, CA
- Fairfield, CA
- Five Points, CA
- Fremont, CA
- Lake Tahoe, NV
- Lakeport, CA
- Menlo Park, CA
- Oakland, CA
- Parlier, CA
- Redding, CA
- Richmond, CA
- Sacramento, CA
- Salinas, CA
- San Francisco, CA
- San Jose, CA
- San Ramon, CA / Bishop Ranch
- Vacaville, CA
- Woodland, CA
- Washington state
- Washington, DC
- Burkina Faso (West Africa)
- Peru

These 129 respondents were skipped to the end of the survey (see Appendix A) and are excluded from the analysis.

Sociodemographic composition of respondents completing the survey

Table 5 shows sociodemographic characteristics of the unweighted sample. As in the 2008-09 survey, the sample is disproportionately comprised of females. In particular, males comprise about 34 percent of the sample compared with 44 percent of the population of undergraduates; 39 percent of respondents versus 48 percent of the population of graduate students; and 47 percent of respondents versus 57 percent of the population of employees.[2] This may mean that there is bias in the results presented in this report for any responses that tend to differ by gender.

In particular, we find that women respondents are substantially less likely to bike than are men (35 percent versus 45 percent doing so on an average weekday among women versus men, respectively), and somewhat more likely to drive alone (25 percent versus 20 percent) and to ride the bus (19 percent versus 14 percent). This means that the estimated bike mode share may be lower, while the drive-alone and bus mode shares may be higher than they would be in the actual population.[3]

Other biases may exist if there are other ways that the sample of respondents differs systematically from the rest of the population, though we have few ways of knowing the extent that it does. One attribute we can verify is the portion of the sample that owns parking permits, which we find matches the portion in the overall population (based on TAPS's records of permits issued), though with "A" permit-holders somewhat over-represented relative to "C" permit-holders. (See the "Parking permits" section later in the report.)

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[2]   Figures for the composition of the campus population by gender are drawn from "Student Headcount by Gender, Fall 2009," "Employees by Gender and Ethnicity, Fall 2009," and "Teaching Faculty by Gender, Fall 2009" available on the *UC Davis Facts* website, online at http://facts.ucdavis.edu/. These population counts include medical (non-Davis campus) affiliates who are excluded from the survey sample. In addition, the employee count includes employed students, who are not included as employees in the survey sample.

[3]   These differences are statistically significant (with *p*-value < 0.05) based on a t-test of equivalence of means among the female versus male segments of the sample, in particular of the mean share of weekdays that respondents biked, drove alone, and rode the bus, respectively. There were also small but statistically significant differences (with *p*-value < 0.05) in the share riding the train (0.3 percent among women versus 0.9 percent among men) and in the share not physically traveling to campus for reasons other than telecommuting (11 percent among women versus 9 percent among men) and marginally significant small differences (with *p*-value < 0.10) in the share telecommuting (0.9 percent among women versus 1.2 percent among men). There was no statistically significant differences by gender in the share walking or carpooling.

Table 5. Sociodemographic characteristics of survey respondents

Characteristic	Role group			
	Undergraduates	Grad students	Employees	All
Gender: valid *n*	1,843	948	927	3,718
% male	34.0%	38.6%	47.2%	38.5%
Age: valid *n*	1,849	946	900	3,695
% < 20 years old	49.8%	0.0%	0.0%	24.9%
% 20 to 29 years old	48.9%	74.9%	8.2%	45.7%
% 30 to 39 years old	0.9%	21.4%	23.7%	11.7%
% 40 to 49 years old	0.3%	3.0%	25.7%	7.1%
% 50 to 59 years old	0.2%	0.6%	28.6%	7.2%
% 60+ years old	0.0%	0.1%	13.9%	3.4%
Household size: valid *n*	1,843	945	922	3,710
% alone	2.4%	16.4%	15.8%	9.3%
% 2 people	13.0%	43.0%	37.5%	26.7%
% 3 to 5 people	46.9%	38.8%	45.2%	44.4%
% 6 or more people	9.2%	1.7%	1.4%	5.3%
% in a dormitory	28.4%	0.1%	0.0%	14.2%
Highest level of education: valid *n*	1,848	952	930	3,730
% High school or less	49.1%	0.2%	1.7%	24.8%
% Some college	41.5%	0.0%	8.5%	22.7%
% 2-year degree	6.7%	0.0%	5.2%	4.6%
% Bachelor's degree	2.8%	21.1%	16.6%	10.9%
% Some grad school	0.0%	47.1%	4.0%	13.0%
% Grad degree	0.0%	31.6%	64.1%	24.0%
Total household income: valid *n*	0	0	890	n/a
$0 - $19,999	n/a	n/a	0.1%	n/a
$20,000 - $39,999	n/a	n/a	5.1%	n/a
$40,000 - $59,999	n/a	n/a	12.9%	n/a
$60,000 - $79,999	n/a	n/a	17.0%	n/a
$80,000 - $99,999	n/a	n/a	11.2%	n/a
$100,000 - $119,999	n/a	n/a	14.4%	n/a
$120,000 - $139,999	n/a	n/a	11.9%	n/a
$140,000 - $159,999	n/a	n/a	7.0%	n/a
$160,000 - $179,999	n/a	n/a	5.7%	n/a
$180,000 - $199,999	n/a	n/a	4.5%	n/a
Greater than $200,000	n/a	n/a	10.2%	n/a
Total respondents (total *n*)	2,074	1,020	1,007	4,101

The statistics shown are unweighted, based on responses to questions *Q0072, Q0078, Q0088, Q0089*, and *Q0090*. Question *Q0090* (income) was not asked of students. Percentages reported are among valid (non-missing) responses to each question.

Weighting responses by role

For the purposes of analysis, we assume that respondents are roughly similar to the rest of the population within their role group (freshmen, sophomore, etc.) with respect to sociodemographics or other attributes that may matter for transportation choices. For this reason, we weight the sample by role group. In particular, as described above, respondents were assigned one of eight role categories based on their responses to questions *Q0001* through *Q0003*: freshmen, sophomores, juniors, seniors (and fifth-years and post-baccaleaureate), masters students (and professional students such as law and business and Ed.D. or CANDEL), PhD students, faculty, or staff (including Post-docs). All results presented in this report are weighted to be representative of the campus population by these role groups. That is, we apply a weight

factor to each case in a given role group so that the group's proportion in the sample is the same as their proportion in the overall population.

To accomplish this, the appropriate weight factor is a ratio of the population share to the sample share for each role group. That is, with N total population, n in the sample, and N_i in role group i in the population (for instance, freshmen), and n_i of role group i in the sample, we apply the weight factor $W_i = (N_i/N) / (n_i/n)$ to all cases in role group i. Applying the weight factors alters the apparent distribution of respondents by role, but the overall sample size is unchanged. In instances where we would like to expand the sample to a projection of the full population, we weight each case by an *expansion* factor E_i, equal to (N_i / n_i). Applying the expansion factors alters both the distribution of respondents by role, and inflates the sample to the size of the population, or 40,209.

Although the number of valid responses varies from question to question (that is, n and n_i), we use the same set of weight factors for most variables, based on the distribution of roles among the n=3,840 valid responses to question *Q0016*, the main question relating to mode choice on each day during the travel week. However, for variables relying on geocoding of respondents' residential location, we generated a separate set of weight factors, based on the 3,569 cases successfully geocoded (by zip code and cross streets given in questions *Q0074* and *Q0076*, or on-campus residence name given in *Q0075*; see Appendix E) and with non-missing mode data from question *Q0016*. Both sets of weights are shown in Table 6.

Table 6. Weight factors, applied by role

Role group (i)	Population (N)	Based on valid responses to question Q0016				Based on valid responses to question Q0016 and successful geocoding of home location (from responses to questions Q0074-Q0076)			
		Valid responses (n)	Weight factor (N_i/N)/(n_i/n)	Expansion factor (N_i / n_i)	Weighted sample size	Valid responses (n)	Weight factor (N_i/N)/(n_i/n)	Expansion factor (N_i / n_i)	Weighted sample size
Freshmen	4,335	562	0.73665	7.71352	414.0	524	0.73431	8.27290	384.8
Sophomores	4,444	487	0.87147	9.12526	424.4	452	0.87269	9.83186	394.5
Juniors	6,363	418	1.45376	15.22249	607.7	391	1.44447	16.27366	564.8
Seniors	8,262	458	1.72277	18.03930	789.0	421	1.74191	19.62470	733.3
Masters	1,926	391	0.47042	4.92583	183.9	362	0.47225	5.32044	171.0
PhD	3,546	583	0.58087	6.08233	338.6	550	0.57227	6.44727	314.7
Faculty	2,081	392	0.50698	5.30867	198.7	354	0.52179	5.87853	184.7
Staff	9,252	549	1.60943	16.85246	883.6	515	1.59460	17.96505	821.2
Overall	40,209	3,840	1.00000	10.47109	3,840.0	3,569	1.00000	11.2662	3,569.0

Reference week

The main statistics we measure are based on questions asking respondents about their activity during each of the seven days of the week prior to receiving the invitation to complete the survey. We plan for the reference week to be approximately the same each year that the survey is administered, and also coinciding with the campus's biannual traffic counts (of vehicles entering campus), usually conducted the last week in October or the first week in November every other year. Therefore, this year's initial reference week was October 26-November 1, 2009 (Monday-

Sunday). As in 2008-09, we updated the reference week on the Sunday after the launch (and just before reminder emails were distributed), such that respondents would refer to the most recent week when completing the survey. Therefore, anyone who completed the survey from the launch on Wednesday, November 4 through midnight on Sunday, November 8 answered the survey referring to October 26-November 1, and anyone who completed the survey after that point answered referring to November 2-8. Initial invitations were sent Wednesday and Thursday (November 4 and 5) and reminder emails were sent Monday and Tuesday (November 9 and 10).[4] In total, about 78 percent of the sample completed the survey with the earlier reference week.

The overall timeline of the survey launch and reference weeks is shown in Figure 16. Table 7 notes weather and other events occurring during each of the reference weeks. In general, there were no major events: no rain during either week, the Halloween holiday fell on a Saturday, and while Tuesday, November 3 (during the second reference week) was Election Day, it was not a presidential election as occurred during the 2008-09 Campus Travel Survey.

Figure 16. Survey launch and reference week schedule

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
19	20	21	22	23	24	25
26 **Reference Week 1**	27	28	29	30	31 Halloween	1
2 **Reference Week 2**	3 Election Day	4 ◄— Initial invitations sent —►	5	6	7	8
9 ◄— Reminder emails sent —►	10	11 Veteran's Day holiday	12	13	14	15
16	17	18	19	20	21	22

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[4] With the aim of having respondents recall their behavior during the week of Monday, October 26, 2009, we had hoped to invite participants to respond to the survey as soon as possible the following week, starting on Monday, November 2. However, we did not receive final approval from the UC Davis Institutional Review Board (IRB), which is needed for all research involving human subjects, until Tuesday, November 3. Thus initial email invitations were not sent until Wednesday and Thursday of that week (November 4-5, 2009). Reminder emails were sent less than a week later, on Monday and Tuesday of the following week (November 9-10, 2009), to avoid (by preceding) the November 11 Veterans Day holiday and because it is thought to be desirable to query respondents as soon after the reference week as possible.

Table 7. Weather and other events occurring during survey reference weeks

| Day | Temperature ranges, precipitation, and notable events | |
	Week 1: October 26-November 1	Week 2: November 2-8
Monday	51 – 80 ºF	46 – 77 ºF
Tuesday	55 – 77 ºF	46 – 79 ºF
	Wind (40 MPH gusts)	Election day
Wednesday	46 – 64 ºF	46 – 70 ºF
	Wind (32 MPH gusts)	Wind (17 MPH gusts)
Thursday	40 – 71 ºF	47 – 68 ºF
		Wind (17 MPH gusts)
Friday	43 – 70 ºF	43 – 70 ºF
Saturday	45 – 73 ºF	42 – 68 ºF
	Halloween holiday	
Sunday	46 – 77 ºF	39 – 66 ºF

Weather data are for Sacramento, as reported in the *Farmer's Almanac*, available online by city and date at http://www.almanac.com/weatherhistory.

FINDINGS

This section summarizes some of the results from the survey. Throughout this section, data presented are weighted by role, as described above. When "unweighted sample" size is reported it reflects the number of actual respondents in this category; "weighted sample" size reflects the number that would be in each category if the distribution of roles in the sample matched the distribution in the population (so the total number in the weighted sample equals the number in the weighted sample, but numbers within subgroups may change). "Projected population" size is a projection of the weighted proportions to the full population size, effectively multiplying each response by an expansion factor by role group.

Many statistics are presented by role group as defined above (freshmen, sophomores, juniors, seniors, master's students, PhD students, faculty, or staff). In addition, some are also broken down by students (including freshmen through PhD student role-group categories), undergraduates (freshmen through senior role-group categories), graduate students (master's and PhD student role-group categories), employees (faculty and staff role-group categories), within Davis (those living on campus or elsewhere in Davis among all role-group categories), and outside Davis (those living outside of Davis among all role-group categories).

Number traveling to campus

About 90 percent of the sample physically travels to campus Monday through Thursday, with a low of about 82 percent traveling to campus on Friday (Table 8). Employees especially are less likely to travel to campus on Fridays. On weekends, students and faculty are more likely to travel to campus than are staff, with about a quarter of graduate students coming on weekends and almost 1 in 5 faculty.

Table 8. Percent traveling to campus by day of the week

Role group	Percent physically traveling to campus								Weighted sample	Projected population
	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	No days		
Students	92.3%	93.3%	92.9%	92.2%	83.8%	23.6%	21.6%	2.4%	2,885	28,876
Undergrad	93.1%	94.2%	93.7%	93.2%	84.4%	23.3%	20.4%	2.0%	2,346	23,404
Graduate	88.7%	89.5%	89.3%	87.9%	81.1%	25.1%	26.7%	3.8%	539	5,472
Employees	84.8%	84.5%	85.1%	83.8%	76.7%	13.0%	8.7%	6.4%	1,135	11,333
Faculty	81.7%	80.4%	81.4%	78.2%	74.1%	19.8%	19.1%	6.4%	207	2,081
Staff	85.4%	85.4%	86.0%	85.1%	77.3%	11.4%	6.4%	6.4%	927	9,252
Outside Davis	84.2%	84.5%	84.6%	83.5%	73.4%	9.1%	6.7%	5.3%	875	8,753
Within Davis	92.4%	93.0%	93.2%	92.2%	84.8%	23.8%	20.9%	2.8%	2,865	28,653
Overall	90.2%	90.8%	90.7%	89.9%	81.8%	20.6%	17.9%	3.5%	4,020	40,209
Weighted sample	3,625	3,651	3,647	3,613	3,288	828	721	141	4,020	
Projected population	36,260	36,516	36,477	36,137	32,889	8,284	7,214	1,409		40,209

Results are based on responses to question *Q0006*. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

In addition to trends by the day of the week, there are substantial differences in the percent traveling to campus among those living in different locations. In particular, among all role groups, those living outside of Davis are less likely to travel to campus on an average weekday (82 percent) than those living in Davis (91 percent) or on campus (94 percent). Grad students and faculty living outside of Davis are the least likely to come to campus, with less than three-quarters coming to campus on an average day (70 percent of masters students, and 72 percent of PhD students and faculty). By contrast, 92 percent of grad students and 84 percent of faculty who are living in town come to campus on an average weekday. (See Table 54 for the overall percent of people living in each location by role group.)

Table 9. Percent traveling to campus on an average weekday, by role and residential location

Role group	Overall	Among those living:			Weighted sample	Projected population
		On campus	Off campus in Davis	Beyond Davis		
Students	90.8%	93.7%	92.0%	80.8%	2,758	28,876
Undergraduate	91.5%	94.3%	92.1%	86.0%	2,235	23,404
Freshmen	93.8%	94.5%	95.2%	91.8%	414	4,335
Sophomores	96.6%	94.1%	96.9%	92.2%	424	4,444
Juniors	91.7%	91.4%	92.9%	84.0%	608	6,363
Seniors	87.5%	95.9%	88.3%	85.5%	789	8,262
Graduate	87.4%	90.2%	91.5%	71.4%	523	5,472
Masters	86.5%	86.0%	91.4%	70.0%	184	1,926
PhD	87.9%	91.6%	91.6%	72.2%	339	3,546
Employees	83.1%	79.6%	84.9%	82.3%	1,082	11,333
Faculty	79.3%	100.0%	83.7%	72.3%	199	2,081
Staff	83.9%	70.0%	85.3%	83.6%	884	9,252
Overall	88.6%	93.6%	90.5%	81.8%		
Weighted sample	3,740	539	2,326	876	3,740	
Projected population	40,209	5,794	24,999	9,415		40,209

Results are based on responses to question *Q0006* (days traveling to campus) and *Q0073* (residential location). Percentages are calculated as the percent of five weekdays that an individual traveled to campus; then the average over all respondents represents the percent traveling to campus on an average weekday. See Table 54 for the overall percent living in each location by role group. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

About 4 percent of the sample did not physically travel to campus on any days during the reference week. These respondents were asked to give the reason they were away all week (Table 10). Employees were more likely to be away all week than students, with work travel and vacation being the most common reasons given for being away.

Table 10. Percent away from campus all week and reasons given, by role

Role group	Percent away all week	Work / school-related travel or field work	Study abroad	Vacation	Sick or personal leave	Telecommuting (from home or other location)	Temp. appointment elsewhere	Sabbatical	Other/ missing	Weighted sample	Projected population
		Among those away all week, percent away for:									
Students	2.3%	22.7%	50.8%	2.5%	10.6%	8.1%	3.3%	0.0%	2.0%	2,883	28,876
Undergrad	2.0%	15.4%	71.4%	0.0%	11.6%	0.0%	0.0%	0.0%	1.6%	2,345	23,404
Graduate	3.7%	39.9%	2.4%	8.2%	8.2%	27.1%	11.2%	0.0%	2.9%	538	5,472
Employees	5.9%	36.2%	2.4%	31.3%	15.2%	11.9%	0.8%	0.8%	1.5%	1,129	11,333
Faculty	5.9%	66.7%	0.0%	0.0%	4.2%	12.5%	4.2%	4.2%	8.3%	206	2,081
Staff	5.9%	29.4%	2.9%	38.2%	17.6%	11.8%	0.0%	0.0%	0.0%	922	9,252
Overall	3.3%	29.5%	26.5%	16.9%	12.9%	10.0%	2.0%	0.4%	1.8%	4,012	40,209
Weighted sample	133	39	35	23	17	13	3	1	2	4,012	
Projected population	1,333	393	353	226	172	133	27	5	23		40,209

Results are based on responses to question *Q0012*. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Employees (and not students) who were away from campus just some of the days during the week were also asked to give the reason they did not travel to campus for each weekday they were away. Table 11 shows the percent of employees away from campus on an average weekday, and the reasons given. While about 6 percent of employees were away all week (Table 10), about 17 percent of employees do not travel to campus on an average weekday (Table 11). The most common reasons for being away from campus are work travel or other off-campus work commitments, as well as working from home (telecommuting).

Table 12 shows the percent of employees who were away from campus for each reason on at least one day during the reference week. This shows, for instance, that although a projected 360 employees work from home on an average weekday (Table 11), about 890 do so at some point during the week (Table 12). Similarly, while less than 1 percent of employees reported being on furlough on an average weekday, about 3 percent (a projected 350 people) took unpaid furlough days off at some point during the reference week.[5]

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[5] In the face of budget shortfalls, the UC Regents implemented a temporary cost-saving measure that required employees to take unpaid furlough days off, numbering between 11 and 26 over the course of the year (from September 1, 2009 through August 31, 2010). For the purposes of this survey, this represents an additional reason employees might be away from campus during the reference week in 2009, but one that did not apply in

Table 11. Percent of employees not traveling to campus on an average weekday and reason

| | | Among those not coming to campus, reason given: | | | | | | | | | Total employees: | |
Role group	Percent of employees away from campus	Off-campus work / travel	Work from home	Vacation	Sick	Regular day off	Furlough	On leave	CWW	Other / missing	Weighted sample	Projected population
Faculty	20.7%	42.4%	37.0%	1.2%	3.4%	5.1%	1.5%	4.1%	0.0%	0.0%	201	2,081
Staff	16.1%	28.1%	13.4%	21.9%	12.8%	9.5%	5.1%	2.2%	0.4%	0.2%	906	9,252
Outside Davis	17.7%	27.6%	19.6%	18.4%	11.3%	10.3%	5.6%	1.8%	0.6%	0.3%	584	6,233
Within Davis	15.1%	39.2%	18.0%	16.9%	11.0%	6.3%	3.0%	2.0%	0.0%	0.0%	481	5,100
All employees	16.9%	31.3%	18.7%	17.3%	10.7%	8.5%	4.3%	2.6%	0.3%	0.2%	1,107	11,333
Weighted sample	187	59	35	32	20	16	8	5	1	<1	1,107	
Projected population	1,916	599	358	331	206	163	82	51	7	3		11,333

Results are based on responses to questions *Q0007* through *Q0011* for individual days absent and on responses to *Q0012* for those absent all week; reasons given in *Q0012* are assumed to apply to all five weekdays. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 12. Percent of employees not traveling to campus at least one weekday, by reason

| | | Percent away from campus for: | | | | | | | | | |
Role group	Percent away from campus (for any reason):	Off-campus work / travel	Work from home	Vacation	Sick	Regular day off	Furlough	On leave	CWW	Weighted sample	Projected population
Faculty	41.6%	16.1%	20.2%	0.8%	1.8%	2.0%	1.0%	1.3%	0.0%	201	2,081
Staff	32.2%	7.8%	5.1%	6.6%	5.2%	5.0%	3.6%	0.9%	0.4%	906	9,252
Outside Davis	38.1%	9.2%	9.3%	6.4%	5.0%	5.9%	4.1%	1.0%	0.6%	584	6,233
Within Davis	28.5%	9.9%	5.9%	4.2%	4.0%	2.7%	2.1%	0.7%	0.0%	481	5,100
All employees	34.0%	9.3%	7.9%	5.5%	4.5%	4.4%	3.1%	1.0%	0.3%	1,107	11,333
Weighted sample	376	103	87	61	50	49	34	11	3	1,107	
Projected population	3,848	1,057	891	625	514	503	350	108	33		11,333

Results are based on responses to questions *Q0007* through *Q0011* for individual days absent and on responses to *Q0012* for those absent all week; reasons given in *Q0012* are assumed to apply to all five weekdays. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Destination on campus

Employees and graduate students were asked the location of their office, lab, or department (in question *Q0004*). This was in part to screen out those whose offices or labs were outside of Davis (see above), who are excluded from the sample for this study. Among the included respondents, about 83 percent reported locations in the central campus area (a projected 13,958 people), including 88 percent of grad students, 92 percent of faculty, and 78 percent of staff (Table 13). About 17 percent (a projected 2,365 people) reported locations in west campus, south

past years of this survey nor will likely apply in the future.

campus, or off-campus within the city of Davis, including 12 percent of grad students, 8 percent of faculty, and 22 percent of staff.

Table 13. Destination on campus, among employees and graduate students

Role group	Central campus area	West campus area (west of SR 113)	South campus area (south of I-80)	Off-campus but in Davis	Weighted sample	Projected population
Grad students	88.0%	4.9%	4.1%	3.0%	547	5,472
Masters	88.0%	2.2%	6.1%	3.7%	192	1,926
Phd	88.1%	6.4%	2.9%	2.6%	355	3,546
Employees	80.7%	5.1%	5.7%	8.5%	1,160	11,333
Faculty	92.3%	3.6%	2.2%	1.9%	210	2,081
Staff	78.1%	5.4%	6.4%	10.0%	950	9,252
Overall	83.1%	5.0%	5.2%	6.8%	1,707	16,805
Weighted sample	1,418	86	88	115	1,707	
Projected population	13,958	846	866	1,135		16,805

Results are based on responses to question *Q0004*. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Mode split for primary means of transportation

For physical trips to campus, mode choice was determined by asking respondents to "Please select which means of transportation you used on your way to your first campus destination each day. (If you used more than one means, select whatever you did for most of the distance)" (question *Q0016*). Thus the modes identified are those used for *most* of the trip, and only on the way *to* campus at the beginning of the day. (Throughout this report, we refer to this as a respondent's "primary" mode, meaning what they did for most of the trip to campus.) For each respondent, we calculate the percent of days out of the five-day week that a given mode was used as a primary mode. (For instance, if someone biked one day, her bike share for the week would be 20 percent.) The overall mode split represents the average shares across all respondents, which is equivalent to the percent of all people using each mode on an average weekday.

Table 14 and Table 15 show the overall mode split among those physically traveling to campus on a given day (broken down by role group in Table 14; and further broken down by both residential location and role group in Table 15). (See Table 9 for a comparison of the percent of people physically traveling to campus on an average weekday by role and residential location.) On an average weekday, we estimate that among those physically traveling to campus, about 39 percent of people bike (a projected 13,974 people), 34 percent arrive by car (12,061 people), and 20 percent ride public transit (7,040 people). The percent biking is highest among freshmen (most of whom live on campus), and among grad students and faculty living off-campus within the city of Davis. Among those living off-campus within the city of Davis, undergrads are least likely to bike. With high Unitrans use, they are about equally likely to bike as ride the bus. By contrast, grad students and employees in Davis who do not bike are most likely to drive or get a ride. The overwhelming majority (89 percent) of those living outside Davis drive or get a ride, though the percentage is somewhat lower among faculty and grad students (81 and 84 percent, respectively; Table 15). Train ridership differs markedly by role, with 13 percent of faculty living outside of Davis riding on an average weekday, compared with 9 percent of grad students, 2 percent of undergrads, and 1 percent of staff.

Table 14. Percent using each mode on an average weekday, by role group (all locations)

Role group	Percent physically traveling	Among those physically traveling, percent using:							Weighted sample	Projected population
		Bike	Walk	Skate	Drive alone	Carpool or ride	Bus	Train		
Students	90.8%	45.3%	7.7%	0.5%	15.5%	5.8%	24.7%	0.4%	2,758	28,876
Undergraduate	91.5%	43.9%	8.4%	0.6%	12.5%	5.3%	29.1%	0.2%	2,236	23,404
Freshmen	93.8%	71.0%	15.9%	0.8%	3.1%	2.2%	6.7%	0.3%	414	4,335
Sophomores	96.6%	40.3%	3.5%	0.2%	7.1%	5.6%	43.2%	0.0%	425	4,444
Juniors	91.7%	37.7%	5.7%	0.3%	12.5%	6.2%	37.1%	0.4%	608	6,363
Seniors	87.5%	35.8%	9.2%	0.9%	20.8%	6.2%	27.0%	0.1%	789	8,262
Graduate	87.4%	51.4%	4.9%	0.4%	29.0%	8.0%	4.9%	1.5%	523	5,472
Masters	86.5%	49.3%	5.2%	0.3%	30.7%	7.0%	6.3%	1.2%	184	1,926
PhD	87.9%	52.4%	4.7%	0.4%	28.1%	8.6%	4.2%	1.6%	339	3,546
Employees	83.1%	22.4%	4.0%	0.1%	55.6%	13.3%	3.7%	1.0%	1,082	11,333
Faculty	79.3%	36.7%	6.1%	0.2%	39.5%	11.3%	2.3%	3.9%	199	2,081
Staff	83.9%	19.4%	3.5%	0.0%	59.0%	13.7%	4.0%	0.4%	884	9,252
Overall	88.6%	39.2%	6.7%	0.4%	26.1%	7.8%	19.2%	0.6%	3,840	40,209
Weighted sample	3,402	1,334	230	14	887	265	652	20	3,840	
Projected population	35,626	13,973	2,403	148	9,291	2,770	6,828	212		40,209

Results are based on responses to question *Q0006* (whether they traveled to campus each day) and question *Q0016* (primary means of transportation each day). All mode split percentages are calculated as follows: we first calculate the percent of five weekdays that an individual used a particular mode. Then the average over all respondents represents the percent using this mode on an average weekday. All data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 15. Percent using each mode on an average weekday, by role group from within Davis

Role group	Percent physically traveling	Among those physically traveling, percent using:							Weighted sample	Projected population
		Bike	Walk	Skate	Drive alone	Carpool or ride	Bus	Train		
On campus	93.6%	73.2%	18.4%	1.1%	1.4%	2.0%	3.7%	0.1%	535	5,915
Off campus	90.5%	43.6%	5.3%	0.4%	15.9%	6.7%	28.1%	0.0%	2,301	24,997
Students	92.0%	42.9%	5.1%	0.5%	11.9%	5.9%	33.8%	0.1%	1,829	19,945
Undergraduate	92.1%	39.6%	5.4%	0.5%	9.0%	5.4%	40.0%	0.1%	1,495	16,322
Freshmen	95.2%	54.9%	5.4%	0.0%	5.1%	2.4%	31.5%	0.7%	46	507
Sophomores	96.9%	39.2%	3.5%	0.1%	4.3%	5.2%	47.7%	0.0%	368	4,022
Juniors	92.9%	38.6%	4.8%	0.1%	7.0%	6.1%	43.3%	0.1%	477	5,134
Seniors	88.3%	39.6%	7.1%	1.2%	14.1%	5.3%	32.7%	0.1%	605	6,659
Graduate	91.5%	57.3%	3.7%	0.2%	24.9%	7.7%	6.2%	0.0%	334	3,623
Masters	91.4%	56.6%	4.7%	0.4%	24.2%	7.4%	6.7%	0.0%	122	1,318
PhD	91.6%	57.7%	3.1%	0.1%	25.4%	7.9%	5.9%	0.0%	212	2,306
Employees	84.9%	46.8%	6.0%	0.2%	33.0%	10.1%	4.0%	0.0%	472	5,050
Faculty	83.7%	52.7%	8.2%	0.3%	27.2%	9.6%	2.0%	0.0%	123	1,344
Staff	85.3%	44.7%	5.3%	0.1%	35.0%	10.3%	4.6%	0.0%	349	3,708
Overall	91.1%	49.3%	7.8%	0.5%	13.1%	5.8%	23.3%	0.1%	2,836	30,912
Weighted sample	2,583	1,274	221	14	372	149	662	2	2,836	
Projected population	28,159	13,893	2,198	154	3,697	1,624	6,575	18		30,912

Results are based on responses to question *Q0006* (whether they traveled to campus each day) and question *Q0016* (primary means of transportation each day). All mode split percentages are calculated as follows: we first calculate the percent of five weekdays that an individual used a particular mode. Then the average over all respondents represents the percent using this mode on an average weekday. All data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 16. Percent using each mode on an average weekday, by role group from outside Davis

Role group	Percent physically traveling	Among those physically traveling, percent using:							Weighted sample	Projected population
		Bike	Walk	Skate	Drive alone	Carpool or ride	Bus	Train		
Students	80.8%	2.1%	1.5%	0.0%	73.7%	13.0%	5.6%	4.1%	281	2,938
Undergraduate	86.0%	1.9%	1.9%	0.0%	75.3%	12.4%	6.7%	1.7%	181	1,896
Graduate	71.4%	2.6%	0.6%	0.0%	70.1%	14.4%	3.1%	9.2%	99	1,041
Employees	82.3%	2.2%	1.9%	0.0%	74.3%	16.0%	3.6%	1.9%	582	6,094
Faculty	72.3%	2.1%	1.0%	0.0%	66.2%	14.5%	3.4%	12.8%	67	701
Staff	83.6%	2.2%	2.0%	0.0%	75.2%	16.2%	3.7%	0.7%	515	5,393
Overall	81.8%	2.2%	1.8%	0.0%	74.1%	15.0%	4.3%	2.6%	862	9,297
Weighted sample	705	15	13	0	523	106	30	18	862	
Projected population	7,605	167	136	0	5,638	1,143	324	197		9,297

Results are based on responses to question *Q0006* (whether they traveled to campus each day) and question *Q0016* (primary means of transportation each day). All mode split percentages are calculated as follows: we first calculate the percent of five weekdays that an individual used a particular mode. Then the average over all respondents represents the percent using this mode on an average weekday. All data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 17. Percent using each mode on an average weekday, including telecommuting, by role

Role group	Percent physically traveling or telecommuting	Among those physically traveling or telecommuting percent using:							Work from home	Weighted sample	Projected population
		Bike	Walk	Skate	Drive alone	Carpool or ride	Bus	Train			
Students	91.0%	45.2%	7.7%	0.5%	15.4%	5.8%	24.7%	0.4%	0.2%	2,758	28,876
Undergraduate	91.5%	43.9%	8.4%	0.6%	12.5%	5.3%	29.1%	0.2%	0.0%	2,236	23,404
Freshmen	93.8%	71.0%	15.9%	0.8%	3.1%	2.2%	6.7%	0.3%	0.0%	414	4,335
Sophomores	96.6%	40.3%	3.5%	0.2%	7.1%	5.6%	43.2%	0.0%	0.0%	425	4,444
Juniors	91.7%	37.7%	5.7%	0.3%	12.5%	6.2%	37.1%	0.4%	0.0%	608	6,363
Seniors	87.5%	35.8%	9.2%	0.9%	20.8%	6.2%	27.0%	0.1%	0.0%	789	8,262
Graduate	88.5%	50.7%	4.8%	0.4%	28.7%	7.9%	4.8%	1.4%	1.2%	523	5,472
Masters	87.6%	48.8%	5.1%	0.3%	30.4%	6.9%	6.2%	1.2%	1.2%	184	1,926
PhD	89.0%	51.8%	4.6%	0.4%	27.8%	8.5%	4.1%	1.6%	1.2%	339	3,546
Employees	86.3%	21.6%	3.8%	0.1%	53.5%	12.8%	3.6%	1.0%	3.7%	1,082	11,333
Faculty	87.0%	33.4%	5.6%	0.2%	36.1%	10.3%	2.1%	3.6%	8.8%	199	2,081
Staff	86.1%	18.9%	3.4%	0.0%	57.5%	13.4%	3.9%	0.4%	2.5%	884	9,252
Within Davis	91.6%	49.1%	7.8%	0.5%	13.1%	5.7%	23.2%	0.1%	0.5%	2,836	30,912
On campus	93.6%	73.2%	18.4%	1.1%	1.4%	2.0%	3.7%	0.1%	0.0%	535	5,915
Off campus	91.1%	43.3%	5.2%	0.4%	15.8%	6.6%	27.9%	0.0%	0.6%	2,301	24,997
Beyond Davis	84.7%	2.1%	1.7%	0.0%	71.6%	14.5%	4.1%	2.5%	3.4%	862	9,297
Overall	89.6%	38.8%	6.7%	0.4%	25.8%	7.7%	18.9%	0.6%	1.2%	3,840	40,209
Weighted sample	3,442	1,334	230	14	887	265	652	20	40	3,840	
Projected population	36,041	13,973	2,403	148	9,291	2,770	6,828	212	416		40,209

Results are based on responses to question *Q0006* (whether they traveled to campus each day), question *Q0016* (primary means of transportation each day), and questions *Q0007-Q0012* (reasons for not traveling, including telecommuting). See footnote 4 regarding student telecommuting. All mode split percentages are calculated as follows: we first calculate the percent of five weekdays that an individual used a particular mode. Then the average over all respondents represents the percent using this mode on an average weekday. All data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 17 reports the mode split if we include telecommuting as a travel mode (sometimes considered virtual travel), as done in Lovejoy et al. (2009) and Congleton (2008), presented here for comparison purposes. The denominator here is all people who physically traveled to campus plus those who worked from home on a given weekday, but excluding those not traveling for any other reason, based on responses to questions *Q0007* through *Q0012*. If working from home was indicated in *Q0012* as the reason for not traveling to campus the entire week, we assumed that the individual did so on all five weekdays.[6]

As an overview of the differences between Table 14 and Table 17, Table 18 shows how the mode split percentages appear different, depending on who is included in the equation. For instance, we project that about 13,900 people bike to campus as their primary means of travel on a typical weekday, which represents just over 39 percent of everyone physically traveling to campus on a given day, just under 39 percent of those either physically traveling or telecommuting, and about 35 percent of the entire campus population (including those not traveling for other reasons).

Table 18. Comparison of mode split percentages using different denominators

Among… (denominator used):	Bike	Walk	Skate	Drive alone	Carpool or ride	Bus	Train	Work from home	Other non-travel	Denominator: As percent of the total population	Projected population included
Total population	34.8%	6.0%	0.4%	23.1%	6.9%	17.0%	0.5%	1.0%	10.4%	100.0%	40,209
Those traveling or telecommuting	38.8%	6.7%	0.4%	25.8%	7.7%	18.9%	0.6%	1.2%	n/a	89.6%	36,044
Those physically traveling only	39.2%	6.8%	0.4%	26.1%	7.8%	19.2%	0.6%	n/a	n/a	88.6%	35,629
Population projection	13,974	2,406	151	9,289	2,768	6,828	212	415	4,165		40,209

While Table 11 through Table 18 present estimates for the percent doing various things on an average weekday, another consideration is the percent doing various things at least once on a given day during the week. Table 19 shows the percent using each mode as a primary mode at least once during the seven-day week (including Saturday and Sunday, although this addition does not affect these numbers substantially). We see, for instance, that although about 39 percent bike to campus (as their primary means of transportation, among those physically coming to campus) on an average weekday (from Table 14), about 47 percent bike to campus (as their primary means of transportation) at least once during the week (Table 19). So while about 14,000 people bike as their primary means of travel on an average day, about 19,000 people are regular bikers (at least once per week). The number of regular carpoolers and train-riders is also substantially greater than the average number doing it on a given day, projected to be 7,530 (versus 2,768) and 476 (versus 212) for carpooling and train-riding, respectively.

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[6]   Only employees were asked questions *Q0007-11* (reasons for not traveling to campus on particular days of the week), and so only employees could indicate telecommuting on these days. Both employees and students were asked question *Q0012* (reason for not traveling to campus the entire week), and could indicate working from home as the reason for being away all week. Thus student telecommuting is only measured if it was done the entire week, and therefore the estimated percent of students working from home (shown in Table 14) may be may low, which would make our estimates of their use of all other modes correspondingly high.

Table 19. Percent using each as a primary mode at least once during the seven-day week

| Role group | Percent physically traveling | Among those traveling, percent using each as a primary mode: | | | | | | | Weighted sample | Projected population |
		Bike	Walk	Skate	Drive alone	Carpool or ride	Bus	Train		
Students	97.5%	55.1%	16.1%	1.3%	27.9%	18.2%	35.4%	1.0%	2,758	28,876
Undergraduate	98.8%	81.1%	36.2%	1.3%	4.7%	9.7%	15.5%	1.4%	2,235	23,404
Freshmen	99.6%	54.4%	9.3%	1.0%	13.6%	21.6%	60.8%	0.2%	414	4,335
Sophomores	98.1%	48.3%	12.0%	0.7%	24.1%	19.5%	49.5%	1.0%	424	4,444
Juniors	96.3%	44.7%	16.6%	2.3%	38.3%	19.0%	38.1%	0.5%	608	6,363
Seniors	97.4%	54.9%	11.5%	0.3%	47.0%	16.5%	11.8%	2.4%	789	8,262
Graduate	95.4%	60.1%	9.0%	0.7%	48.0%	20.7%	8.1%	2.3%	523	5,472
Masters	93.4%	41.0%	8.5%	0.3%	54.9%	18.9%	3.3%	6.0%	184	1,926
PhD	93.3%	23.2%	6.8%	0.2%	70.5%	20.5%	6.4%	0.6%	339	3,546
Employees	93.3%	26.5%	7.1%	0.2%	67.6%	20.2%	5.9%	1.6%	1,082	11,333
Faculty	93.4%	41.0%	8.5%	0.3%	54.9%	18.9%	3.3%	6.0%	199	2,081
Staff	93.3%	23.2%	6.8%	0.2%	70.5%	20.5%	6.4%	0.6%	884	9,252
Outside Davis	94.7%	3.9%	3.6%	0.0%	82.8%	21.8%	6.1%	3.9%	862	9,297
Within Davis	97.1%	60.2%	16.2%	1.3%	26.1%	17.7%	33.8%	0.4%	2,836	30,912
Overall	96.3%	47.3%	13.7%	1.0%	38.8%	18.7%	27.3%	1.2%	3,840	40,209
Weighted sample	3,699	1,815	525	37	1,489	719	1,050	45	3,840	
Projected population	38,733	19,008	5,501	391	15,587	7,530	10,995	476		40,209
Average weekday projected population	35,629	13,974	2,406	151	9,289	2,768	6,828	212		40,209

Results are based on responses to questions *Q0006* (whether traveled to campus) and *Q0016* (primary means of transportation each day). Data are weighted by role group based on the 3,840 valid responses to question *Q0016*.

Comparison of 2009-10 mode split with 2008-09 and 2007-08

While one of the main purposes of the Campus Travel Survey is to collect comparable data each year for the assessment of trends over time, as we refine how to best collect information such as mode choice, we have made some changes each year of the survey, potentially compromising comparisons across years. With that caveat in mind, meaningful comparisons can be made. First, there are almost no differences between the 2009-10 and 2008-09 surveys. There is more difference between these and the earlier 2007-08 survey (see Lovejoy, et al. 2009). In particular, the 2007-08 respondents were not given the options of train/rail, getting a ride, or skating, but they were given the option of "other" as well as "more than one of these," generating an additional category of ambiguously multimodal commuters (in 2007-08) who in later years were forced to indicate a single primary mode used for most of the trip. Another addition to the 2009-10 survey was the choice of "motorcycle/ scooter" as its own mode category. (In the 2008-09 survey, motorcyclists were expected to choose "drive alone" as their means of travel. For the purposes of analysis in this report, we still group the motorcyclists with those driving alone.)

Roughly comparable mode-split data for all three years are presented in Table 20. (See Lovejoy, et al. 2009 for more information on the preparation of the 2007-08 mode splits.) Table 21 shows the percentage-point change across years (and tests for statistically significant changes), from 2007-08 to 2008-09, then from 2008-09 to 2009-10, and finally across the two-year span from 2007-08 to 2009-10.

Table 20. Percent using each mode on an average weekday, 2007-08 through 2009-10

Year and role group	Percent physically traveling to campus	Among those physically traveling to campus, percent by:							Weighted sample
		Bike	Walk or skate	Personal vehicle			Bus	Train	
				Any	Drive alone	Carpool or ride			
2007-08 Overall	93.1%	37.7%	4.9%	34.5%	29.0%	5.5%	19.1%	n/a	4,180
Undergrad	94.7%	40.6%	6.0%	20.0%	16.7%	4.1%	28.8%	n/a	2,437
Grad	88.4%	55.4%	6.0%	24.4%	23.8%	3.4%	7.1%	n/a	570
Faculty	88.2%	39.5%	2.9%	46.6%	45.3%	6.7%	2.1%	n/a	479
Staff	92.9%	20.1%	2.1%	66.1%	60.3%	10.1%	4.4%	n/a	1,235
2008-09 Overall	90.4%	40.8%	6.0%	32.3%	24.7%	7.6%	20.2%	0.8%	3,929
Undergrad	93.4%	46.0%	7.9%	15.4%	10.8%	4.6%	30.3%	0.4%	2,246
Grad	89.0%	52.7%	5.4%	33.1%	28.1%	5.1%	6.8%	2.0%	553
Faculty	80.7%	40.0%	4.5%	49.9%	42.5%	7.4%	2.7%	2.9%	522
Staff	86.4%	19.8%	1.7%	72.2%	55.2%	17.0%	5.5%	0.8%	797
2009-10 Overall	88.6%	39.2%	7.2%	33.9%	26.1%	7.8%	19.2%	0.6%	3,840
Undergrad	91.5%	43.9%	9.0%	17.8%	12.5%	5.3%	29.1%	0.2%	2,235
Grad	87.4%	51.4%	5.2%	37.1%	29.0%	8.0%	4.9%	1.5%	523
Faculty	79.3%	36.7%	6.3%	50.8%	39.5%	11.3%	2.3%	3.9%	392
Staff	83.9%	19.4%	3.6%	72.7%	59.0%	13.7%	4.0%	0.4%	549

Results from 2009-10 are based on responses to questions *Q0006* (whether traveled to campus) and *Q0016* (primary mode each day) and are weighted by role based on the 3,840 valid responses to *Q0016* (see Table 6). Results from 2008-09 and 2007-08 data are similarly calculated and weighted, as described in Lovejoy, et al. (2009).

Table 21. Percentage-point change in overall mode shares, 2007-08 through 2009-10

Years of comparison	Percentage-point change in percent of people doing each on an average weekday							Physically traveling to campus
	Among those physically traveling to campus:							
	Bike	Walk	Personal vehicle			Bus	Train	
			Any	Drive alone	Carpool or ride			
2007-08 to 2008-09	3.0% **	0.7%	-2.2% **	-4.3% **	2.1% **	1.1%	n/a	-2.7% **
2008-09 to 2009-10	-1.5%	1.1% *	1.6%	1.4%	0.2%	-1.0%	-0.2%	-1.8% **
2007-08 to 2009-10	1.5%	1.8% **	-0.6%	-2.9% **	2.3% **	0.1%	n/a	-4.5% **

Total sample sizes are 4,180 (in 2007-08), 3,929 (in 2008-09), and 3,840 (in 2009-10).
* Statistically significant difference with $p < 0.1$ in a two-category χ^2 test of the frequency of those using this mode versus those using any other mode in one year versus the other.
** Statistically significant at $p < 0.05$.

We see that between 2007-08 and 2008-09, there was some shift toward what are thought of as more environmentally friendly, sustainable modes, but that this trend slowed between 2008-09 and 2009-10 (Table 21). In particular, between 07-08 and 08-09, the percent of people biking increased by about 3 percentage points (from 39 to 41 percent), but declined to 38 percent in 2009-10, not statistically significantly different from the 2007-08 figure. Similarly while the percent arriving in a car had been down by about 2 percentage points from 07-08 to 08-09, it was back up to the 07-08 levels this year. The percent driving alone is still lower in 2009-10 than in 2007-08, but by 3 percentage points (at 26 percent) rather than 4 percentage points, as found in 2008-09. And an overall increase in carpooling was sustained, still about 2 percentage points above 2007-08 levels (at 8 percent). There was also a statistically significant increase in the

percent of people walking in 2009-10, up about 2 percentage points since 2007-10 (to 7 percent). There was no statistically significant change in bus or train ridership over any of the years.

There appear to be some patterns within role groups that differ from the rest of the population. (Table 22 through Table 29 show the percentage-point changes in the number using each mode on an average weekday across survey years for more detailed role-group categories.) In particular, while in the overall population there was no significant change in the percent using a personal vehicle to get to campus (either as rider or passenger), the percent of undergrads arriving cars has decreased in each of the last two years (by about 3 percentage points since 2007-08, to 18 percent) while the percent of grad students using cars has increased in each of the last two years (by about 10 percent, to 37 percent, about three-quarters of them driving alone) (Table 24 and Table 20). The percent of employees arriving by car has not changed, but the percent of employees arriving by carpool has increased (by about 4 percentage points, to 11 percent) (Table 26).

The biggest change since 2007-08 is in the percent of people physically traveling to campus on an average weekday, down each of the last two years to about 89 percent (from 93 percent in 2007-08), representing approximately 1,800 fewer people traveling to campus on an average weekday in 09-10 versus 07-08. This trend exists among all role groups—students, faculty, and staff—but is most pronounced among employees, down by about 9 percentage points (to 83 percent) since 2007-08 (Table 29).

Table 22. Percent change in bike mode share, by role, 2007-08 through 2009-10

Role group	Percentage point change			Sample size[a]		
	2007-08 to 2008-09	2008-09 to 2009-10	2007-08 to 2009-10	2007-08	2008-09	2009-10
Students[a]	4.1% **	-2.0%	2.0%	2,812	2,589	2,503
Undergraduate[a]	5.4% **	-2.1%	3.3% **	2,308	2,096	2,046
Freshmen	-0.1%	-2.8%	-2.9%	418	422	527
Sophomores	10.2% **	-2.4%	7.8% **	445	387	471
Juniors	4.6%	-0.4%	4.2%	399	385	383
Seniors	4.7%	-0.9%	3.8%	356	315	401
Graduate[a]	-2.7%	-1.4%	-4.1%	504	492	457
Masters	-2.2%	0.3%	-1.9%	261	287	338
PhD	-2.8%	-2.2%	-5.0%	412	604	512
Employees[a]	-0.2%	-0.9%	-1.0%	1,079	965	899
Faculty	0.6%	-3.4%	-2.8%	422	421	311
Staff	-0.3%	-0.4%	-0.7%	1,147	689	461
Outside Davis[a]	-0.3%	-0.5%	-0.8%	888	741	705
Within Davis[a]	2.8% **	-1.5%	1.3%	3,004	2,812	2,583
Overall[a]	3.0% **	-1.5%	1.5%	3,891	3,553	3,402

[a] For statistical tests, we used the unweighted sample for the eight basic role group categories (freshmen, sophomores, juniors, seniors, masters students, PhD students, faculty, and staff), but the weighted sample for consolidated groups (students, undergraduates, grad students, employees, outside Davis, within Davis, and overall).

[*] Statistically significant difference with $p < 0.1$ in a two-category χ^2 test of the frequency of those using this mode versus those using any other mode in one year versus the other.

[**] Statistically significant at $p < 0.05$.

Table 23. Percent change in walk mode share, by role, 2007-08 through 2009-10

Role group	Percentage point change			Sample size[a]		
	2007-08 to 2008-09	2008-09 to 2009-10	2007-08 to 2009-10	2007-08	2008-09	2009-10
Students[a]	1.0%	0.8%	1.8% **	2,812	2,589	2,503
Undergraduate[a]	1.4% *	1.0%	2.4% **	2,308	2,096	2,046
Freshmen	2.7%	3.9% *	6.6% **	418	422	527
Sophomores	-0.6%	1.2%	0.6%	445	387	471
Juniors	-0.5%	0.1%	-0.4%	399	385	383
Seniors	3.0%	0.3%	3.3% *	356	315	401
Graduate[a]	-0.7%	-0.4% *	-1.1%	504	492	457
Masters	-1.5%	0.5%	-1.0%	261	287	338
PhD	-0.4%	-0.8%	-1.2%	412	604	512
Employees[a]	-0.1%	1.8% **	1.7% **	1,079	965	899
Faculty	1.5%	1.6%	3.2% **	422	421	311
Staff	-0.4%	1.8% **	1.5% *	1,147	689	461
Outside Davis[a]	0.1%	1.3% **	1.4% **	888	741	705
Within Davis[a]	0.7%	0.8%	1.5% **	3,004	2,812	2,583
Overall[a]	0.7%	1.1% *	1.8% **	3,891	3,553	3,402

[a]   For statistical tests, we used the unweighted sample for the eight basic role group categories (freshmen, sophomores, juniors, seniors, masters students, PhD students, faculty, and staff), but the weighted sample for consolidated groups (students, undergraduates, grad students, employees, outside Davis, within Davis, and overall).

*   Statistically significant difference with $p < 0.1$ in a two-category χ^2 test of the frequency of those using this mode versus those using any other mode in one year versus the other.

**   Statistically significant at $p < 0.05$.

Table 24. Percent change in personal-vehicle mode share, by role, 2007-08 through 2009-10

Role group	Percentage point change			Sample size[a]		
	2007-08 to 2008-09	2008-09 to 2009-10	2007-08 to 2009-10	2007-08	2008-09	2009-10
Students[a]	-3.2% **	2.5% **	-0.7%	2,812	2,589	2,503
Undergraduate[a]	-5.4% **	2.3% **	-3.1% **	2,308	2,096	2,046
Freshmen	-1.0%	1.6%	0.6%	418	422	527
Sophomores	-5.5% **	1.3%	-4.2% *	445	387	471
Juniors	-7.2% **	1.5%	-5.7% *	399	385	383
Seniors	-5.7% *	3.2%	-2.6%	356	315	401
Graduate[a]	6.0% **	3.9%	9.9% **	504	492	457
Masters	5.6%	1.9%	7.5% *	261	287	338
PhD	6.0% **	4.9% *	10.9% **	412	604	512
Employees[a]	1.2%	0.5% **	1.7%	1,079	965	899
Faculty	-2.1%	0.9% **	-1.2%	422	421	311
Staff	1.8%	0.5%	2.3%	1,147	689	461
Outside Davis[a]	2.9%	2.1%	5.0% **	888	741	705
Within Davis[a]	-2.0% *	1.1%	-0.9%	3,004	2,812	2,583
Overall[a]	-2.2% **	1.6%	-0.6%	3,891	3,553	3,402

[a]   For statistical tests, we used the unweighted sample for the eight basic role group categories (freshmen, sophomores, juniors, seniors, masters students, PhD students, faculty, and staff), but the weighted sample for consolidated groups (students, undergraduates, grad students, employees, outside Davis, within Davis, and overall).

*   Statistically significant difference with $p < 0.1$ in a two-category χ^2 test of the frequency of those using this mode versus those using any other mode in one year versus the other.

**   Statistically significant at $p < 0.05$.

Table 25. Percent change in drive-alone mode share, by role, 2007-08 through 2009-10

Role group	Percentage point change			Sample size[a]		
	2007-08 to 2008-09	2008-09 to 2009-10	2007-08 to 2009-10	2007-08	2008-09	2009-10
Students[a]	-3.9% **	1.4%	-2.5% **	2,812	2,589	2,503
Undergraduate[a]	-5.9% **	1.6%	-4.3% **	2,308	2,096	2,046
Freshmen	-1.2%	1.0%	-0.2%	418	422	527
Sophomores	-6.3% **	0.5%	-5.8% **	445	387	471
Juniors	-7.9% **	-0.2%	-8.1% **	399	385	383
Seniors	-6.3% **	3.4%	-2.9%	356	315	401
Graduate[a]	4.3%	1.0%	5.3% *	504	492	457
Masters	3.8%	-0.4%	3.3%	261	287	338
PhD	4.5%	1.6%	6.1% **	412	604	512
Employees[a]	-4.6% **	2.6%	-2.0%	1,079	965	899
Faculty	-2.8%	-3.0%	-5.7%	422	421	311
Staff	-5.1% **	3.8%	-1.3%	1,147	689	461
Outside Davis[a]	-3.1%	5.2% **	2.1%	888	741	705
Within Davis[a]	-3.3% **	0.1%	-3.1% **	3,004	2,812	2,583
Overall[a]	-4.3% **	1.4%	-2.9% **	3,891	3,553	3,402

[a]   For statistical tests, we used the unweighted sample for the eight basic role group categories (freshmen, sophomores, juniors, seniors, masters students, PhD students, faculty, and staff), but the weighted sample for consolidated groups (students, undergraduates, grad students, employees, outside Davis, within Davis, and overall).

*   Statistically significant difference with $p < 0.1$ in a two-category χ^2 test of the frequency of those using this mode versus those using any other mode in one year versus the other.

**   Statistically significant at $p < 0.05$.

Table 26. Percent change in carpool mode share, by role, 2007-08 through 2009-10

Role group	Percentage point change			Sample size[a]		
	2007-08 to 2008-09	2008-09 to 2009-10	2007-08 to 2009-10	2007-08	2008-09	2009-10
Students[a]	0.7%	1.1% *	1.8% **	2,812	2,589	2,503
Undergraduate[a]	0.5%	0.7%	1.2% *	2,308	2,096	2,046
Freshmen	0.1%	0.6%	0.8%	418	422	527
Sophomores	0.8%	0.8%	1.6%	445	387	471
Juniors	0.7%	1.7%	2.4%	399	385	383
Seniors	0.6%	-0.3%	0.3%	356	315	401
Graduate[a]	1.6%	3.0% *	4.6% **	504	492	457
Masters	1.8%	2.4%	4.2% **	261	287	338
PhD	1.6%	3.3% **	4.8% **	412	604	512
Employees[a]	5.8% **	-2.1% *	3.8% **	1,079	965	899
Faculty	0.7%	3.8% *	4.5% **	422	421	311
Staff	6.9% **	-3.3%	3.6% **	1,147	689	461
Outside Davis[a]	6.0% **	-3.1%	2.8% *	888	741	705
Within Davis[a]	1.2% **	1.0%	2.2% **	3,004	2,812	2,583
Overall[a]	2.1% **	0.2%	2.3% **	3,891	3,553	3,402

[a]   For statistical tests, we used the unweighted sample for the eight basic role group categories (freshmen, sophomores, juniors, seniors, masters students, PhD students, faculty, and staff), but the weighted sample for consolidated groups (students, undergraduates, grad students, employees, outside Davis, within Davis, and overall).

*   Statistically significant difference with $p < 0.1$ in a two-category χ^2 test of the frequency of those using this mode versus those using any other mode in one year versus the other.

**   Statistically significant at $p < 0.05$.

Table 27. Percent change in bus mode share, by role, 2007-08 through 2009-10

| Role group | Percentage point change | | | Sample size[a] | | |
	2007-08 to 2008-09	2008-09 to 2009-10	2007-08 to 2009-10	2007-08	2008-09	2009-10
Students[a]	0.9%	-1.1%	-0.2%	2,812	2,589	2,503
Undergraduate[a]	1.5%	-1.1%	0.4%	2,308	2,096	2,046
Freshmen	0.8%	-1.9%	-1.1%	418	422	527
Sophomores	-1.2%	0.3%	-0.9%	445	387	471
Juniors	5.3%	-1.1%	4.3%	399	385	383
Seniors	1.7%	-3.0%	-1.3%	356	315	401
Graduate[a]	-0.4%	-1.9%	-2.2%	504	492	457
Masters	0.8%	-2.2%	-1.3%	261	287	338
PhD	-1.0%	-1.8%	-2.8% *	412	604	512
Employees[a]	1.0%	-1.4%	-0.3%	1,079	965	899
Faculty	0.6%	-0.4%	0.2%	422	421	311
Staff	1.2%	-1.6%	-0.4%	1,147	689	461
Outside Davis[a]	-0.8%	-1.9%	-2.6% **	888	741	705
Within Davis[a]	1.2%	-0.5%	0.6%	3,004	2,812	2,583
Overall[a]	1.1%	-1.0%	0.1%	3,891	3,553	3,402

[a] For statistical tests, we used the unweighted sample for the eight basic role group categories (freshmen, sophomores, juniors, seniors, masters students, PhD students, faculty, and staff), but the weighted sample for consolidated groups (students, undergraduates, grad students, employees, outside Davis, within Davis, and overall).
* Statistically significant difference with $p < 0.1$ in a two-category χ^2 test of the frequency of those using this mode versus those using any other mode in one year versus the other.
** Statistically significant at $p < 0.05$.

Table 28. Percent change in train mode share, by role, 2007-08 through 2009-10

| Role group | Percentage point change | | | Sample size[a] | |
	2007-08 to 2008-09	2008-09 to 2009-10	2007-08 to 2009-10	2008-09	2009-10
Students[a]	n/a	-0.2%	n/a	2,589	2,503
Undergraduate[a]	n/a	-0.1%	n/a	2,096	2,046
Freshmen	n/a	-0.8%	n/a	287	338
Sophomores	n/a	-0.4%	n/a	604	512
Juniors	n/a	-0.8%	n/a	287	338
Seniors	n/a	-0.4%	n/a	604	512
Graduate[a]	n/a	-0.5%	n/a	492	457
Masters	n/a	-0.8%	n/a	287	338
PhD	n/a	-0.4%	n/a	604	512
Employees[a]	n/a	-0.2%	n/a	965	899
Faculty	n/a	1.1%	n/a	421	311
Staff	n/a	-0.4%	n/a	689	461
Outside Davis[a]	n/a	-0.9%	n/a	741	705
Within Davis[a]	n/a	0.0%	n/a	2,812	2,583
Overall[a]	n/a	-0.2%	n/a	3,553	3,402

[a] For statistical tests, we used the unweighted sample for the eight basic role group categories (freshmen, sophomores, juniors, seniors, masters students, PhD students, faculty, and staff), but the weighted sample for consolidated groups (students, undergraduates, grad students, employees, outside Davis, within Davis, and overall).
* Statistically significant difference with $p < 0.1$ in a two-category χ^2 test of the frequency of those using this mode versus those using any other mode in one year versus the other.
** Statistically significant at $p < 0.05$.

Table 29. Percent change in those physically traveling, by role, 2007-08 through 2009-10

Role group	Percentage point change			Sample size[a]		
	2007-08 to 2008-09	2008-09 to 2009-10	2007-08 to 2009-10	2007-08	2008-09	2009-10
Students[a]	-1.0%	-1.7% *	-2.7% **	3,007	2,799	2,758
Undergraduate[a]	-1.3%	-1.8% *	-3.2% **	2,437	2,246	2,235
Freshmen	-0.4%	-1.5%	-1.9%	437	443	562
Sophomores	-0.9%	0.3%	-0.7%	457	402	487
Juniors	-1.7%	-0.3%	-2.1%	425	418	418
Seniors	-1.9%	-3.9%	-5.8% **	382	345	458
Graduate[a]	0.5%	-1.5%	-1.0%	570	553	523
Masters	3.4%	-0.8%	2.6%	311	329	391
PhD	-0.9%	-1.9%	-2.8%	454	673	583
Employees[a]	-6.7% **	-2.3%	-8.9% **	1,173	1,130	1,082
Faculty	-7.5% **	-1.3%	-8.8% **	479	522	392
Staff	-6.4% **	-2.5%	-8.9% **	1,235	797	549
Outside Davis[a]	-5.4% **	0.2%	-5.3% **	1,019	908	862
Within Davis[a]	-1.9% **	-2.0% **	-3.9% **	3,161	3,021	2,836
Overall[a]	-2.7% **	-1.8% **	-4.5% **	4,180	3,929	3,840

[a]   For statistical tests, we used the unweighted sample for the eight basic role group categories (freshmen, sophomores, juniors, seniors, masters students, PhD students, faculty, and staff), but the weighted sample for consolidated groups (students, undergraduates, grad students, employees, outside Davis, within Davis, and overall).

*   Statistically significant difference with $p < 0.1$ in a two-category χ^2 test of the frequency of those using this mode versus those using any other mode in one year versus the other.

**   Statistically significant at $p < 0.05$.

Secondary means of transportation and circulation on campus

Another consideration in evaluating the number of people regularly using particular modes is whether people use a particular means of transportation for some portion of the trip to campus, but not as a primary means of transportation for most of the way (as reported in question *Q0016*). While this year's survey did not ask respondents to provide a detailed accounting of what different (multiple) modes they typically use to get to campus (as in the 2008-09 survey; see Lovejoy, et al., 2009), it did include one question asking respondents to indicate "all the different means of transportation you used at some point on your way to school or work, from the moment you left home to when you arrived at your first destination on campus -- even if it was just for part of the way -- on any day last week. (Check all that apply.)" (See question *Q0015*.) We might infer that any means of transportation indicated in question *Q0015* but not in question *Q0016* (where respondents report their primary means of transportation for most of the distance on each day) was used by the respondent as a secondary mode, at least once at some point during the reference week (though we have no way of knowing how frequently each was used, or in combination with what other modes).

Table 30 shows the percent who reported using a given mode at least once during the week in question *Q0015*, but who did *not* identify that mode as their primary means of transportation for most of the distance on any day (question *Q0016*). For instance, although about 47 percent biked as a primary means of transportation at some point during the week (Table 19), an additional 6 percent apparently biked in combination with some other means of transportation at least once during the week (Table 30). By this estimate, a projected 16,264 bike at least once a week, either

as a primary or secondary mode. Clearly, walking is the most commonly reported secondary mode, with about a third of respondents reporting walking for some portion of their trip. Relative to the number using it as a primary mode, skating is especially common as a secondary mode, approximately doubling the total number doing so for transportation at least once per week (to about 750). Similarly considering those who report riding a train or light rail but not as a primary mode increases the projected total number of train riders by about 33 percent (to 631, consisting of both Sac RT and Capitol Corridor Amtrak riders) and of carpoolers by 35 percent (to 10,198).

Table 30. Percent using each mode at least once as a secondary mode

| Role group | Percent physically traveling | Among those traveling, percent using each mode at least once but not as a primary mode on any days: | | | | | | | Weighted sample | Projected population |
		Bike	Walk	Skate	Drive alone	Carpool or ride	Bus	Train		
Students	97.5%	6.7%	37.7%	1.3%	5.5%	8.2%	5.8%	0.4%	2,783	28,876
Undergraduate	97.9%	7.2%	40.2%	1.5%	5.9%	9.5%	6.5%	0.5%	2,254	23,404
Freshmen	98.8%	5.7%	42.7%	0.5%	2.9%	7.7%	9.3%	1.1%	418	4,335
Sophomores	99.6%	8.8%	41.8%	2.4%	4.9%	9.8%	5.5%	0.0%	430	4,444
Juniors	98.1%	7.0%	43.1%	1.5%	7.5%	9.9%	4.8%	0.5%	612	6,363
Seniors	96.3%	7.2%	35.8%	1.6%	7.0%	9.9%	6.8%	0.5%	794	8,262
Graduate	96.1%	4.7%	26.7%	0.5%	3.8%	2.8%	2.8%	0.2%	529	5,472
Masters	97.4%	3.1%	27.0%	0.8%	4.2%	2.9%	3.6%	0.3%	186	1,926
PhD	95.4%	5.5%	26.5%	0.4%	3.6%	2.8%	2.3%	0.2%	343	3,546
Employees	93.3%	4.5%	23.2%	0.0%	3.6%	3.5%	1.6%	0.3%	1,098	11,333
Faculty	93.4%	7.2%	22.8%	0.0%	5.1%	2.1%	1.9%	0.8%	203	2,081
Staff	93.3%	3.9%	23.3%	0.0%	3.3%	3.9%	1.5%	0.2%	895	9,252
Outside Davis	94.7%	8.5%	33.2%	0.1%	4.8%	3.6%	2.3%	1.0%	871	9,297
Within Davis	97.1%	5.1%	33.8%	1.2%	4.9%	7.6%	5.2%	0.2%	2,864	30,912
Overall	96.3%	5.9%	33.6%	0.9%	5.0%	6.9%	4.5%	0.4%	3,880	40,209
Weighted sample	3,737	221	1,257	35	187	257	170	15	3,880	
Projected population	38,733	2,290	13,023	358	1,936	2,668	1,760	155		40,209

Results are based on responses to questions *Q0006* (whether traveled to campus), *Q0015* (all means of transportation used to get to campus any days during the seven-day reference week) and compared with *Q0016* (primary means each day). Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Focusing on biking in particular, the survey explicitly asked all respondents about whether they biked after arriving on campus each day, regardless of their primary means of transportation *to* campus each day (question *Q0017*). Table 31 shows that on average weekday, in addition to the people biking as their primary means of transportation to campus, about 7 percent of people (a projected 2,637) bike on campus after arriving by some other means, with a high of 12 percent of sophomores doing so and a low of 5 percent of masters students and staff doing so.

Finally, question *Q0032* asked respondents about how they "typically get around campus (or off campus)" during the day, after arriving at the beginning of the day and before leaving campus for the last time. This question did not ask about what respondents actually did during each day of the reference but rather to rate on a five-point scale from "never" to "always" the frequency that they walk, bike, or ride in a vehicle to get to different destinations around campus. About 6 percent of faculty and 19 percent of staff report "always" or "very often" using a vehicle to get around campus (Table 32). The percent that "always" or "very often" bike is highest among undergraduates (55 percent), then grad students (41 percent), faculty (34 percent), and staff (23

percent). About half report "always" or "very often" walking in all role groups except faculty, where the percent is somewhat higher (60 percent).

Table 31. Percent biking as a secondary mode on campus on average weekday, by role

| Role group | Physically traveling to campus | Among those physically traveling to campus | | | Weighted sample | Projected population |
		Bike was primary mode	Other primary mode, then biked on campus	Other primary mode, and did not bike on campus		
Students	90.6%	46.0%	8.2%	45.8%	2,693	28,876
Undergraduate	91.4%	44.8%	8.9%	46.3%	2,176	23,404
Freshmen	93.9%	73.4%	5.9%	20.7%	408	4,335
Sophomores	96.7%	41.0%	11.8%	47.2%	412	4,444
Juniors	91.5%	37.8%	9.4%	52.8%	586	6,363
Seniors	87.3%	36.3%	8.5%	55.2%	770	8,262
Graduate	87.3%	51.3%	5.1%	43.6%	516	5,472
Masters	86.4%	49.5%	4.7%	45.8%	183	1,926
PhD	87.7%	52.2%	5.4%	42.4%	333	3,546
Employees	83.1%	22.7%	5.2%	72.1%	1,039	11,333
Faculty	78.7%	37.5%	6.7%	55.8%	191	2,081
Staff	84.1%	19.6%	4.8%	75.6%	848	9,252
Outside Davis	81.8%	1.7%	10.6%	87.6%	829	9,297
Within Davis	91.0%	50.1%	6.5%	43.4%	2,765	30,912
On campus	90.4%	44.0%	6.9%	49.2%	2,236	5,915
Off campus	93.6%	75.4%	4.9%	19.7%	529	24,997
Overall	88.5%	39.9%	7.4%	52.7%	3,732	40,209
Weighted sample	3,304	1,489	276	1,967	3,732	
Projected population	35,599	14,202	2,637	18,760		40,209

Results are based on responses to questions *Q0006* and *Q0017*. We first calculate the percent of five weekdays that an individual biked, and then the average over all respondents represents the percent biking on an average weekday. All data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 32. Means of transportation typically used during the day to get around campus

| By role group | | How do you typically get around campus (or campus) during the day? How frequently for each means of transportation: | | | | | | Weighted sample |
		Always	Very often	Fairly often	Sometimes	Very rarely	Never	
Undergraduate	Walk	34.3%	18.7%	11.7%	21.4%	12.6%	1.2%	2,142
	Bike	29.4%	25.3%	6.8%	11.3%	8.4%	18.8%	1,964
	Vehicle	0.8%	1.2%	1.1%	6.4%	20.3%	70.2%	1,778
Graduate	Walk	28.8%	24.1%	12.9%	21.3%	11.1%	1.7%	506
	Bike	17.5%	23.6%	7.8%	17.1%	10.6%	23.4%	449
	Vehicle	1.3%	2.4%	2.8%	8.1%	26.4%	59.1%	405
Faculty	Walk	34.6%	25.1%	14.6%	19.2%	5.1%	1.4%	188
	Bike	12.3%	22.0%	12.3%	17.3%	9.3%	26.7%	152
	Vehicle	1.4%	4.6%	2.1%	14.2%	27.7%	50.0%	143
Staff	Walk	27.1%	24.8%	14.3%	23.4%	6.8%	3.7%	832
	Bike	5.7%	17.3%	8.7%	16.8%	10.8%	40.7%	594
	Vehicle	8.3%	10.5%	7.8%	20.8%	29.3%	23.5%	644
Overall	Walk	31.9%	21.2%	12.6%	21.7%	10.7%	1.9%	3,667
	Bike	22.5%	23.4%	7.5%	13.4%	9.2%	24.0%	3,159
	Vehicle	2.5%	3.5%	2.8%	10.1%	23.4%	57.6%	2,970

Results are based on responses to question *Q0032*. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Overnight bike parking

Question *Q0027* asked respondents if they left "a bike on campus overnight any nights last week," and if so which nights. This can be used to estimate the total number of bikes on campus that are not abandoned, by day of the week. We find that about 18 percent report leaving a bike overnight at least once during the reference week, with somewhat fewer leaving bikes over the weekend. Overall, about 15 percent leave bikes overnight on the average weekday, a projected 6,031 bikes (Table 33). About half of these belong to people living on campus. Among the other half, about three-quarters belong to students (69 percent to undergrads and 7 percent to grad students) and one-quarter belong to employees (6 percent to faculty and 18 percent to staff). About 71 percent belong to people living (off campus) within Davis, and the remainder to people living outside of Davis.

Table 33. Percent of people with bikes on campus overnight each day, by role

| Role group | Percent with a bike on campus overnight on: | | | | | | | | Week-day avg. | Total | |
	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.	At least 1 night		Weighted sample	Projected population
Living on campus	49.8%	49.8%	49.8%	50.0%	49.6%	48.3%	47.5%	52.9%	49.8%	538	5,915
Living off campus	9.3%	9.3%	9.2%	8.9%	8.3%	7.1%	7.1%	12.5%	9.0%	3,192	34,294
Students	10.6%	10.5%	10.6%	10.3%	9.3%	7.9%	7.9%	14.6%	10.3%	2,123	23,011
Undergraduate	12.1%	12.1%	12.0%	11.7%	10.5%	9.0%	9.0%	16.6%	11.7%	1,687	18,324
Freshmen	20.5%	20.5%	20.5%	19.2%	20.5%	19.2%	17.9%	24.4%	20.3%	57	646
Sophomores	15.8%	15.8%	16.4%	15.8%	14.9%	12.2%	11.7%	23.4%	15.7%	387	4,191
Juniors	10.3%	10.8%	9.5%	11.1%	8.6%	7.6%	8.4%	15.7%	10.1%	538	5,772
Seniors	10.8%	10.3%	10.8%	9.3%	8.8%	7.6%	7.3%	13.0%	10.0%	705	7,715
Graduate	5.0%	4.7%	5.1%	4.8%	4.6%	3.8%	3.7%	6.7%	4.8%	436	4,687
Masters	3.8%	3.2%	3.8%	4.1%	2.7%	2.4%	2.4%	5.3%	3.5%	159	1,715
PhD	5.7%	5.5%	5.9%	5.3%	5.7%	4.6%	4.4%	7.6%	5.6%	276	2,973
Employees	6.6%	6.9%	6.5%	6.0%	6.2%	5.4%	5.4%	8.3%	6.4%	1,069	11,283
Faculty	8.9%	8.4%	8.4%	8.4%	9.2%	8.1%	8.1%	9.4%	8.7%	193	2,065
Staff	6.1%	6.6%	6.1%	5.5%	5.5%	4.8%	4.8%	8.1%	6.0%	876	9,218
Outside Davis	9.9%	9.6%	9.6%	8.9%	9.5%	8.2%	8.4%	10.7%	9.5%	873	9,297
In Davis off campus	9.0%	9.2%	9.0%	8.8%	7.8%	6.7%	6.6%	13.2%	8.8%	2,319	24,997
Overall	15.3%	15.3%	15.2%	14.9%	14.3%	13.1%	13.0%	18.5%	15.0%	3,854	40,209
Weighted sample	588	591	586	574	552	505	500	712	578	3,854	
Projected population	6,133	6,165	6,110	5,987	5,758	5,268	5,222	7,425	6,031		40,209
Living on campus	2,948	2,948	2,948	2,960	2,935	2,855	2,811	3,132	2,948		5,915
Living off campus	3,180	3,199	3,157	3,038	2,834	2,432	2,427	4,284	3,082		34,294

Results are based on responses to question *Q0027* (nights during reference week that bike left on campus overnight). Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 34 shows the total number of nights respondents reported leaving their bikes overnight per week. Among those living off campus and leaving a bike overnight at least once during the week, about half stored their bike on campus overnight all seven days of the week. The remainder left a

bike overnight only some days, including 21 percent leaving a bike overnight just one day of the week. Table 34 also shows whether respondents reported that they "typically store this bike on campus," that is "deliberately keep this bike on campus somewhat permanently" versus "generally bring the bike home or intend to bring it home at some point" (question *Q0028*). In retrospect, this question is somewhat redundant, and does not capture much more information about why bikes are stored overnight (e.g. deliberate and pre-planned versus inadvertent or careless). In general, the percent giving affirmative responses to question *Q0028* is about the same as those reporting storing it overnight 4 or 5 nights or more during the reference week.

Table 34. Percent with bikes on campus various numbers of nights per week, by role

Role group	Percent leaving overnight at least once	Among those leaving a bike overnight on campus at least once:							Percent typically storing it there	Total	
		Percent leaving it this number of nights during the week:								Weighted sample	Projected population
		1	2	3	4	5	6	7			
Living on campus	52.9%	3.1%	2.4%	1.0%	0.8%	4.7%	1.8%	86.1%	94.3%	538	5,915
Living off campus	12.5%	21.1%	7.8%	7.9%	5.5%	5.5%	2.2%	50.0%	60.6%	3,192	34,294
Students	14.6%	22.6%	7.5%	8.0%	6.7%	5.8%	2.2%	47.1%	55.7%	2,123	23,011
Undergraduate	16.6%	22.8%	7.1%	8.2%	7.4%	5.5%	2.1%	47.0%	56.0%	1,687	18,324
Freshmen	24.4%	10.5%	5.3%	5.3%	0.0%	10.5%	0.0%	68.4%	78.9%	57	646
Sophomores	23.4%	25.0%	8.7%	6.7%	8.7%	6.7%	2.9%	41.3%	57.4%	387	4,191
Juniors	15.7%	32.8%	5.2%	6.9%	5.2%	5.2%	1.7%	43.1%	50.0%	538	5,772
Seniors	13.0%	13.2%	7.5%	11.3%	9.4%	3.8%	1.9%	52.8%	56.6%	705	7,715
Graduate	6.7%	21.5%	11.5%	5.6%	0.0%	9.1%	3.6%	48.8%	53.2%	436	4,687
Masters	5.3%	33.3%	5.6%	5.6%	0.0%	11.1%	5.6%	38.9%	47.1%	159	1,715
PhD	7.6%	16.7%	13.9%	5.6%	0.0%	8.3%	2.8%	52.8%	55.6%	276	2,973
Employees	8.3%	15.6%	9.0%	7.8%	1.1%	4.2%	2.4%	59.9%	77.3%	1,069	11,283
Faculty	9.4%	5.6%	0.0%	2.8%	5.6%	2.8%	2.8%	80.6%	86.1%	193	2,065
Staff	8.1%	18.2%	11.4%	9.1%	0.0%	4.5%	2.3%	54.5%	75.0%	876	9,218
Outside Davis	10.7%	6.8%	4.1%	5.3%	2.9%	5.2%	0.5%	75.1%	88.3%	873	9,297
In Davis off campus	13.2%	25.4%	9.0%	8.7%	6.3%	5.5%	2.8%	42.3%	52.0%	2,319	24,997
Overall	18.5%	13.7%	5.5%	4.9%	3.6%	5.3%	2.0%	65.1%	74.1%	3,854	40,209
Weighted sample	712	98	39	35	25	37	14	463	527	3,854	
Projected population	7,425	1,020	408	363	264	391	147	4,832	5,502		40,209
Living on campus	1,092	150	60	53	39	58	22	711	810		5,915
Living off campus	6,333	870	348	310	225	333	126	4,121	4,693		34,294

Results are based on responses to questions *Q0027* (nights during reference week that left a bike on campus overnight) and *Q0028* (whether typically store this bike on campus). Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 35 shows responses to question *Q0029* "About how long has it been since you rode this bike?" with respondents choosing between the five categories shown. Most people ride the bike they leave on campus overnight somewhat regularly, with 74 percent riding it within the last day, 87 percent riding within the last week, and 91 percent within the last two weeks (or 65, 83, and 89 percent, respectively, among those living off-campus). About 6 percent reported that the bike

had been idle for a month or more (about 480 bikes), with the highest incidence of this among grad students and faculty.

Table 35. Time elapsed since last riding bikes stored on campus overnight

Role group	Among those who left a bike on campus overnight at least once during the week, percent who rode it within the last:					Total who left a bike overnight at least once:	
	1 day	2-7 days	8-14 days	15-30 days	More than 30 days ago	Weighted sample	Projected population
Living on campus	88.0%	4.1%	1.5%	0.7%	5.7%	284	3,132
Living off campus	64.6%	18.6%	5.5%	4.7%	6.6%	399	4,284
Students	64.9%	18.0%	4.5%	6.0%	6.6%	310	3,356
Undergraduate	65.6%	18.4%	4.0%	6.4%	5.6%	280	3,044
Freshmen	68.4%	21.1%	0.0%	5.3%	5.3%	14	157
Sophomores	70.2%	16.3%	1.9%	3.8%	7.7%	91	982
Juniors	63.8%	15.5%	5.2%	12.1%	3.4%	84	905
Seniors	62.3%	22.6%	5.7%	3.8%	5.7%	91	1,000
Graduate	58.7%	13.9%	9.1%	2.0%	16.3%	29	316
Masters	38.9%	27.8%	11.1%	0.0%	22.2%	8	91
PhD	66.7%	8.3%	8.3%	2.8%	13.9%	21	225
Employees	63.2%	20.8%	8.9%	0.6%	6.5%	89	940
Faculty	52.8%	22.2%	8.3%	2.8%	13.9%	18	195
Staff	65.9%	20.5%	9.1%	0.0%	4.5%	71	746
Outside Davis	64.3%	18.0%	7.8%	0.6%	9.2%	94	997
In Davis off campus	64.6%	18.8%	4.8%	6.0%	5.8%	305	3,289
Overall	73.8%	13.1%	3.8%	2.9%	6.5%	710	7,425
Weighted sample	524	93	27	21	46	710	
Projected population	5,476	970	281	218	480		7,425
Living on-campus	2,310	409	119	92	202		3,132
Living off-campus	3,160	559	162	126	277		4,284

Results are based on responses to questions *Q0027* (nights during reference week that left a bike on campus overnight) and *Q0029* (time elapsed since riding this bike). Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Number of (claimed) bikes on campus and gross movements of bikes

A physical count of the total number of bikes parked on campus bike racks was last conducted by TAPS on June 4, 2009, including counts at 10:00am (13,933 bikes), 2:00pm (15,554 bikes), and 5:00am (to capture a nighttime baseline, 10,168 bikes).[7] These counts included bikes parked around on-campus residences, but only included bikes visible from the outdoors in typical bike parking areas. In addition, it is unknown from these counts what percent of the bikes are abandoned, as well as the extent of gross movements of bikes during the day. The survey data provide some estimates of these figures.

In particular, we can estimate the total number of people bringing (or having) bikes on campus on an average weekday by combining responses of how many rode a bike as their primary mode (question *Q0016*), how many rode a bike as a circulator mode (*Q0017*), and how many left a bike on campus overnight (with or without riding it, question *Q0027*), each night of the reference

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[7] For more information, contact David Takemoto-Weerts at TAPS regarding the Bike Parking Utilization Survey.

week. In total, we estimate that 45 percent of the campus population has a bike on campus on an average weekday, a projected 18,123 people with bikes during the day. In addition, we estimate that 13 percent of the campus population stores a bike on campus overnight on an average weeknight, a projected 5,383 bikes (included in the daily total of 18,123). We estimate that of all the 18,123 people reporting having a bike on campus on average weekday, only about 7 percent left their bike idle on campus (1,218 bikes), and remaining 93 percent (16,905) rode it at some point during the day. (See Table 36 and Figure 17.)

The estimated figure of 18,123 total (claimed) bikes on campus includes 35 percent of the campus population who have ridden a bike from home as their primary means of transportation (14,121 bikes), 3 percent who have brought a bike for use on campus during the day after using some other mode to get there (1,263 bikes), 4 percent who have stored a bike on campus overnight for use during the day after using some other mode to get there (1,521 bikes), and 3 percent who have a bike stored on campus without riding it that day (1,218 bikes). Among the bikes people intentionally store on campus overnight on a typical weekday (a projected 5,383 bikes), about 77 percent are ridden at some point during the day. Among those using a bike to get around campus during the day after using some other means of transportation to get to campus (about 7 percent of the campus community, or 2,784 people on an average weekday), about 55 percent leave this bike on campus overnight, though this figure is somewhat lower among graduate students (37 percent) and staff (45 percent).

Table 36. Number of people with bikes on campus on an average weekday

| Role group | No bike | Bike on campus only during the day | | | Bike left on campus overnight | | | | Total with bikes | Weighted sample | Projected population |
		Ridden as primary mode	Ridden as circulator mode	Total	Ridden as primary mode	Ridden as circulator mode	Not ridden	Total			
Students	47.7%	32.4%	3.4%	35.8%	8.8%	4.4%	3.3%	16.5%	52.3%	2,727	28,876
Undergrad	47.4%	29.6%	3.5%	33.2%	10.6%	5.0%	3.7%	19.4%	52.6%	2,211	23,404
Graduate	48.7%	44.2%	3.0%	47.3%	1.0%	1.7%	1.3%	4.0%	51.3%	516	5,472
Employees	73.7%	18.6%	2.4%	20.9%	0.8%	2.2%	2.4%	5.4%	26.3%	1,055	11,333
Faculty	62.1%	28.6%	2.4%	30.9%	1.5%	3.1%	2.4%	6.9%	37.9%	194	2,081
Staff	76.3%	16.3%	2.4%	18.7%	0.6%	1.9%	2.4%	5.0%	23.7%	861	9,252
Outside Davis	86.3%	1.6%	4.1%	5.6%	0.3%	4.9%	2.9%	8.1%	13.7%	847	9,297
Within Davis	45.4%	36.8%	2.8%	39.7%	8.4%	3.4%	3.1%	14.9%	54.6%	2,815	30,912
Off campus	50.6%	38.3%	3.1%	41.4%	1.5%	3.5%	3.0%	8.0%	49.4%	2,282	24,997
On Campus	23.3%	30.6%	1.6%	32.2%	38.1%	3.0%	3.5%	44.5%	76.7%	533	5,915
Overall	54.9%	28.5%	3.1%	31.7%	6.6%	3.8%	3.0%	13.4%	45.1%	3,782	40,209
Weighted sample	2,077	1,080	119	1,198	249	143	115	506	1,705	3,782	
Projected population	22,086	11,477	1,263	12,740	2,644	1,521	1,218	5,383	18,123		40,209

Results are based on responses to questions *Q0016* (primary means of transportation to campus), *Q0017* (whether biked on-campus only), and *Q0027* (whether left a bike on campus overnight). Percentages in each category are calculated by first calculating the percent of five weekdays that an individual had a bike (or not), and then hen the average over all respondents represents the percent with a bike on an average weekday. All data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Figure 17. Tree diagram depicting sources of the estimated 18,123 bikes on campus on an average weekday
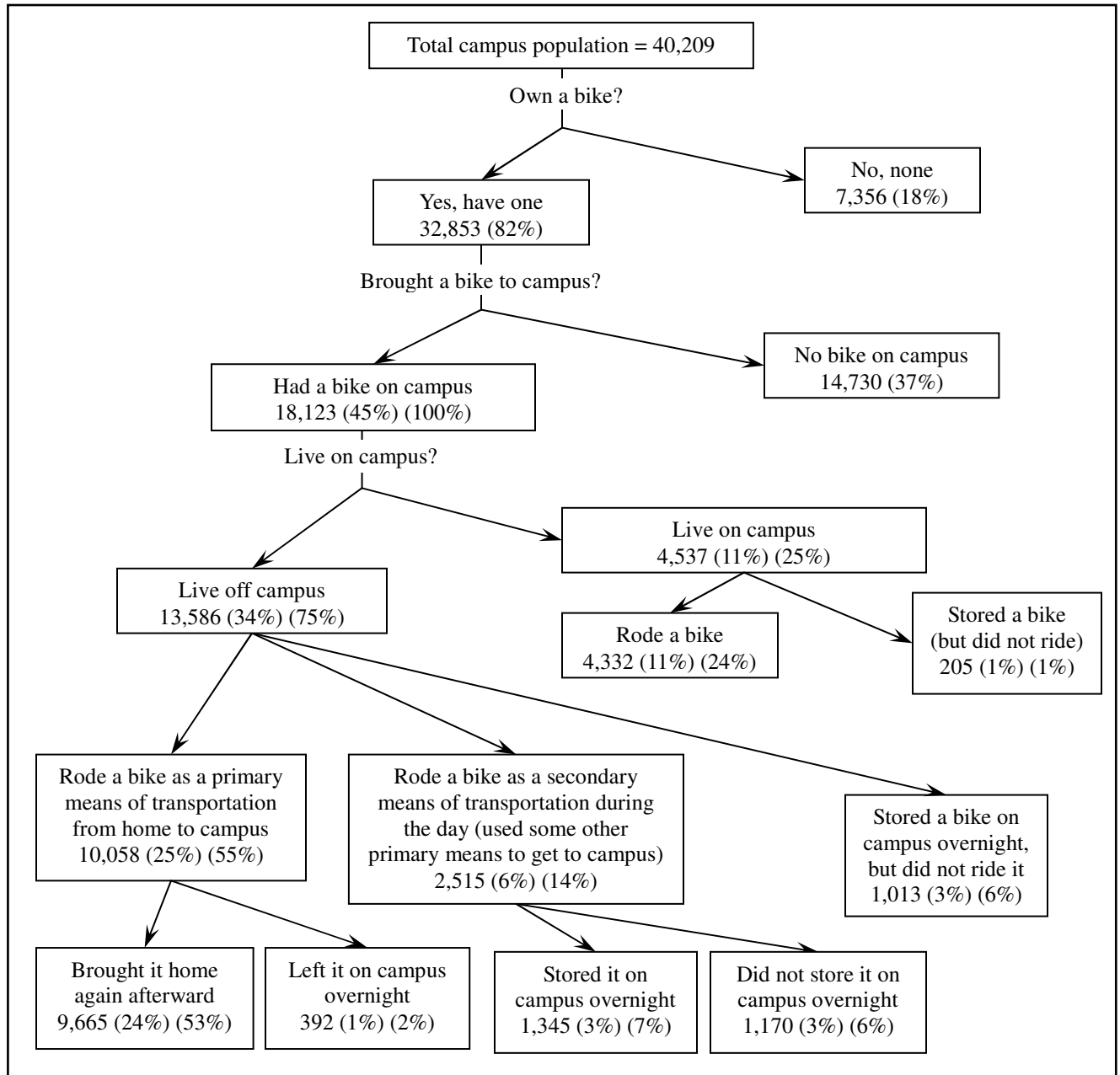
Comparing these projections to the numbers of bikes counted on bike racks by TAPS, we find that our daytime total is substantially higher than the TAPS counts and that our overnight figure is substantially lower (see Table 37). As for the daytime figures, the results from the two surveys are not exactly comparable statistics, since ours is an estimate of those who had a bike on campus at *any* moment during the day, rather than the snapshot of bikes on campus at a particular hour, which ought to be substantially lower.[8] By contrast, we might expect the nighttime figures

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[8]   Other reasons we might expect the estimates from the Campus Travel Survey to be higher than the TAPS bike rack counts include: people parking bikes in places other than visible outdoor parking areas (only the latter were

to be more comparable, because we do not expect bikes to move around much at night, and therefore the 5am snapshot could be compared to the number reporting leaving a bike overnight. Yet we find a discrepancy of about 4,785 more nighttime bikes in the June rack count than the projected number owned by campus community members according to the Campus Travel Survey. To the extent that the figures from the two surveys are comparable, this discrepancy may be interpreted as an estimate of the total number of abandoned bikes on campus at any given time: 4,785 bikes, or 47 percent of the nighttime total. If this number are abandoned and idle, they might be deducted from the 10am and 2pm snapshot counts from TAPS, meaning that the number of unabandoned bikes parked at 10am and 2pm would be 9,148 and 10,769, respectively. These figures can then be compared to our total daytime estimates of 16,905 "active" bikes and 1,218 idle bikes, to give some idea of the gross movements of bikes during the day. In particular, we might conclude that at 10am, about 50 percent of the (unabandoned) bikes that would be on campus at all during the day are currently there and parked (and 47 percent of the active, unabandoned bikes); at 2pm, about 59 percent of the total unabandoned bikes are there and parked (and 56 percent of the active, unabandoned bikes).

Table 37. Comparison of bike counts: Rack count versus survey results

Estimated number of bikes on campus:	Data source:		
	Bike Rack Utilization Count		Campus Travel Survey 2009-10 (projections)
Overnight	10,168	(5am count)	5,383 (left overnight, on an average weekday)
During the day	13,933 (10am count) 15,554 (2pm count)		18,123 (at any point during the day, on an average weekday)

Carpooling and ridesharing

Among those physically traveling to campus on an average weekday, we estimate about 34 percent arrive by personal vehicle (including carpooling, getting a ride, and driving alone in a car, motorcycle or scooter) (see Table 14 and Table 39). Among these, about 77 percent drive alone, 16 percent carpool, and 5 percent get a ride with someone who drops them off (Table 39). Within all role groups, those coming from outside Davis are more likely to drive alone than those coming from within Davis (83 percent versus 69 percent of those arriving in personal vehicles). Among those living within Davis and arriving by car, undergrads are especially likely to be dropped off (14 percent) and least likely to drive alone, although the majority do (62 percent).

Both those arriving in carpools (multiple people in the vehicle arriving on campus together) and those getting a ride to campus (where the driver continues on to another destination after the drop-off) were asked how many other people were in the vehicle. The percent of vehicle users arriving in 2- and 3-plus-person carpools and of those getting a ride as the sole passenger or multiple passengers dropped off is shown in Table 39. The average vehicle occupancy for carpools and rides is shown in Table 38. Among those who carpooled at any point during the reference week, the average number of passengers was 2.54 (including the driver). Most people dropped off on campus were the sole passenger dropped (Table 39), with an average of 1.45 passengers dropped off per ride to campus (excluding the driver) (Table 38).

counted in the TAPS count); to differences in the number of people biking in the fall versus the spring (some attrition is expected, especially among undergraduates, on the other hand the overall campus population would have grown somewhat); or to measurement error in either survey.

Table 38: Average carpool size

| Role group | Average occupancy among those that carpooled /rode at least once | | Weighted sample | |
	Carpool occupants (including driver)	Ride passengers (excluding driver)	Carpoolers	Riders
Undergraduate	2.68	1.54	305	338
Graduate	2.31	1.08	75	35
Faculty	2.65	1.20	23	13
Staff	2.34	1.18	143	45
Outside Davis	2.33	1.19	168	35
Within Davis	2.63	1.47	353	378
Overall	2.54	1.45	547	430

Vehicle occupancy is based on responses to question *Q0018* for those carpooling and to question *Q0019* for those who got a ride. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 39: Percent driving alone versus ridesharing on an average weekday

| | Percent physically traveling | Among those traveling, percent in personal vehicles | Among those in vehicles, percent: | | | | | Weighted sample | Projected population |
			Driving alone	Carpool of 2	Carpool of 3+	Ride: 1 dropped	Ride: 2+ dropped		
Students	90.8%	21.3%	72.8%	13.3%	4.0%	7.1%	0.9%	2,758	28,876
Undergraduate	91.5%	17.8%	70.1%	13.0%	5.1%	8.1%	1.1%	2,235	23,404
Freshmen	93.8%	5.3%	59.0%	8.6%	9.4%	13.7%	2.2%	414	4,335
Sophomores	96.6%	12.7%	56.0%	14.0%	10.7%	12.7%	3.0%	424	4,444
Juniors	91.7%	18.7%	67.0%	15.6%	2.8%	9.2%	1.4%	608	6,363
Seniors	87.5%	27.0%	77.1%	11.6%	4.4%	5.5%	0.4%	789	8,262
Graduate	87.4%	37.1%	78.4%	14.1%	1.5%	4.9%	0.3%	523	5,472
Masters	86.5%	37.7%	81.5%	11.4%	0.6%	5.0%	0.0%	184	1,926
PhD	87.9%	36.7%	76.6%	15.5%	2.0%	4.9%	0.4%	339	3,546
Employees	83.1%	68.9%	80.7%	12.5%	3.2%	1.9%	0.8%	1,082	11,333
Faculty	79.3%	50.8%	77.8%	15.2%	1.6%	4.1%	0.1%	199	2,081
Staff	83.9%	72.7%	81.1%	12.1%	3.4%	1.6%	0.9%	884	9,252
Outside Davis	81.8%	89.2%	83.1%	13.0%	2.5%	0.8%	0.2%	862	9,297
Undergraduate	86.0%	87.8%	85.9%	11.4%	0.4%	1.7%	0.0%	181	2,002
Graduate	71.4%	84.5%	83.0%	14.4%	1.3%	0.9%	0.4%	99	1,064
Faculty	72.3%	80.7%	82.1%	11.4%	2.6%	3.6%	0.0%	67	721
Staff	83.6%	91.4%	82.3%	13.5%	3.4%	0.2%	0.2%	515	5,511
Off campus in Davis	90.5%	22.6%	70.5%	12.1%	4.8%	8.6%	1.7%	2,301	24,997
Undergraduate	92.1%	14.4%	62.2%	12.5%	8.0%	12.2%	1.9%	1,495	16,322
Graduate	91.5%	32.7%	76.3%	14.4%	1.2%	6.7%	0.2%	334	3,623
Faculty	83.7%	36.8%	74.0%	19.0%	0.8%	3.8%	0.3%	123	1,344
Staff	85.3%	45.2%	77.3%	7.9%	3.8%	6.0%	2.9%	349	3,708
On campus	93.6%	3.4%	41.6%	11.9%	14.7%	19.8%	0.9%	535	5,915
Overall	88.6%	33.9%	77.0%	12.9%	3.6%	4.3%	0.8%	3,840	40,209
Weighted sample	3,402	1,152	887	148	41	50	10	3,840	
Projected population	35,626	12,061	9,291	1,554	428	520	100		40,209

Results are based on responses to questions *Q0006* (days physically traveling), *Q0016* (mode used), *Q0018* (carpool size), and *Q0019* (number given a ride). Motorcyclists are included with those driving alone. All Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Number of vehicles on campus

The results on the number of people driving alone, carpooling, getting a ride, and the number of people per vehicle can be combined to estimate the total number of vehicles arriving on campus. In particular, we estimate the total number of vehicles as the number of people driving alone, plus fractional vehicles counted in proportion to vehicle occupancy. That is, if a respondent reports arriving in a three-person carpool, we count this as 0.33 vehicles arriving on campus on behalf of that respondent. We weight and expand the sample to project the total number of vehicles for the entire campus population, using the expansion factors shown in Table 6. We estimate that 10,891 vehicles come to campus on an average weekday, or about one vehicle for every 3.69 people traveling to campus (Table 40). About 959 of these contain carpools and 640 are vehicles just dropping passenger(s) off. (Note that these estimates are the number of vehicles arriving, regardless of whether or where those vehicles are parked. See Table 44 for an estimate of the number of vehicles actually parking on campus on a typical weekday.)

Table 40. Projected vehicles arriving on an average weekday, by occupancy and role

Role group	Projected number of vehicles on an average weekday				Ratio of total people to total vehicles	Ratio of physically traveling people to total vehicles
	Drive alone	Carpool	Ride	Total		
Students	4,058	472	465	4,995	5.78	5.25
Undergraduate	2,668	335	367	3,371	6.94	6.36
Freshmen	127	17	42	186	23.29	21.84
Sophomores	307	65	79	451	9.86	9.53
Juniors	731	102	134	967	6.58	6.04
Seniors	1,504	151	111	1,767	4.68	4.09
Graduate	1,389	136	98	1,624	3.37	2.95
Masters	512	40	35	587	3.28	2.84
PhD	877	97	63	1,037	3.42	3.01
Employees	5,233	488	175	5,896	1.92	1.60
Faculty	653	68	42	763	2.73	2.17
Staff	4,580	420	133	5,134	1.80	1.51
Outside Davis	5,476	488	65	6,030	1.54	1.26
Within Davis	3,551	428	565	4,543	6.80	6.20
Off campus	3,477	405	516	4,398	5.68	5.14
On Campus	74	22	49	145	40.78	38.16
Overall	9,291	959	640	10,891	3.69	3.27

Results are based on responses to questions *Q0006* (days physically traveling to campus), *Q0016* (mode of transportation used each day), *Q0018* (carpool size), and *Q0019* (number given a ride). "Drive alone" includes driving alone in a vehicle as well as driving a motorcycle or scooter. The distinction between carpools and rides is whether the driver's destination is campus: Carpool is "Carpool or vanpool with others also going to campus (either as driver or passenger)" and rides are "Get a ride (someone drops you off and continues on elsewhere)." All data are weighted (and expanded) by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Average Vehicle Ridership

Average vehicle ridership (AVR) is a statistic calculated at each UC campus representing a ratio of the number of people arriving on campus to the number of personal vehicles brought to campus. In particular, we use a formula developed by the South Coast Air Quality Management District, intended to count weekday arrivals of employees from off-campus (only) and making adjustments (credits) for employees who telecommute, who adopt a compressed work week schedule, or who use a zero-emissions vehicle to commute to campus (see Appendix D for

details on the calculation of AVR). In general, a way to interpret AVR is that if everyone drove by themselves to campus, the campus AVR would be one, and so higher values (greater than 1.0) indicate more carpooling or use of alternative modes of transportation. Among those traveling from off campus, campus-wide AVR is estimated to be 2.83, or 1.66 among employees only. This means that for every car coming to campus, there are about 2.83 off-campus people coming to campus or telecommuting. This is down somewhat from 2008-09, meaning relatively more cars came to campus in 2009-10.

Table 41: Average Vehicle Ridership (AVR), 2007-08 through 2009-10

Role group	Off-campus only			All (on and off-campus)		
	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10
Students	1.67	4.76	4.28	5.04	5.91	5.25
Undergraduate	4.24	5.80	5.11	5.04	7.37	6.36
Freshmen	5.32	5.35	4.69	26.39	33.40	21.84
Sophomores	6.46	10.24	9.38	6.78	10.67	9.53
Juniors	4.05	6.26	5.48	4.46	6.56	6.04
Seniors	3.55	4.39	3.88	3.77	4.67	4.09
Graduate	3.43	2.81	2.57	3.94	3.21	2.95
Masters	3.22	2.71	2.60	3.49	2.94	2.84
PhD	3.55	2.86	2.56	4.20	3.36	3.01
Employees	1.67	1.69	1.66	1.67	1.71	1.66
Faculty	2.23	2.34	2.37	2.23	2.35	2.38
Staff	1.58	1.60	1.56	1.58	1.62	1.55
Non-student and student employees	n/a	n/a	2.20	n/a	n/a	2.31
Outside Davis	1.33	1.32	1.26	1.33	1.33	1.26
Within Davis	4.60	5.17	4.99	5.61	6.32	5.99
Overall	2.75	2.99	2.83	3.20	3.51	3.30

See Appendix D for details on AVR calculations.

Table 42 compares the employee AVR at UC Davis with that at other UC campuses for which statistics are available. The comparison suggests that UC Davis draws more vehicles per (non-student) employee than UC San Francisco, UC Irvine, and UC Santa Cruz, but fewer than UC San Diego and UC Riverside. UC Davis was one of just two campuses (along with UC San Diego) for which AVR decreased between 2008-09 and 2009-10, that is with an increasing number of vehicles per employee.

Table 42. Off-campus employee AVR at Davis versus other UC campuses

UC Campus	2007-08	2008-09	2009-10
Irvine	n/a	1.82	1.90
Los Angeles	n/a	1.58	1.67
Riverside	n/a	1.53	1.55
San Diego	n/a	1.69	1.60
San Francisco	n/a	n/a	2.20
Santa Cruz	n/a	1.80	1.89
Davis, non-student employees only	1.67	1.69	1.66
Davis, including student employees	n/a	n/a	2.20

See Appendix D for details on the calculation of the Davis AVR. Other campus figures are from the Systemwide Transportation Survey Matrix 08-09 and 09-10, available online at http://www.universityofcalifornia.edu/sustainability/trans_pres.html.

Parking on and off campus

Question *Q0020* asked "Where did you (or whoever drove you) park?" among the choices: on campus, off-campus in Davis, outside of Davis, or being dropped off while the driver continued on elsewhere. It was asked (once) of any respondent who indicated having driven, carpooled, gotten a ride, or rode a motorcycle or scooter to campus on any day during the reference week (question *Q0016*), and therefore did not give respondents a chance to indicate parking in different places on different days, if they had done so (the questionnaire advised, "If it was different on different days, please indicate what you did most often"). Therefore, to estimate the number parking in each location on an average weekday, we assume that wherever they indicated parking in question *Q0020* is where they parked anytime they drove, carpooled, or got a ride to campus on any day during the week.

Table 43 shows an estimated percent of people parking in each location on an average weekday while Table 44 shows the estimated number of vehicles parking in each location on an average weekday. The number of vehicles differs from the number of people depending on how many people arrived in each vehicle. We estimate total numbers of vehicles by counting each person who drove alone as contributing one vehicle, while each person who carpooled or got a ride as contributing a partial vehicle in inverse proportion to the total number of occupants (e.g. a respondent reporting arriving in a carpool of two is assumed to generate 0.5 vehicles).

Among those arriving by vehicle, we estimate that about 82 percent of people (also 82 percent of vehicles) park on campus on an average weekday, a projected 8,925 vehicles (carrying 9,947 people). For calibration, we can compare this figure to counts conducted by TAPS. In particular, a vehicle count conducted October 19-21, 2009 (the week just prior to the first reference week for the survey) indicates that there were 6,313 vehicles parked on average (at a 76 percent average utilization rate) in the parking areas in the core of campus included in their study, and potentially 2,982 additional vehicles parked in areas not included in their study, if the same utilization rate is assumed.[9] However, their counts also include university, service, and vendor vehicles (whereas our figures do not), a difference that would at least partially offset the discrepancy between an overall figure of 9,295 vehicles (based on the count data) and 8,925 vehicles (based on our Campus Travel Survey data).

Among those parking vehicles parking on campus, we estimate that about 47 percent are staff, 30 percent are undergraduate students, 16 percent are grad students, and 8 percent are faculty. About 59 percent of vehicles parking on campus bring people traveling from outside Davis, while 41 percent bring people from within Davis. A projected 1,337 vehicles park off-campus in the city of Davis on an average weekday (carrying 1,460 people), and 525 vehicles dropped passengers off on campus without parking (dropping off a projected 585 people).

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[9]   For more information, see the "TAPS Parking Space Utilization Survey: October 19-21, 2009" (available from George Lamb at TAPS).

Table 43: Percent of people parking on and off campus on a typical weekday, by role

Role group	Percent arriving by vehicle	Among those arriving by vehicle, percent of people parking:				Weighted sample	Projected population
		On campus	Off campus in Davis	Outside Davis	Drop off (did not park)		
Students	19.3%	82.2%	11.4%	0.2%	6.4%	2,758	28,876
Undergraduate	16.3%	80.0%	12.2%	0.2%	7.4%	2,198	23,404
Freshmen	4.9%	69.0%	11.6%	2.2%	16.7%	410	4,335
Sophomores	12.3%	78.6%	10.1%	0.0%	11.5%	419	4,444
Juniors	17.1%	77.3%	14.7%	0.3%	8.5%	602	6,363
Seniors	23.6%	83.7%	11.6%	0.0%	4.6%	767	8,262
Graduate	32.4%	86.6%	9.7%	0.2%	4.5%	515	5,472
Masters	32.6%	88.7%	7.3%	0.6%	4.1%	181	1,926
PhD	32.3%	85.5%	11.0%	0.0%	4.6%	335	3,546
Employees	57.2%	82.9%	12.7%	1.6%	3.5%	1,061	11,333
Faculty	40.3%	90.5%	4.7%	0.6%	5.1%	197	2,081
Staff	61.0%	81.8%	13.9%	1.7%	3.2%	864	9,252
Outside Davis	72.9%	84.5%	12.9%	1.3%	1.5%	848	9,297
Within Davis	17.2%	79.4%	11.5%	0.2%	9.3%	2,787	30,912
Overall	30.0%	82.5%	12.1%	0.9%	4.8%	3,774	40,209
Weighted sample	1,132	934	137	11	55	3,774	
Projected population	12,061	9,947	1,460	113	585		40,209

Results are based on responses to questions *Q0016* (mode used) and to question *Q0020* (parking location). The parking location indicated in question *Q0020* is assumed to be true for all days that the respondent arrived in a vehicle. As with mode split, we calculated the share of the five days that each respondent parked, and then the average of this over all respondents is equivalent to the share of all respondents parking on an average weekday. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 44. Projected vehicles parking on and off campus on a typical weekday, by role

Role group	Total vehicles	Vehicles parking:			
		On campus	Off campus in Davis	Outside Davis	Drop off (did not park)
Students	4,995	4,011	574	8	332
Undergraduate	3,371	2,627	421	4	255
Freshmen	186	131	19	1	32
Sophomores	451	343	50	0	54
Juniors	967	732	142	3	87
Seniors	1,767	1,420	209	0	83
Graduate	1,624	1,384	154	4	77
Masters	587	510	44	4	24
PhD	1,037	874	109	0	52
Employees	5,895	4,788	744	93	186
Faculty	761	676	39	5	41
Staff	5,134	4,112	706	88	144
Outside Davis	6,211	5,238	812	83	78
Within Davis	4,679	3,672	541	9	457
Percent of total	100%	82.0%	12.3%	0.9%	4.8%
Total number	10,890	8,925	1,337	103	525

Results are based on responses to questions *Q0016* (mode used), *Q0018* (carpool size), *Q0019* (number given a ride), and *Q0020* (parking location). All data are weighted (and expanded) by role group based on the 3,840 valid responses to question *Q0016*.

Parking permits

Whether or not they had a car, all respondents were asked whether they currently have a UC Davis parking permit, and if so which type (questions *Q0081* and *Q0082*). About 29 percent of respondents reported having a monthly, quarter, or annual parking permit, a projected 11,819 people (Table 45). This matches closely with TAPS's records of actual permits issued.[10] TAPS records and the survey results also both indicate that about three-quarters of the permits issued are either "C" or "A" permits, but those with "C" permits are somewhat under-represented in the survey data, with about 1.8 "C" permit holders for every "A" permit holder in the survey sample, compared to about 2.6 "C" permits for every "A" permit issued by TAPS.[11] (See Table 46.)

Table 45. Percent of people with a parking permit, by role

Role group	Annual (or multi-year)	Monthly or quarter	Daily	None	Weighted sample	Projected population
Students	9%	9%	0%	82%	2,653	28,876
Undergraduate	6%	8%	0%	86%	2,145	23,404
Freshmen	2%	2%	0%	96%	387	4,335
Sophomores	5%	4%	0%	91%	409	4,444
Juniors	6%	9%	0%	85%	595	6,363
Seniors	9%	12%	1%	79%	755	8,262
Graduate	19%	13%	1%	68%	508	5,472
Masters	18%	15%	1%	66%	177	1,926
PhD	19%	12%	1%	69%	331	3,546
Employees	53%	6%	2%	38%	1,068	11,333
Faculty	47%	5%	3%	45%	196	2,081
Staff	55%	7%	2%	37%	872	9,252
Living outside Davis	54%	17%	2%	27%	872	24,997
Living off-campus in Davis	13%	6%	1%	80%	2,306	9,297
Overall	21%	8%	1%	70%	3,721	40,209
Weighted sample	799	295	34	2,594	3,721	
Projected population	8,635	3,184	365	28,026		40,209

Results are based on responses to questions *Q0081*. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

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[10] Jeremy Dalbeck at TAPS compiled a tabulation of permits active as of November 1, 2009 by role group as on file in July 2010. There were a total of 11,770 annual, multiyear, quarterly, or monthly permits issued as of November 2009 to individuals whose role (as of July 2010) was on record as any of: undergraduate student, graduate student, employee, new employee, other program, or visiting scholar (notably excluding retirees, contractors, Sodexho, and vendors). As found in the survey data, this is about 29 percent of the campus population.

[11] The TAPS records may include permits issued to people not included in the survey, especially vendors and contractors, which may affect the relative numbers of different permit types.

Table 46. Percent with each type of parking permit

	Percent	Projected population
Percent with any permit	30.1%	12,112
Among those with any permit, percent with:		
A permit	26.7%	3,232
2-person A carpool permit	6.1%	741
3-person A carpool permit	0.7%	87
Bike commuter A permit	0.05%	5
C permit	47.1%	5,704
2-person C carpool permit	6.7%	807
3-person C carpool permit	0.5%	62
K permit	0.4%	47
L permit	6.4%	774
M permit	0.5%	64
N permit	0.6%	76
Vanpool permit	0.2%	23
Complimentary commuter or GoClub permit	1.3%	155
Disabled permit	0.8%	97
Retiree permit	0.1%	11
On-campus residence permit (wrote-in)	0.9%	113
Other (wrote-in)	0.9%	111
Weighted sample	3,712	
Projected population	40,209	40,209

Results are based on responses to questions *Q0082*. Data are weighted by
role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Ridership by transit provider

If respondents indicated that they rode a bus (or a train) at any point on their way to campus any days during the prior week (question *Q0015*), they were then asked to indicate which bus (or train) service(s) they used ("Check all that apply"). Therefore we know which bus and train services people used at least once on their way to campus during the prior week (Table 47 and Table 48), but do not know how many days they used each service or if it was used as their primary means of transportation or in combination with some other mode. Table 49 and Table 50 offer some estimate of the total number riding a given system on an average weekday by showing the percent riding the bus (or train) on an average weekday as their primary mode who reported using each service at least once during the week. This excludes anyone riding a bus or train not as their primary means of transportation, such as if they drove to Davis, then rode Unitrans to the campus core.

Many more people ride Unitrans than any other service, with a projected 11,517 riding at least once per week (Table 47) and 6,466 riding on an average weekday as their primary means of transportation (Table 49). Unitrans riders are predominately undergraduates, comprising 94 percent of average daily riders. For all providers, the number riding at least once during the week is substantially more than the estimated number riding as their primary mode on an average weekday. This is either due to the fact that people do not ride everyday, or because they ride not as their primary mode. For instance, while a projected 464 ride Yolobus on an average weekday as their primary means of transportation to campus (Table 49), a projected 958 ride at least once per week (Table 47). Similarly, a projected 208 ride Amtrak as their primary mode on an average weekday (Table 50), while 563 ride at least once per week (Table 48).

Among train riders, all of the trains aside from the Amtrak Capitol Corridor are located outside of Davis and therefore must be used in combination with some other provider or means of transportation to get to campus. In particular, we find that all those who report riding BART, Muni, and Caltrain also rode the Capitol Corridor. The only rail system respondents reported using *not* in combination with Amtrak was the Sacramento Regional Transit, although 60 percent of those riding that system did use it in combination with Amtrak.

Table 47. Number riding specific bus services at least once during the week

Role group	Among those used a bus at least once, percent who at least once used:									Total bus users:	
	Unitrans	Yolobus	UCD/ UCDMC Shuttle	Sac. Regional Transit	Amtrak bus	Fairfield Suisun Transit	Berkeley / Davis Shuttle	Davis Com. Transit	Other[a]		Projected population
Students	96.6%	7.6%	2.1%	0.8%	0.5%	0.0%	0.4%	0.4%	0.3%	1,084	11,476
Undergrad	97.1%	7.5%	1.9%	0.6%	0.5%	0.0%	0.5%	0.4%	0.2%	1,026	10,845
Fresh.	87.3%	16.7%	4.8%	1.6%	4.0%	0.0%	2.4%	1.6%	1.6%	93	1,047
Soph.	98.4%	4.1%	2.8%	0.0%	0.0%	0.0%	0.3%	0.3%	0.3%	276	2,894
Juniors	99.1%	7.7%	1.8%	0.0%	0.5%	0.0%	0.0%	0.5%	0.0%	323	3,370
Seniors	96.9%	7.7%	0.5%	1.5%	0.0%	0.0%	0.5%	0.0%	0.0%	334	3,531
Graduate	87.1%	7.8%	5.4%	2.8%	0.8%	0.0%	0.0%	0.8%	0.8%	58	636
Masters	80.7%	10.5%	5.3%	1.8%	1.8%	0.0%	0.0%	1.8%	1.8%	27	288
PhD	92.6%	5.6%	5.6%	3.7%	0.0%	0.0%	0.0%	0.0%	0.0%	31	349
Employees	55.5%	11.9%	25.2%	4.5%	0.0%	6.7%	0.0%	0.0%	0.7%	72	781
Faculty	66.7%	5.6%	22.2%	0.0%	0.0%	0.0%	0.0%	0.0%	5.6%	9	99
Staff	53.8%	12.8%	25.6%	5.1%	0.0%	7.7%	0.0%	0.0%	0.0%	63	682
Outisde Davis	33.4%	34.9%	25.4%	16.6%	0.0%	7.4%	2.7%	1.3%	1.5%	65	733
Within Davis	97.6%	6.1%	2.3%	0.1%	0.5%	0.0%	0.2%	0.3%	0.2%	1,056	11,606
Overall	94.0%	7.8%	3.6%	1.0%	0.5%	0.4%	0.4%	0.4%	0.3%	1,156	12,247
Weighted sample	1,087	90	41	11	6	5	5	4	3	1,156	
Projected population	11,517	958	435	122	59	51	51	45	35		12,247

[a] "Other" includes Muni and AC Transit, a projected 30 and 5 riders, respectively in the population.
Results are based on responses to questions *Q0015* (whether a bus was ever used) and *Q0023* (which bus services).
Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 48. Number riding specific train services at least once during the week

| Role group | Among those used a train at least once, percent who at least once used: | | | | | Total train users: | |
	Amtrak Capitol Corridor	Sac. Regional Transit	BART	Muni	Caltrain	Weighted sample	Projected population
Students	93.1%	21.8%	13.6%	6.0%	2.0%	37	411
Undergraduate	93.8%	26.7%	9.2%	9.2%	3.1%	2,385	278
Freshmen	83.3%	16.7%	8.3%	8.3%	8.3%	9	107
Sophomores	0.0%	0.0%	0.0%	0.0%	0.0%	1	9
Juniors	100.0%	20.0%	20.0%	20.0%	0.0%	7	91
Seniors	100.0%	50.0%	0.0%	0.0%	0.0%	7	72
Graduate	91.8%	12.7%	21.8%	0.0%	0.0%	535	133
Masters	90.0%	10.0%	10.0%	0.0%	0.0%	5	49
PhD	92.9%	14.3%	28.6%	0.0%	0.0%	8	84
Employees	91.4%	11.4%	11.4%	2.7%	0.0%	19	198
Faculty	100.0%	4.2%	4.2%	4.2%	0.0%	12	130
Staff	75.0%	25.0%	25.0%	0.0%	0.0%	6	67
Outisde Davis	91.4%	23.7%	12.4%	1.3%	0.0%	40	428
Within Davis	94.6%	5.4%	16.0%	16.0%	5.4%	14	179
Overall	92.5%	18.3%	12.8%	4.9%	1.3%	55	609
Weighted sample	51	10	7	3	1	55	
Projected population	563	111	78	30	8		609

Results are based on responses to questions *Q0015* (whether a train was ever used) and *Q0026* (which train services). Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 49: Percent riding specific bus services on an average weekday

| Role group | Percent physically traveling | Among travelers, percent on a bus | Among those riding a bus, percent riding a bus who indicated using this carrier at least once during the week[a] | | | | | Weighted sample | Projected population |
			Unitrans	Yolobus	UCDMC Shuttle	Sac Reg. Transit	Other[b]		
Students	90.8%	24.7%	97.2%	6.5%	1.8%	0.3%	1.2%	2,758	28,876
Undergraduate	91.5%	29.1%	97.6%	6.4%	1.5%	0.3%	1.3%	2,236	23,404
Freshmen	93.8%	6.7%	89.8%	10.2%	4.0%	3.4%	8.0%	414	4,335
Sophomores	96.6%	43.2%	98.3%	3.9%	2.7%	0.0%	0.9%	425	4,444
Juniors	91.7%	37.1%	98.9%	6.0%	1.7%	0.0%	1.3%	608	6,363
Seniors	87.5%	27.0%	96.7%	8.5%	0.0%	0.4%	0.7%	789	8,262
Graduate	87.4%	4.9%	86.4%	8.9%	8.0%	0.5%	0.4%	523	5,472
Masters	86.5%	6.3%	81.1%	14.2%	7.5%	0.0%	0.9%	184	1,926
PhD	87.9%	4.2%	90.7%	4.7%	8.4%	0.9%	0.0%	339	3,546
Employees	83.1%	3.7%	47.7%	13.1%	29.5%	5.8%	9.7%	1,082	11,333
Faculty	79.3%	2.3%	55.6%	13.9%	30.6%	0.0%	0.0%	199	2,081
Staff	83.9%	4.0%	46.7%	13.0%	29.3%	6.5%	10.9%	884	9,252
Outside Davis	81.8%	4.3%	17.6%	44.8%	36.2%	11.6%	10.7%	862	9,297
Within Davis	91.1%	23.3%	98.4%	4.9%	1.6%	0.0%	1.8%	2,836	30,912
Overall	88.6%	19.2%	94.7%	6.8%	3.2%	0.6%	2.2%	3,840	40,209
Weighted sample	3,402	652	618	44	21	4	14	3,840	
Projected population	35,626	6,828	6,466	464	218	38	151		40,209

[a] Only includes those who reported riding the bus as their primary means of transportation in question *Q0016*. Percentages do not sum to 100 because respondents could indicate using more than one service.
[b] "Other" includes Fairfield Suisun Transit (a projected 20 riders), Davis Community Transit (18), UC Berkeley - UC Davis Shuttle Shuttle (17), Amtrak motorcoach bus (17), Muni (13), and Other or missing (29). Results are based on questions *Q0006*, *Q0016*, and *Q0023*. Data are weighted by role based on the 3,840 valid responses to *Q0016*.

Table 50. Percent riding specific trains on the way to campus on an average weekday

Role group	Percent physically traveling	Among travelers, % on a train	Among those riding a train, percent who indicated using this carrier at least once during the week[a]				Weighted sample	Projected population
			Amtrak	Sac Reg Transit	BART	Other[b]		
Students	90.8%	0.4%	96.0%	21.9%	15.3%	2.6%	2,758	28,876
Undergraduate	91.5%	0.2%	90.2%	46.3%	3.3%	6.5%	2,236	23,404
Freshmen	93.8%	0.3%	66.7%	22.2%	11.1%	22.2%	414	4,335
Sophomores	96.6%	0.0%	100.0%	0.0%	0.0%	0.0%	425	4,444
Juniors	91.7%	0.4%	100.0%	62.5%	0.0%	0.0%	608	6,363
Seniors	87.5%	0.1%	100.0%	50.1%	0.0%	0.0%	789	8,262
Graduate	87.4%	1.5%	100.0%	5.2%	23.5%	0.0%	523	5,472
Masters	86.5%	1.2%	100.0%	0.0%	15.0%	0.0%	184	1,926
PhD	87.9%	1.6%	100.0%	7.3%	26.8%	0.0%	339	3,546
Employees	83.1%	1.0%	100.0%	3.3%	10.6%	0.0%	1,082	11,333
Faculty	79.3%	3.9%	100.0%	4.9%	0.0%	0.0%	199	2,081
Staff	83.9%	0.4%	100.0%	0.0%	33.3%	0.0%	884	9,252
Outside Davis	81.8%	2.6%	100.0%	13.4%	13.8%	0.0%	862	9,297
Within Davis	91.1%	0.1%	73.5%	17.7%	8.8%	17.7%	2,836	30,912
Overall	88.6%	0.6%	97.8%	13.6%	13.2%	1.4%	3,840	40,209
Weighted sample	3,402	20	20	3	3	<1	3,840	
Projected population	35,626	212	207	29	28	3		40,209

a   Only includes those who reported riding a train as their primary means of transportation in question *Q0016*. Percentages do not sum to 100 because respondents could indicate using more than one service.
b   "Other" includes those riding Muni and Caltrain, presumably in combination with Amtrak.
Results are based on responses to questions *Q0006*, *Q0016*, and *Q0026*. Data are weighted by role based on the 3,840 valid responses to question *Q0016*.

Time arriving on campus

Table 51 and Table 52 show the percent of respondents traveling to campus who arrived during the morning peak (6am-10am[12]), by day and by role group. Among those traveling to campus on an average weekday, about three-quarters arrive during this period, or a projected 26,017 people.

Table 51. Arrivals during the peak period, by day

Day	Percent on campus	Arrival time	
		6am-10am	Off-peak
Monday	90.1%	75.1%	24.9%
Tuesday	90.7%	72.4%	27.6%
Wednesday	90.6%	74.4%	25.6%
Thursday	89.7%	72.2%	27.8%
Friday	81.6%	71.3%	28.7%
Saturday	20.3%	32.2%	67.8%
Sunday	17.4%	23.2%	76.8%
Average weekday	88.5%	73.1%	26.9%
Projected population	35,598	26,017	9,581

Results are based on responses to question *Q0013,* which had a weighted sample size of 3,964. Data are weighted (and expanded) by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

12   This period was chosen to match the peak period defined by the SCAQMD for the purposes of adjusting AVR calculations for off-peak travel, which we do not currently do but wanted to have the option of doing so should we elect to in the future (see Appendix D).

Table 52. Percent arriving during the peak period on an average weekday, by role

Role group	Percent on campus	Arrival time 6am-10am	Arrival time Off-peak	Unweighted sample	Projected population
Freshmen	93.5%	61.0%	39.0%	579	4,335
Sophomores	96.6%	63.2%	36.8%	495	4,444
Juniors	91.8%	66.1%	33.9%	427	6,363
Seniors	88.0%	64.7%	35.3%	475	8,262
Masters	86.6%	72.6%	27.4%	399	1,926
PhD	87.6%	78.5%	21.5%	591	3,546
Faculty	79.2%	85.9%	14.1%	399	2,081
Staff	84.1%	93.1%	6.9%	560	9,252
Overall	88.5%	73.1%	26.9%	3,925	40,209
Projected population	35,598	26,017	9,581		40,209

Results are based on responses to question *Q0013*. "Overall" figures are weighted by role group based on the 3,840 valid responses to question *Q0008* (see Table 6).

Self-reported travel time

Question *Q0030* asked respondents to indicate how many minutes it usually takes them to get from home to their first campus destination (in categories of five-minute intervals up to an hour, then 1-2 hours, or 2 hours or more). Taking the midpoints of each category as the travel time, the average minutes spent ranges from 11 minutes among freshmen to 26 minutes among faculty (Table 53). About 14 percent reports spending more than a half hour, with a high among staff at 25 percent.

Table 53: Reported number of minutes spent traveling to campus, by role

Role group	Average minutes	Percent reporting… Less than 10 minutes	Percent reporting… 10-29 minutes	Percent reporting… 30-59 minutes	Percent reporting… 1 hour or more	Weighted sample	Projected population
Students	17.2	26.1%	64.1%	7.9%	2.0%	2,737	28,876
Undergraduate	16.4	27.9%	63.1%	7.7%	1.3%	2,213	23,404
Freshmen	10.6	61.7%	34.9%	2.6%	0.9%	404	4,335
Sophomores	15.9	18.1%	76.8%	4.7%	0.4%	424	4,444
Juniors	18.1	20.0%	68.0%	10.6%	1.4%	605	6,363
Seniors	18.3	21.9%	66.4%	9.7%	2.0%	780	8,262
Graduate	20.6	18.4%	68.1%	8.8%	4.8%	524	5,472
Masters	21.1	17.9%	66.1%	12.0%	4.1%	184	1,926
PhD	20.4	18.6%	69.2%	7.0%	5.1%	340	3,546
Employees	24.4	9.3%	66.5%	20.6%	3.5%	1,089	11,333
Faculty	25.5	15.3%	64.9%	10.2%	9.7%	199	2,081
Staff	24.2	8.0%	66.9%	23.0%	2.2%	890	9,252
Outside Davis	36.1	1.4%	49.4%	39.2%	9.9%	875	9,297
Within Davis	14.1	27.2%	69.8%	2.8%	0.1%	2,858	30,912
On campus	9.6	62.4%	36.1%	1.2%	0.3%	538	5,915
Off campus	15.1	19.0%	77.6%	3.2%	0.1%	2,320	24,997
Overall	19.2	21.3%	64.8%	11.5%	2.4%	3,827	40,209
Weighted sample		814	2,478	441	93	3,827	
Projected population		8,557	26,042	4,631	979		40,209

Results are based on responses to question *Q0030*, which was categorical. To calculate average minutes, we assumed that the travel time for each individual is the midpoint of the category reported (e.g. "0-4 minutes" was treated as 2 minutes) or as 120 minutes for those reporting the highest category ("2 hours or more"). Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Residential location and distance from campus

The survey included several ways of measuring respondents' residential locations and how far they typically travel to get to campus. The first way was to ask them whether they lived on campus, elsewhere in Davis, or outside of Davis (question *Q0073*). The results suggest that about 14 percent live on campus (a projected 5,794 people), 62 percent live elsewhere in Davis (24,999 people), and 23 percent live outside of Davis (9,415 people), as shown in Table 54. A comparison with results from the 2008-09 and 2007-08 surveys shows no change in this overall distribution (Table 54).

Table 54: Residential location by role group: on or off-campus, in our outside of Davis

Role group	On campus	Off campus in Davis	Outside of Davis	Off campus (in and outside of Davis)	In Davis (on and off-campus)	Weighted sample	Population projection
Students	20.1%	69.3%	10.7%	79.9%	89.3%	2,664	28,876
Undergraduate	21.4%	70.0%	8.6%	78.6%	91.4%	2,153	23,404
Freshmen	85.1%	11.7%	3.2%	14.9%	96.8%	390	4,335
Sophomores	5.7%	90.5%	3.8%	94.3%	96.2%	413	4,444
Juniors	9.3%	80.7%	10.0%	90.7%	90.0%	595	6,363
Seniors	6.6%	80.6%	12.8%	93.4%	87.2%	755	8,262
Graduate	14.3%	66.2%	19.5%	85.7%	80.5%	511	5,472
Masters	10.8%	68.7%	20.5%	89.2%	79.5%	179	1,926
PhD	16.3%	64.9%	18.9%	83.7%	81.1%	332	3,546
Employees	0.4%	44.6%	55.0%	99.6%	45.0%	1,077	11,333
Faculty	0.8%	64.6%	34.6%	99.2%	65.4%	195	2,081
Staff	0.4%	40.1%	59.5%	99.6%	40.5%	882	9,252
Overall	14.4%	62.2%	23.4%	85.6%	76.6%	3,740	40,209
Weighted sample	539	2,326	876	3,201	2,865	3,740	
Projected population	5,794	24,999	9,415	34,415	30,794		40,209
Overall 2008-09	14.8%	62.3%	22.9%	85.2%	77%	4,052	39,562
Overall 2007-08	14.7%	61.0%	24.3%	85.3%	76%		40,601

For 2009-10, results are based on responses to question *Q0073* and are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6). Previous years' data are based on results from the 2008-09 and 2007-08 Campus Travel Surveys (see Lovejoy, et al. (2009), Table 31; and Congleton (2009), Table 3-3, respectively).

Table 55 shows what percent of residents in each location are in each role group. For instance, among those living on campus, over 99 percent are students and 86 percent are undergraduates. Of the 25,000 living off campus in the city of Davis, 80 percent are students and 20 percent are employees. Employees, particularly staff, are more likely to live outside of Davis: 58 percent of the 9,415 living outside of Davis are staff, though staff accounts for just 23 percent of the total university population.

Table 55. Role group by residential location: on or off-campus, in our outside of Davis

Role group	Among those who are living in this location, percent who are in this role group:					This role group's percent of the total population
	On campus	Off campus in Davis	Outside of Davis	Off campus (in and outside of Davis)	In Davis (on and off-campus)	
Students	99.96%	80.0%	32.7%	67.1%	83.8%	71.8%
Undergraduate	86.5%	65.6%	21.3%	53.4%	69.5%	58.2%
Freshmen	63.7%	2.0%	1.5%	1.9%	13.6%	10.8%
Sophomores	4.4%	16.1%	1.8%	12.2%	13.9%	11.1%
Juniors	10.2%	20.5%	6.8%	16.8%	18.6%	15.8%
Seniors	9.4%	26.6%	11.2%	22.4%	23.4%	20.5%
Graduate	13.5%	14.5%	11.3%	13.6%	14.3%	13.6%
Masters	3.6%	5.3%	4.2%	5.0%	5.0%	4.8%
PhD	9.9%	9.2%	7.1%	8.6%	9.3%	8.8%
Employees	0.9%	20.2%	66.2%	32.8%	16.6%	28.2%
Faculty	0.3%	5.4%	7.7%	6.0%	4.4%	5.2%
Staff	0.6%	14.9%	58.5%	26.8%	12.2%	23.0%
Overall	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Weighted sample	539	2,326	876	3,201	2,865	3,740
Projected population	5,794	24,999	9,415	34,415	30,794	40,209

Results are based on responses to question *Q0073*. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 56. Cities and counties where respondents live, based on geocoded addresses

Location	Percent	Weighted sample	Projected population
Davis total	76.9%	2,775	30,929
City of Davis	62.8%	2,265	25,242
On campus, UC Davis	14.1%	510	5,687
City of Sacramento	4.9%	178	1,989
City of Woodland	4.5%	162	1,803
Sacramento County, beyond the city of Sacramento (Elk Grove, Arden-Arcade, Carmichael, North Highlands, Citrus Heights, Rancho Cordova, etc.)	4.1%	149	1,656
Solano County (Vacaville, Dixon, Fairfield, Suisun City, Benicia, Vallejo)	4.0%	145	1,617
Yolo County, beyond the cities of Davis and Woodland (Winters, Esparto, etc.)	2.9%	106	1,179
East Bay counties (Contra Costa, Alameda)	1.0%	36	403
Foothills (Placer, El Dorado, and Nevada counties)	0.8%	30	339
North and South Bay counties (Santa Clara, San Mateo, Napa, Marin, Sonoma)	0.3%	9	102
City of San Francisco	0.2%	8	90
Central valley (Stanislaus and San Joaquin counties)	0.2%	7	74
Yuba and Sutter counties and points north	0.1%	3	29
Total	100.0%	3,609	40,209

Locations are based on the geocoded cross-streets (given in questions *Q0074 and Q0076*, or dorm name given in *Q0075*) and the city and county area that the point was within or nearest (see Appendix E). Data are weighted by role group for the 3,569 cases successfully geocoded (based on *Q0074-76*) and with non-missing mode choice data in question *Q0016*.

The survey also asked respondents more detailed information about where they live, including their zip code, if outside of Davis, and the set of cross-streets nearest where they live (or the name of their on-campus residences) in questions Q0074 through Q0076. This information was geocoded in ArcGIS, enabling a variety of spatial analyses (see Appendix E for details on the methodology). Table 56 shows the cities and counties where respondents report living, among those who gave answers that could be successfully geocoded, which was about 88 percent of all respondents. Of these, about 22 percent live outside of Davis (as found in question Q0074 and Table 55 above), including 5 percent in Sacramento, 5 percent in Woodland (a projected 2,000 people or so in each), and another 9 percent elsewhere in Sacramento, Yolo, or Solano counties (a projected 3,730 people). The remainder (about 3 percent or a projected 1,049 people) live in farther flung locations, including about 600 in the Bay Area.

We also used the geocoded addresses to estimate the distance respondents must travel (along a shortest-time route) to get to campus (in particular, to the Silo) on a daily basis (see Appendix E). Table 57 and Table 58 summarize distances traveled by role group, showing that employees, especially staff, tend to travel from farther away. The median distance traveled among students is about 1.8 miles, versus 3.0 among faculty and 11.0 among staff (Table 57). While about 85 percent of undergraduates live within 3 miles of campus, only 51 percent of faculty and 30 percent of staff do (Table 58). About 18 percent of the campus population lives more than 10 miles away and 7 percent more than 20 miles away (a projected 7,401 people and 2,648 people, respectively). Note that the threshold for living within Davis is about 5 miles, and that very few people live 5 to 10 miles from campus. That is, once they live outside of Davis, it is likely that they live more than 10 miles away, given the agricultural belt that surrounds Davis.

Table 57. Average distance from campus, based on geocoded addresses, by role

Role group	Percent successfully geocoded	Among those successfully geocoded, distance from campus (in miles):				Weighted sample	Projected population
		Mean	Median	Minimum	Maximum		
Students	87.5%	4.3	1.8	0.4	106.0	2,955	28,876
Undergraduate	86.8%	3.5	1.6	0.4	79.2	2,412	23,404
Freshmen	85.7%	1.3	0.7	0.5	35.4	452	4,335
Sophomores	89.3%	2.6	1.8	0.4	57.6	448	4,444
Juniors	87.2%	4.1	1.8	0.4	75.5	654	6,363
Seniors	85.8%	4.7	1.8	0.4	79.2	859	8,262
Graduate	90.4%	7.5	2.2	0.4	106.0	543	5,472
Masters	89.5%	7.5	2.0	0.4	103.9	193	1,926
PhD	90.8%	7.5	2.3	0.5	106.0	350	3,546
Employees	88.4%	12.0	9.0	0.5	84.7	1,159	11,333
Faculty	87.0%	11.0	3.0	0.5	84.7	217	2,081
Staff	88.7%	12.3	11.0	0.6	80.0	942	9,252
Outside Davis	91.5%	22.7	18.0	1.1	106.0	873	9,297
Within Davis	97.9%	1.9	1.8	0.4	19.4	2,865	30,912
Off campus	97.5%	2.1	1.9	0.4	19.4	2,327	24,997
On campus	99.7%	0.8	0.6	0.4	2.4	537	5,915
Overall	87.7%	6.5	2.0	0.4	106.0	4,114	40,209

Distances are calculated as the shortest-time network distance between respondents' geocoded cross-streets (given in questions *Q0074 and Q0076*, or dorm name given in *Q0075*) and a centroid on campus near the Silo (see Appendix E). Data are weighted by role group for the 3,569 cases successfully geocoded (based on *Q0074-76*) and with non-missing mode choice data in question *Q0016* (see Table 6).

Table 58. Cumulative percent of people living within each distance of campus, by role

Distance from campus	Overall	Students		Employees	
		Undergraduate	Graduate	Faculty	Staff
0.5 miles or less	2.1%	3.4%	0.7%	0.3%	0.0%
1 mile	17.5%	26.6%	10.7%	4.2%	1.9%
1.5 miles	32.9%	44.6%	31.5%	15.5%	8.4%
2 miles	49.6%	67.0%	47.2%	23.8%	13.0%
2.5 miles	57.7%	74.3%	57.0%	35.7%	21.6%
3 miles	68.0%	84.6%	69.4%	51.2%	29.6%
4 miles	76.6%	91.5%	80.6%	64.8%	39.5%
6 miles	77.9%	92.0%	81.4%	69.5%	42.4%
8 miles	78.1%	92.0%	81.5%	70.4%	43.1%
10 miles	79.2%	92.3%	82.1%	70.9%	46.4%
12 miles	81.6%	92.7%	83.4%	74.2%	54.4%
14 miles	84.4%	93.4%	85.1%	78.4%	62.8%
16 miles	86.3%	94.1%	87.2%	80.3%	67.6%
18 miles	88.9%	95.0%	89.1%	83.9%	74.6%
20 miles	91.4%	95.9%	90.7%	87.0%	81.5%
25 miles	93.4%	96.9%	92.2%	89.2%	86.5%
30 miles	96.7%	98.7%	93.8%	90.6%	94.8%
40 miles	97.7%	99.1%	95.0%	91.1%	97.3%
50 miles	98.2%	99.3%	95.6%	92.0%	98.5%
60 miles	98.7%	99.4%	97.0%	92.8%	99.0%
70 miles	99.3%	99.7%	98.4%	97.2%	99.4%
100 miles	100.0%	100.0%	99.8%	100.0%	100.0%
More than 100 miles	100.0%	100.0%	100.0%	100.0%	100.0%
Weighted sample	3,609	2,094	491	188	836
Projected population	40,209	23,404	5,472	2,081	9,252
Group's percent of the overall population	100.0%	58.2%	13.6%	5.2%	23.0%

Distances are calculated as the shortest-time network distance between respondents' geocoded cross-streets (given in questions *Q0074 and Q0076*, or dorm name given in *Q0075*) and a centroid on campus near the Silo (see Appendix E). Data are weighted by role group for the 3,569 cases successfully geocoded (based on *Q0074-76*) and with non-missing mode choice data in question *Q0016* (see Table 6).

Table 59 and Table 60 show the correspondence between distance and mode choice. In particular, Table 59 shows the percent of people using each mode as their primary means of transportation on an average weekday, among those who live various distances from campus. Table 60 shows distance from campus, among those who reported using each mode as their primary means of transportation at least once during the reference week. For instance, we see that the percent of people biking on an average weekday drops from 68 percent, to 47 percent, to 28 percent at the thresholds of 1 mile, 3 miles, and 5 miles from campus, respectively, while walking drops from 21 percent to 4 percent at the 1-mile versus 3-mile threshold, respectively (Table 59). Bus use is most prevalent among those within 5 miles of campus (within Davis), while the train attracts a substantial share (5 percent) only among those living 20 miles away or farther – which makes sense, given the locations of the train stations along the Amtrak Capitol Corridor. From the converse perspective, among those who biked as their primary mode at least once, 30 percent lived within 1 mile, 91 percent within 3 miles, and 99 percent within 5 miles; while about 67

percent of train users (those who rode the train at least one weekday) live 20 miles away or more (Table 60). Among those arriving in personal vehicles, carpooling (or getting a ride) is less likely from greater distances: The percent of vehicle users who carpool drops from 48 percent among those living within 1 mile to 13 percent among those living 20 or miles away (Table 59); and the average (and median) distance among those driving alone is 12.8 miles (and 9.0 miles) versus 7.8 miles (2.9 miles) among those carpooling or getting a ride (Table 60).

Table 59. Primary means of transportation on an average weekday, by distance from campus

| Distance group | Percent physically traveling | Among those physically traveling to campus, percent who: | | | | | | | Weighted sample | Projected population |
| | | Bike | Walk | Skate | Drive, carpool, or ride | | Bus | Train | | |
					Overall	Among these, percent who carpool/ ride				
Within 1 mile	92.9%	68.2%	21.0%	1.5%	4.6%	48%	4.6%	0.1%	693	7,804
1 to 2.9 miles	90.9%	47.4%	4.0%	0.3%	19.3%	32%	28.8%	0.1%	1,820	20,503
3 to 4.9 miles	89.5%	28.4%	3.2%	0.1%	42.3%	24%	26.0%	0.0%	357	4,018
5 to 9.9 miles	87.4%	9.0%	0.0%	0.0%	91.0%	8%	0.0%	0.0%	41	464
10 to 19.9 miles	85.1%	1.6%	2.3%	0.0%	89.2%	19%	6.1%	0.9%	369	4,161
20 miles or more	77.2%	1.3%	1.4%	0.0%	89.3%	13%	2.6%	5.4%	290	3,264
Overall	89.2%	40.1%	6.6%	0.4%	33.1%	23%	19.1%	0.6%	3,569	40,209
Weighted sample	3,182	1,275	211	14	1,055	722	609	18	3,569	
Projected population	35,853	14,370	2,376	160	11,885	8,132	6,864	198		40,209

Mode data are based on responses to question *Q0016* and distance data are calculated network distances between the geocoded cross-streets (given in *Q0074 and Q0076*, or dorm name given in *Q0075*) and a centroid on campus near the Silo (see Appendix E). Data are weighted by role group for the 3,569 cases successfully geocoded (based on *Q0074-76*) and with non-missing mode choice data in question *Q0016* (see Table 6).

Table 60. Distance from campus, by mode group

| Mode group | Percent using this mode at least one weekday | Among those using this mode as their primary means of transportation at least one weekday during the reference week: | | | | | | | | Weighted sample |
| | | Mean distance | Median distance | Maximum distance | Percent living within: | | | | | |
					1 mile	3 miles	5 miles	10 miles	20 miles	
Bike	44.9%	1.9	1.4	79.2	29.6%	90.6%	98.5%	98.8%	99.6%	3,569
Walk	11.2%	2.3	0.9	34.7	53.3%	89.3%	89.3%	93.6%	97.8%	3,569
Skate	0.9%	1.4	1.1	3.3	43.8%	94.7%	100.0%	100.0%	100.0%	3,569
Drive alone	33.1%	12.8	9.0	88.7	2.3%	35.0%	47.4%	50.7%	79.5%	3,569
Carpool or ride	14.4%	7.8	2.9	74.0	8.3%	57.1%	69.6%	71.2%	90.8%	3,569
Bus	25.9%	3.0	1.9	35.9	7.2%	82.3%	94.8%	94.8%	98.9%	3,569
Train	1.1%	45.8	62.4	106.0	4.3%	17.0%	17.0%	17.0%	32.9%	3,569
Work from home	2.4%	24.3	15.2	96.1	3.2%	24.5%	34.8%	34.8%	65.8%	3,569
Other no travel	23.6%	9.8	2.5	106.0	12.1%	58.7%	67.8%	69.0%	84.5%	3,569
Overall	100.0%	6.5	2.0	106.0	17.6%	68.1%	77.9%	79.3%	91.4%	3,569
Weighted sample	3,840				629	2,429	2,781	2,829	3,262	3,569
Projected population	40,209				7,086	27,369	31,331	31,868	36,751	

Mode data are based on responses to question *Q0016* (primary means of transportation each day during the reference week) and distance data are calculated network distances between the geocoded cross-streets (given in *Q0074 and Q0076*, or dorm name given in *Q0075*) and a centroid on campus near the Silo (see Appendix E). Data are weighted by role group for the 3,569 cases successfully geocoded (based on *Q0074-76*) and with non-missing mode choice data in question *Q0016*, except for those in the first column showing the percent using this mode, which are weighted by role group for the 3,840 valid responses to question *Q0016* (see Table 6).

This year's survey also asked respondents to estimate the number of miles it is "from where you're living to the UC Davis campus (one-way)?" (and specifying "for where you live locally, from where you would come to school or work at UC Davis on a daily basis" to avoid having students report their parents' home addresses) in question *Q0031*. In general, these self-reported distances (Table 61) are slightly longer than distances estimated from respondents' geocoded addresses.

A comparison including just cases for which both sets of data are non-missing shows that the figures are closer, but still with longer self-reported distances, on average (Table 62). In particular, about half of respondents (53 percent) have a higher self-reported distance than a calculated distance and for the other half it is lower. However, for those cases where the self-reported distances are higher, the discrepancy tends to be greater than when they are lower. For cases with a higher self-reported distance than a calculated distance, the average discrepancy (amount that the self-reported distance is greater) is 2.0 miles, whereas for cases with a lower self-reported distance, the average discrepancy (amount that the self-reported distance is lesser) is 0.94 miles. Across all respondents, the self-reported distance is greater than the calculated distance by an average of 0.65 miles, or by 25 percent of the calculated distance.

Table 61. Self-reported distance from campus, by role

Role group	Minimum	Maximum	Mean	Median	Weighted sample	Projected population
Students	0	280	5.2	2.0	2,706	28,876
Undergraduate	0	150	4.4	2.0	2,189	23,404
Freshmen	0	150	2.3	0.8	390	4,335
Sophomores	0	120	3.3	2.0	421	4,444
Juniors	0	75	4.8	2.0	599	6,363
Seniors	0	105	5.6	2.0	779	8,262
Graduate	0	280	8.9	2.5	517	5,472
Masters	0	100	8.7	2.5	182	1,926
PhD	0	280	9.0	2.9	335	3,546
Employees	0	500	14.3	10.0	1,086	11,333
Faculty	0	500	14.9	4.0	199	2,081
Staff	0.5	92	14.1	11.0	887	9,252
Outside Davis	0.5	500	25.6	20.0	871	9,297
Within Davis	0	150	2.3	2.0	2,826	30,912
Off campus	0	30	2.5	2.0	2,303	24,997
On campus	0	150	1.3	0.5	523	5,915
Overall	0	500	7.8	2.0	3,791	40,209

Results are based on responses to question *Q0031*. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 62. Comparison of self-reported versus estimated distances from campus, by role

Role group	Average difference	Average percent difference	Percent of respondents whose self-reported distance is higher	Weighted sample	Projected population
Students	0.40	26.4%	47.8%	2,532	28,876
Undergraduate	0.36	27.1%	44.5%	2,051	23,404
Freshmen	0.64	91.7%	38.8%	371	4,335
Sophomores	0.31	19.9%	46.2%	391	4,444
Juniors	0.34	11.5%	49.5%	558	6,363
Seniors	0.27	10.1%	42.6%	732	8,262
Graduate	0.57	23.4%	62.0%	481	5,472
Masters	0.34	19.7%	61.2%	169	1,926
PhD	0.69	25.4%	62.4%	312	3,546
Employees	1.26	20.6%	67.7%	1,000	11,333
Faculty	0.80	16.6%	61.9%	184	2,081
Staff	1.36	21.5%	68.9%	816	9,252
Outside Davis	1.56	8.1%	65.5%	782	9,297
Within Davis	0.38	29.5%	49.9%	2,744	30,912
Off campus	0.35	18.3%	52.0%	2,227	24,997
On campus	0.52	77.7%	40.9%	517	5,915
Overall	0.65	24.8%	53.4%	3,532	40,209

Self-reported distances are based on responses to question *Q0031* and estimated distances are calculated as the shortest-time network distance between respondents' geocoded cross-streets (given in questions *Q0074 and Q0076*, or dorm name given in *Q0075*) and a centroid on campus near the Silo (see Appendix E). Only the 3,532 cases with non-missing data for both sets of variables are included in this table. All data are weighted by role for the 3,569 cases successfully geocoded (based on *Q0074-76*) and with non-missing mode choice data in question *Q0016* (see Table 6).

Aggregate person-miles and vehicle-miles traveled

For estimates of the numbers of miles traveled, we rely on the calculated distances between respondents' geocoded home locations and a centroid on campus (rather than the self-reported distances discussed above). We assume respondents take this shortest path to and from campus on the days they report having traveled to campus, which likely underestimates the true number of miles traveled to and from campus, since it does not take into account side trips respondents might make on the way to or from campus (for instance stopping at the store, to pickup children, or visit friends), or trips away from campus during the middle of the day (such as to go to lunch or to an off-site meeting).

We estimate the number of miles (person-miles, versus vehicle-miles, described below) traveled each day as the doubled network distance between respondents' geocoded home location and the Silo on campus (as described in Appendix E), multiplied times the percent of weekdays a respondent travels to campus. Thus, if a person lives 10 miles from campus and traveled to campus all five days, her average daily person-miles would be 20 miles; by contrast, if she traveled to campus only one day, her average daily person-miles would be 4 miles. We further attribute person-miles to each mode based on the share of weekdays a respondent used each mode. Thus, if a respondent biked one day and drove four, we count 20 percent of his miles as bike miles and 80 percent as driving miles. Summed across all respondents, this represents the person-miles traveled by each mode on an average weekday. We also report miles avoided for those who do not travel to campus on a given day, either because working from home or for

other reasons. We weight and inflate all responses by role group to estimate a projection of the total person-miles traveled in the entire population.

To estimate the number of person-miles traveled annually, we first assume that respondents travel the same number of days per week and using the same modes as in the reference week for the entire 36 weeks of the academic year. Then to estimate summer travel, we rely on responses to questions *Q0033* and *Q0034* about the number of weeks and average number of days per week traveled to campus during the summer, but assuming they used the same modes used during the survey reference week throughout the summer. For instance, annual miles biked = (distance from campus × 2) × (share of days biked during reference week) × [(36 weeks × 5 days/week) + (weeks traveled to campus during the summer × days/week traveled per summer)].

Our estimates for the number of miles traveled, by mode and role, are shown in Table 63 and Table 64. We estimate that the campus population travels about 418,340 miles on an average weekday. We see that trips in cars account for a disproportionate share of the miles (72 percent of miles 30 percent of people) as do train trips (5 percent of miles but 0.5% percent of people), relative to biking, walking, and bus use. Considering role groups, employees cover a disproportionate share of miles (52 percent of miles, while comprising only 28 percent of the population). Miles avoided by employees working from home reduces the total miles traveled by about 5 percent, to the extent that this activity truly replaces physical trips to campus that otherwise would have taken place.

Table 63. Total miles traveled daily and annually, by mode used

Mode group	Aggregate round-trip Miles traveled		Percent of total daily miles traveled	Percent of total people	Projected population
	Daily	Annually			
Bike	49,780	10,342,862	11.9%	34.8%	13,973
Walk	9,715	2,079,178	2.3%	6.0%	2,403
Skate	348	71,001	0.1%	0.4%	148
Personal vehicle	299,426	66,959,570	71.6%	30.0%	12,061
Drive alone	249,599	55,887,435	59.7%	23.1%	9,291
Carpool or ride	49,827	11,072,135	11.9%	6.9%	2,770
Bus	39,982	8,305,542	9.6%	17.0%	6,828
Train	19,090	3,831,615	4.6%	0.5%	212
Work from home	(20,837)	(4,166,756)	(5.0%)	1.0%	416
Other no travel	(81,774)	(17,096,259)	(19.5%)	10.4%	4,168
Overall	418,340	91,589,770	100.0%	100.0%	40,209

Mode groups are the estimated number using each means of transportation on a typical weekday during the reference week, based on responses to questions *Q0006, Q0007-12*, and *Q0016*. Person-miles are calculated as described in the text, drawing on data from questions *Q0006, Q0007-12, Q0016, Q0033-34*, and *Q0074-76*. "Overall" miles includes those for all physical travel, not including miles avoided by those not traveling to campus by working from home or for other reasons. All data are weighted (and expanded) by role group for the 3,569 cases successfully geocoded (based on *Q0074-76*) and with non-missing mode choice data in question *Q0016* (see Table 6).

Table 64. Total miles traveled daily and annually, by role

Role	Aggregate round-trip Miles traveled		Percent of total daily miles traveled	Percent of total people	Projected population
	Daily	Annually			
Students	200,673	39,763,042	48.0%	71.8%	28,876
Undergraduate	144,588	28,337,032	34.6%	58.2%	23,404
Freshmen	10,725	1,965,253	2.6%	10.8%	4,335
Sophomores	22,598	4,258,185	5.4%	11.1%	4,444
Juniors	45,156	8,756,797	10.8%	15.8%	6,363
Seniors	66,109	13,356,797	15.8%	20.5%	8,262
Graduate	56,085	11,426,010	13.4%	13.6%	5,472
Masters	19,227	3,676,055	4.6%	4.8%	1,926
PhD	36,858	7,749,955	8.8%	8.8%	3,546
Employees	217,667	51,826,728	52.0%	28.2%	11,333
Faculty	30,616	6,625,805	7.3%	5.2%	2,081
Staff	187,051	45,200,923	44.7%	23.0%	9,252
Outside Davis	312,239	69,432,712	74.6%	23.1%	9,297
Within Davis	105,553	22,045,153	25.2%	76.9%	30,912
Off campus	96,804	20,347,896	23.1%	62.2%	24,997
On campus	8,749	1,697,257	2.1%	14.7%	5,915
Overall	418,340	91,589,770	100.0%	100.0%	40,209

Person-miles are calculated as described in the text, drawing on data from questions *Q0006, Q0007-12, Q0016, Q0033-34*, and *Q0074-76*. "Overall" miles includes those for all physical travel, not including miles avoided by those not traveling to campus by working from home or for other reasons. All data are weighted (and expanded) by role group for the 3,569 cases successfully geocoded (based on *Q0074-76*) and with non-missing mode choice data in question *Q0016* (see Table 6).

Vehicle-miles traveled (VMT) accounts for vehicle use and occupancy per mile. To estimate VMT, we assume that each person-mile contributes a fractional vehicle-mile equivalent to one divided by vehicle occupancy, for any travel in a personal vehicle or public transit vehicle (including driving alone, carpooling, getting a ride, riding a bus, and riding a train). We assume that travel by walking, biking, or skating contributes no VMT. Vehicle occupancy for carpooling and getting a ride varies for each respondent, as reported in questions *Q0018* and *Q0019* for those carpooling/vanpooling or getting a ride, respectively. If a respondent lives 10 miles from campus and traveled in a 3-person carpool all five weekdays, her average daily VMT would be (10 miles × 2) / 3 = 6.67 miles. Occupancy for those driving alone and for those who got a ride and were the only person dropped off on campus by the person giving them a ride was assumed to be one.

For bus and train occupancy, we assume average occupancy for all trips on those modes. In particular, we estimated average bus occupancy based on annual ridership data from Unitrans, since the majority of bus riders use Unitrans. According to 2008 figures from the National Transit Database, Unitrans provided 6,847,971 annual passenger miles and 704,711 vehicle revenue miles, suggesting an average of about 9.72 passengers per mile (up from 8.90 passengers per mile in 2007; see Lovejoy, et al. 2009).[13] Thus, for someone who lives 10 miles from campus

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[13] U.S. Department of Transportation, Federal Transit Administration, 2008 National Transit Database, Annual Transit Profile, Unitrans - City of Davis/ASUCD (NTD ID 9142) (http://www.ntdprogram.gov/ntdprogram/data.htm).

and traveled by bus all five weekdays, average VMT per day is (10 miles × 2) / 9.72 = 2.06 vehicle-miles. In general, each mile someone travels by bus contributes 1/ 9.72 ≈ 0.103 vehicle-miles per passenger-mile.

We estimated train occupancy based on annual ridership data from Amtrak's Capitol Corridor, since they provide the majority of train rides to campus. According to figures in the Capitol Corridor Business Plan Update, the Capitol Corridor provided 110,036,259 passenger-miles and 1,183,109 train-miles of service in FY2007-08, suggesting an average of about 85.6 passengers per mile (down from about 93.0 in FY 2007-08; see Lovejoy, et al. 2009).[14] So if a respondent lives 100 miles from campus and traveled by train all five days, her average VMT per day is estimated to be (100 miles × 2) / 85.6 = 2.34 vehicle-miles. In general, each mile someone travels by train contributes 1 / 85.6 ≈ 0.117 vehicle-miles per passenger-mile.

Our estimates for vehicle-miles traveled, by mode and role, are shown in Table 65 and Table 66. We estimate that travel to campus in personal vehicles contributes about 274,626 miles to VMT on an average weekday or 61.4 million VMT annually. Including estimates of VMT on buses and trains raises the total to 278,964 miles on an average weekday or 62.3 million miles annually. Those driving alone account for 23 percent of the population, 60 percent of (person) miles traveled, and 90 percent of VMT, while those carpooling account for 7 percent of the population, 12 percent of (person) miles traveled, and 9 percent of VMT. About 53 percent of the population contributes no VMT. Employees, and especially staff, contribute the most VMT, corresponding to living farther away, which in turn corresponds to more driving in lower-occupancy vehicles. In particular, those coming from outside Davis account for 23 percent of the campus population, 75 percent of (person) miles traveled, and 90 percent of VMT.

Table 65. Vehicle-miles traveled, by mode, daily and annually

Mode	Daily			Annually			Percent of total people	Population projection
	Total VMT	VMT per person	Percent of total VMT	Total VMT	VMT per person	Percent of total VMT		
No vehicle (bike, skate, walk, no travel)	0	0.0	0.0%	0	0	0.0%	52.5%	21,108
Personal vehicles	274,626	22.8	98.4%	61,415,760	5,092	98.6%	30.0%	12,061
Drive alone	249,599	26.9	89.5%	55,887,435	6,015	89.7%	23.1%	9,291
Carpool or ride	25,028	9.0	9.0%	5,528,325	1,996	8.9%	6.9%	2,770
Bus	4,114	0.6	1.5%	854,640	125	1.4%	17.0%	6,828
Train	223	1.1	0.1%	44,792	211	0.1%	0.5%	212
Total	278,964	6.9	100.0%	62,315,192	1,550	100.0%	100.0%	40,209

Mode groups are the estimated number using each means of transportation on a typical weekday during the reference week, based on responses to questions *Q0006, Q0007-12*, and *Q0016*. Vehicle-miles are calculated as described in the text, drawing on data from questions *Q0006, Q0007-12, Q0016, Q0018-19, Q0033-34*, *Q0074-76*, and the average number of passengers per mile on Unitrans and Amtrak's Capitol Corridor. All data are weighted (and expanded) by role group for the 3,569 cases successfully geocoded (based on *Q0074-76*) and with non-missing mode choice data in question *Q0016* (see Table 6).

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[14] *Capitol Corridor Intercity Passenger Rail Service Business Plan Update FY 2010-11 – FY 2011-12*, Appendix C (http://www.capitolcorridor.org/about_ccjpa/business_plan.php).

Table 66. Vehicle-miles traveled, by role, daily and annually

Role	Daily			Annually			Percent of total people	Population projection
	Total VMT	VMT per person	Percent of total VMT	Total VMT	VMT per person	Percent of total VMT		
Students	110,261	3.8	39.5%	21,916,783	759	35.2%	71.8%	28,876
Undergraduate	76,024	3.2	27.3%	14,888,814	636	23.9%	58.2%	23,404
Freshmen	3,312	0.8	1.2%	609,186	141	1.0%	10.8%	4,335
Sophomores	7,782	1.8	2.8%	1,453,833	327	2.3%	11.1%	4,444
Juniors	23,510	3.7	8.4%	4,436,570	697	7.1%	15.8%	6,363
Seniors	41,421	5.0	14.8%	8,389,224	1,015	13.5%	20.5%	8,262
Graduate	34,237	6.3	12.3%	7,027,969	1,284	11.3%	13.6%	5,472
Masters	12,841	6.7	4.6%	2,447,149	1,271	3.9%	4.8%	1,926
PhD	21,396	6.0	7.7%	4,580,820	1,292	7.4%	8.8%	3,546
Employees	168,702	14.9	60.5%	40,398,409	3,565	64.8%	28.2%	11,333
Faculty	17,679	8.5	6.3%	3,928,736	1,888	6.3%	5.2%	2,081
Staff	151,023	16.3	54.1%	36,469,673	3,942	58.5%	23.0%	9,252
Outside Davis	251,310	27.0	90.1%	56,247,781	6,050	90.3%	23.1%	9,297
Within Davis	27,233	0.9	9.8%	5,982,783	194	9.6%	76.9%	30,912
Off campus	26,881	1.1	9.6%	5,906,231	236	9.5%	62.2%	24,997
On campus	352	0.1	0.1%	76,552	13	0.1%	14.7%	5,915
Total	278,964	6.9	100.0%	62,315,192	1,550	100.0%	100.0%	40,209

Vehicle-miles are calculated as described in the text, drawing on data from questions *Q0006, Q0007-12, Q0016, Q0018-19, Q0033-34*, *Q0074-76*, and the average number of passengers per mile on Unitrans and Amtrak's Capitol Corridor. All data are weighted (and expanded) by role group for the 3,569 cases successfully geocoded (based on *Q0074-76*) and with non-missing mode choice data in question *Q0016* (see Table 6).

As one assessment of the extent that alternative transportation reduces campus-wide VMT, we might consider that if everyone drove alone to campus but all else were unchanged (e.g. the distances traveled and frequency that people came to campus), then VMT would be equivalent to the number of person-miles traveled. Thus comparing VMT to person-miles, we might conclude that there are 139,376 fewer vehicle-miles traveled each day (or 29,274,578 miles annually) as a result of using alternative transportation. On the other hand, there are 278,964 more vehicle-miles traveled each day than there would have been if everyone biked or walked.

Carbon emissions

As in 2008-09, we estimate the amount of CO_2 produced by campus travelers by assuming that each means of transportation generates a certain quantity of carbon (pounds-equivalent) per mile traveled, and multiplying this times our estimate of miles traveled by each mode on an average weekday. In particular, we assume driving alone generates 1.1 pounds-equivalent of CO_2 per vehicle-mile (regardless of vehicle type), and that carpooling/getting a ride, riding a bus, and riding a train produce some fractional amount of the emissions produced for the entire vehicle, adjusted for the total number of passengers in the vehicle. For carpooling and getting rides, we adjust vehicle occupancies based on occupancies reported by the respondents themselves. For transit, we assume average occupancies apply for all respondents. We consider estimates based on national averages (provided by TravelMatters.org) as well as an alternative (lower) estimate for buses based on Unitrans data, as summarized in Table 67.

Table 67. Formula for calculating average weekday pounds-equivalent of CO2, by mode

Mode			
Driving alone	1.1 lbs / mile	×	aggregated average weekday person-miles traveled (or equivalently, vehicle-miles traveled) by driving alone (from Table 63 or Table 65)
Carpool / ride	1.1 lbs / mile	×	aggregated average weekday carpool/ride vehicle-miles traveled (from Table 62, this is the equivalent of adjusting person-miles by the reported carpool size)
Bus (high)	0.90 lbs / mile	×	aggregated average weekday person-miles traveled by bus (from Table 61) x 0.90 lbs. / mile
Bus (low)	0.091 lbs / mile	×	aggregated average weekday person-miles traveled by bus (from Table 61)
Train	0.46 lbs / mile	×	aggregated average weekday person-miles by train (from Table 61)

The "low" estimate for bus emissions is based on annual fuel use and passenger-miles of service at Unitrans, as described in Lovejoy, et al. (2009). All other estimates are drawn from the *TravelMatters* website, Individual Emissions Calculator Methodology, available online at http://www.travelmatters.org/calculator/individual/methodology, which is meant to capture national averages. Annual estimates of CO2 generated are based on comparable figures of miles traveled annually.

Table 68. Estimated daily carbon emissions by mode and role

| Role group | Pounds-equivalent of CO_2 generated on an average weekday | | | | | | | | | | |
| | Among those using personal vehicles | | | Among those using public transit | | | Total[c] | Average lbs. / person | Percent of total CO_2 | Percent of total people | Projected population n |
	Drive alone	Carpool or ride	Average lbs. / user[a]	Bus (high)[b]	Bus (low)[b]	Train					
Students	105,304	12,232	21.1	28,845	2,927	4,428	150,809	5.2	43.5%	71.8%	28,876
Undergraduate	71,158	9,031	21.1	27,098	2,750	1,097	108,383	4.6	31.2%	58.2%	23,404
Freshmen	2,724	780	16.3	1,104	112	12	4,619	1.1	1.3%	10.8%	4,335
Sophomores	5,878	1,738	13.9	7,502	761	0	15,119	3.4	4.4%	11.1%	4,444
Juniors	22,495	2,169	22.6	9,291	943	1,030	34,984	5.5	10.1%	15.8%	6,363
Seniors	40,060	4,344	22.7	9,202	934	55	53,661	6.5	15.5%	20.5%	8,262
Graduate	34,146	3,202	21.1	1,747	177	3,331	42,426	7.8	12.2%	13.6%	5,472
Masters	13,298	695	22.3	906	92	655	15,553	8.1	4.5%	4.8%	1,926
PhD	20,848	2,507	20.4	841	85	2,677	26,873	7.6	7.7%	8.8%	3,546
Employees	169,255	15,298	28.5	7,139	724	4,353	196,045	17.3	56.5%	28.2%	11,333
Faculty	17,301	1,993	23.0	516	52	3,139	22,949	11.0	6.6%	5.2%	2,081
Staff	151,954	13,305	29.3	6,623	672	1,214	173,096	18.7	49.9%	23.0%	9,252
Outside Davis	252,554	22,351	40.5	10,261	1,041	8,768	293,934	31.6	84.7%	23.1%	9,297
Within Davis	21,571	5,152	5.0	25,709	2,609	14	52,445	1.7	15.1%	76.9%	30,912
Off campus	21,400	4,985	5.2	25,316	2,569	7	51,708	2.1	14.9%	62.2%	24,997
On campus	171	166	1.8	393	40	7	737	0.1	0.2%	14.7%	5,915
Overall	274,558	27,530	25.0	35,984	3,652	8,781	346,854	8.6	100.0%	100.0%	40,209
Projected population	9,291	2,770	12,061	6,828	6,828	212					40,209
Average lbs. / person	29.6	9.9	25.0	5.3	0.5	41.4		8.6			
Percent of total people (mode share[a])	23.1%	6.9%	30.0%	17.0%	17.0%	0.5%				100.0%	
Percent of total CO_2	79.2%	7.9%	87.1%	10.4%	1.1%	2.5%			100.0%		

[a]   Estimated number of (or percent of) users of this mode on average weekday, as shown in Table 14. For instance, from Table 14, a total of 26.1% drive alone plus 7.8% carpool/ride is a total of 33.9% using a personal vehicle among those physically traveling, times 88.6% physically traveling to campus, means 30.0% of the total population using a personal vehicle on an average weekday, or .300 times 40,209 people equals a projected 12,061 total people using personal vehicles.

[b]   High estimates assume 0.90 pounds/passenger-mile (as estimated by TravelMatters.org). Low estimates assume 0.091 pounds/passenger-mile, as estimated using Unitrans data on annual fuel use and passenger-miles of service provided as described in Lovejoy, et al. (2009).

[c]   Total and average are based on the "high" estimate of bus emissions.

Table 69. Estimated annual carbon emissions, by mode and role

Role group	Metric tons-equivalent of CO$_2$ generated on an average weekday						Average tons / person[b]	Percent of total[b] CO$_2$	Percent of total people	Population projection
	Drive alone	Carpool or ride	Bus (high)[a]	Bus (low)[a]	Train	Total[b]				
Students	9,502	1,096	2,598	264	387	13,583	0.47	39.0%	71.8%	28,876
Undergraduate	6,327	793	2,436	247	96	9,652	0.41	27.7%	58.2%	23,404
Freshmen	228	65	91	9	1	384	0.09	1.1%	10.8%	4,335
Sophomores	500	144	644	65	0	1,289	0.29	3.7%	11.1%	4,444
Juniors	1,904	199	855	87	90	3,049	0.48	8.8%	15.8%	6,363
Seniors	3,695	384	846	86	5	4,930	0.60	14.2%	20.5%	8,262
Graduate	3,175	303	162	16	291	3,931	0.72	11.3%	13.6%	5,472
Masters	1,148	62	80	8	54	1,343	0.70	3.9%	4.8%	1,926
PhD	2,028	241	82	8	237	2,588	0.73	7.4%	8.8%	3,546
Employees	18,383	1,663	793	80	413	21,251	1.88	61.0%	28.2%	11,333
Faculty	1,738	207	54	6	277	2,277	1.09	6.5%	5.2%	2,081
Staff	16,645	1,455	738	75	135	18,973	2.05	54.5%	23.0%	9,252
Outside Davis	25,663	2,248	1,044	106	798	29,753	3.20	85.4%	23.1%	9,297
Within Davis	2,182	508	2,346	238	1	5,037	0.16	14.5%	76.9%	30,912
Off campus	2,165	491	2,311	235	1	4,968	0.20	14.3%	62.2%	24,997
On campus	17	16	34	4	1	69	0.01	0.2%	14.7%	5,915
Total	27,885	2,758	3,391	344	799	34,834	0.87	100.0%	100.0%	40,209

[a] High estimates assume 0.90 pounds/passenger-mile (as estimated by TravelMatters.org). Low estimates assume 0.091 pounds/passenger-mile, as estimated using Unitrans data on annual fuel use and passenger-miles of service provided as described in Lovejoy, et al. (2009).
[b] Total and average are based on the "high" estimate of bus emissions.

We do not take into account emissions associated with the manufacture of bicycles or vehicles, or of home energy use for those working from home, assuming that biking, walking, skating, working from home, or otherwise not traveling contributes no emissions. As with our estimates of total miles traveled on which these are based, side trips made on the way to or from campus, and any trips made in the middle of the day are not taken into account. See Lovejoy, et al. (2009) for additional caveats regarding the assumptions made estimating overall carbon emissions.

Using these assumptions, we estimate that travel to campus generates a total of 346,854 pounds-equivalent of carbon on an average weekday, or 8.6 per person (Table 68) and about 34,834 metric tons-equivalent annually, or 0.87 per person (Table 69). This is down somewhat from the 2008-09 estimate of 357,438 pounds-equivalent daily (or 9.03 per person) and 35,831 metric tons annually (or 0.91 per person) (See Lovejoy, et al., 2009). Undergraduates, but especially freshmen and sophomores, contribute much less to campus-wide CO$_2$ emissions than their share of the population. Employees, and especially staff, contribute the most CO$_2$ relative to their share of the campus population, comprising 28 percent of the population while contributing 57 percent of CO$_2$ daily (and 61 annually).

Again, as an assessment of the extent that alternative transportation reduces carbon emissions, we might consider that if everyone drove alone to campus but all else were unchanged (e.g. the distances traveled and frequency that people came to campus), then there would be 460,174 pounds-equivalent (daily) or 45,699 metric tons-equivalent (annually) of CO$_2$ generated, and so

we might conclude that there are 113,320 pounds saved (daily) or 10,865 tons saved (annually) as a result of using alternative transportation.

Car ownership

All respondents were asked whether they "have access to a car (for driving to campus, if you wanted to use it)?" (question *Q0080*). About three-quarters of respondents indicated that they have access to a car (Table 70). Among undergraduates, the percent with cars grow substantially each class level, from 15 percent among freshmen to 83 percent among seniors. Those living (off-campus) within Davis are less likely to have a car than those living outside Davis (76 percent versus 98 percent).

Table 70. Percent with access to a car

Role group	Percent with access	Weighted sample	Projected population
Students	66.5%	2,653	28,876
Undergraduate	62.0%	2,142	23,404
Freshmen	14.6%	390	4,335
Sophomores	57.4%	410	4,444
Juniors	69.5%	592	6,363
Seniors	83.0%	751	8,262
Graduate	85.6%	511	5,472
Masters	86.8%	178	1,926
PhD	85.0%	332	3,546
Employees	96.3%	1,070	11,333
Faculty	96.1%	195	2,081
Staff	96.3%	876	9,252
Outside Davis	98.1%	864	9,297
Within Davis	68.0%	2,852	30,912
On campus	32.7%	538	5,915
Off campus	76.3%	2,314	24,997
Overall	75.1%	3,723	40,209
Weighted sample	2,795	3,723	
Projected population	30,183		40,209

Results are based on responses to question *Q0080*. Data are weighted by role group based on the 3,840 valid responses to question *Q0016*.

Vehicle type

Anyone who reported driving, carpooling, or getting a ride at any point on their way to campus during the reference week (based on question *Q0015*) was asked to indicate the type and technology (questions *Q0020* and *Q0021*) of the vehicle they used. About 20 percent used a truck or SUV (Table 71) and about 6 percent of respondents reported using a hybrid or alternative-fuel vehicle (Table 72). Note that the percentages shown are the percent of people using these vehicles at any point during the week, *not* necessarily the percent of vehicles arriving on a typical weekday (due to varying numbers of days that respondents might travel to campus and varying occupancies per vehicle).

Table 71. Types of vehicles used

	Percent using a vehicle	Among those using a vehicle at least once, percent using:					Weighted sample	Projected population
		Regular car or sedan	SUV	Truck	Van, minivan, or stationwagon	Motorcycle or scooter		
Overall	56.2%	71.6%	14.0%	6.5%	6.2%	1.8%	3,806	40,902
Weighted sample	2,138	1,530	299	139	132	39	3,806	
Projected population	22,975	16,442	3,210	1,491	1,416	417		40,902

Results are based on responses to questions *Q0015* (for whether any vehicle was used and whether motorcycle/ scooter used) and *Q0021* (type of vehicle other than a motorcycle/scooter). Percent using a vehicle includes those who indicated driving alone, carpooling, getting a ride, or riding a motorcycle/scooter at any point on their way to campus at least once during the reference week (question *Q0015*), whether or not as their primary means of transportation on a given day. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 72. Types of vehicle technologies (fuel) used

	Percent using a vehicle	Among those using a vehicle at least once, percent using:					Weighted sample	Projected population
		Regular diesel or gasoline	Hybrid	Natural gas	Biodiesel	All electric		
Overall	56.2%	94.3%	4.1%	1.0%	0.4%	0.2%	3,812	40,902
Weighted sample	2,141	2,019	87	21	9	4	3,812	
Projected population	22,975	21,666	938	224	102	46		40,902

Results are based on responses to question *Q0015* (for whether any vehicle was used) and *Q0022* (type of vehicle technology). Percent using a vehicle includes those who indicated driving alone, carpooling, getting a ride, or riding a motorcycle/scooter at any point on their way to campus at least once during the reference week (question *Q0015*), whether or not as their primary means of transportation on a given day. All data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Bicycle ownership and bike-riding aptitude

This year, rather than asking where a bike was obtained (as in the 2008-09 survey), we asked whether respondents "own (or have access to) a functioning bike" (question *Q0083*) and if so how much they spent on it (question *Q0084*). Respondents were asked to choose among the price categories shown in Table 73. Overall, about 82 percent have access to a bike. Faculty spend most on their bikes, followed by staff, grad students, and undergraduates. Undergraduates are most likely to spend nothing. Those spending less than $100 includes 53 percent of undergrads, 40 percent of grad students, 33 percent of staff, and 23 percent of faculty. Conversely, those spending more than $300 includes 44 percent of faculty, 32 percent of staff, 26 percent of grad students, and 14 percent of undergrads.

Question *Q0085* asked all respondents to rate their ability to ride a bike, specifying that we were interested "whether you know how or are physically able to ride a bike, regardless of whether it is practical or desirable for you to do so as a means of transportation to campus." About 2 percent indicated that they did not know how to ride a bike at all, a projected 775 people (or 573 living within Davis) (Table 74). An additional 7 percent indicated that they were "not very confident" riding, making for a projected 2,501 people living within Davis who do not know how or are not confident riding a bike. Overall, about 90 percent of people indicated that they were "somewhat" or "very confident" riding, which mostly held across all role groups. The percent reporting that they were "very confident" was highest among PhD students, faculty, and seniors (73, 72, and 72 percent, respectively), and lowest among freshmen (58 percent).

Table 73. Percent who own a bike and expense paid

Role group	Percent owning a bike	Among those who own a bike, percent having spent on it:								Avg.[a]	Weighted sample	Projected population
		$0	$1 to $50	$51 to $100	$101 to $200	$201 to $300	$301 to $400	$401 to $500	More than $500			
Students	82.7%	18.3%	11.0%	21.4%	21.6%	11.2%	6.5%	4.5%	5.6%	$63	2,178	28,876
Undergrad	82.1%	19.7%	11.3%	22.2%	21.7%	10.8%	6.0%	4.1%	4.3%	$55	1,750	23,404
Fresh.	91.3%	17.0%	8.1%	29.0%	24.3%	9.8%	6.2%	3.3%	2.3%	$44	355	4,335
Soph.	88.4%	16.9%	8.7%	20.3%	27.6%	11.4%	6.8%	4.1%	4.1%	$57	360	4,444
Juniors	79.3%	25.9%	13.1%	19.1%	17.8%	12.8%	4.7%	2.5%	4.1%	$51	465	6,363
Seniors	76.1%	18.1%	13.3%	21.8%	19.6%	9.4%	6.3%	5.7%	5.7%	$63	570	8,262
Graduate	85.2%	12.3%	10.1%	17.8%	21.0%	13.0%	8.7%	6.1%	10.9%	$96	428	5,472
Masters	82.2%	17.3%	11.1%	14.7%	22.2%	11.1%	6.5%	5.2%	11.8%	$99	144	1,926
PhD	86.9%	9.8%	9.6%	19.4%	20.4%	13.9%	9.8%	6.5%	10.4%	$95	284	3,546
Employees	79.2%	12.7%	6.1%	12.6%	16.8%	17.3%	12.4%	8.7%	13.3%	$112	844	11,333
Faculty	86.6%	7.6%	5.8%	9.7%	17.6%	15.2%	17.6%	8.2%	18.2%	$142	167	2,081
Staff	77.6%	14.0%	6.2%	13.3%	16.6%	17.8%	11.2%	8.8%	12.1%	$104	678	9,252
Outside Davis	68.7%	17.5%	7.4%	13.1%	16.7%	14.0%	10.5%	8.2%	12.5%	$104	597	9,297
Within Davis	85.7%	16.6%	10.1%	20.4%	21.1%	12.7%	7.6%	5.0%	6.6%	$70	2,420	30,912
Overall	81.7%	16.7%	9.7%	18.9%	20.3%	12.9%	8.2%	5.6%	7.7%	$77	3,023	40,209
Weighted sample	2,470	413	238	467	500	319	202	139	191		3,023	
Projected population	32,853	5,498	3,171	6,214	6,657	4,240	2,683	1,851	2,539			40,209

[a] To calculate "average" expense, we assumed that the expense for each individual is the midpoint of the category reported (e.g. "$1 to $50" was treated as $24.50) or as $600 for those reporting the highest category ("More than $500"). Results are based on responses to question *Q0083* (whether owns a bike) and *Q0084* (amount spent on bike). Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 74. Self-reported bike-riding aptitude by role

Role group	Cannot ride because do not know how	Cannot ride because physically unable	Can ride, but not very confident	Somewhat confident	Very confident	Weighted sample	Projected population
Students	2.2%	0.5%	6.1%	23.6%	67.7%	2,658	28,876
Undergraduate	2.2%	0.4%	6.0%	23.9%	67.4%	2,147	23,404
Freshmen	1.9%	0.2%	6.8%	33.1%	58.0%	390	4,335
Sophomores	1.5%	0.4%	4.7%	26.5%	66.9%	411	4,444
Juniors	1.2%	0.5%	8.1%	22.5%	67.6%	593	6,363
Seniors	3.7%	0.5%	4.8%	18.8%	72.3%	753	8,262
Graduate	1.9%	0.6%	6.3%	22.3%	68.8%	511	5,472
Masters	1.8%	0.8%	8.7%	26.8%	61.8%	179	1,926
PhD	1.9%	0.5%	5.1%	19.9%	72.6%	332	3,546
Employees	1.3%	3.3%	7.8%	19.4%	68.2%	1,070	11,333
Faculty	0.5%	1.6%	6.3%	19.3%	72.4%	195	2,081
Staff	1.5%	3.7%	8.1%	19.5%	67.3%	876	9,252
Outside Davis	2.2%	2.9%	7.7%	23.8%	63.4%	870	9,297
Within Davis	1.9%	0.8%	6.2%	22.0%	69.1%	2,852	30,912
Overall	1.9%	1.3%	6.6%	22.4%	67.8%	3,728	40,209
Weighted sample	72	47	245	835	2,529	3,728	
Projected population	775	509	2,644	9,007	27,273		40,209

Results are based on responses to question *Q0085*. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Crashes while biking, walking, or riding in a vehicle

All respondents were asked if they experienced "a fall or crash that resulted in personal injury to you" while walking, biking, or riding in personal vehicle between home and campus, at any point within the last year. For each type of activity (e.g. walking on campus), respondents were asked to select among the following choices, "I did this at least once in the last year, but was not injured," "Yes, I was injured doing this in the last year," or "Not applicable: I did not do this in the last year". An implausibly large number of respondents indicated the last category (Not applicable / did not do this," (for instance, 48 percent of respondents indicated not walking on campus), suggesting that this option was widely misinterpreted. We suspect that respondents tended to indicate "not applicable" if they were not injured, regardless of whether they did the activity at all. While question wording should be revised for next year, for this year we assume that our estimate of the percent for whom the question is applicable is an underestimate, and therefore reporting the percentage of injuries among the applicable respondents may appear as overestimates (e.g. 2.6 percent of all "applicable" respondents reported walking injuries, but only 1.4 percent of all respondents reported walking injuries). However, the total projected number of injuries would not be affected by this bias.

Table 75 shows that about 10 percent of respondents said they experienced an injury in the last year. About 15 percent of these required a hospital visit, a projected 634 individuals overall. Cyclists are more likely to experience an injury than walkers or those in vehicles, with 16 and 11 percent reporting injuries on and off-campus respectively (versus 1 or 2 percent of walkers or those in vehicles). While injuries occurring while driving or walking are most likely to require a hospital visit (27 percent and 18 percent off campus, respectively), because bike injuries are more frequent, cyclists are more likely to report an injury requiring a hospital visit overall – about 2 percent of all cyclists versus about 0.2 percent of walkers and 0.3 percent of vehicle-users, with a projected total of 593 hospital visits by cyclists, or 83 percent of the total hospital visits reported.

Table 75. Crashes while traveling between home and campus in the last year, by mode

Type of activity	Percent "applicable" (did this in the last year)	Percent injured in the last year: Among total population	Among applicable population	Among injured: Percent requiring a hospital visit	Percent police report filed	Projected number experiencing injuries in the last year	Total: Weighted sample	Projected population
Walking on campus	52.0%	1.4%	2.6%	6.5%	1.6%	550	3,653	40,209
Walking off campus	38.0%	0.5%	1.3%	17.5%	0.0%	192	3,615	40,209
Biking on campus	45.1%	7.3%	16.3%	11.6%	3.5%	2,950	3,670	40,209
Biking off campus	38.2%	4.1%	10.8%	15.2%	4.3%	1,658	3,634	40,209
Driving or riding in a vehicle	44.5%	0.5%	1.0%	26.8%	40.4%	181	3,620	40,209
For any of the above		10.5%		15.1%	4.6%	379	3,749	40,209
Projected population		4,207		634	193	4,207		40,209

Results are based on responses to questions *Q0035* (whether experienced an injury); and *Q0039-40, Q0044-45, Q0050-51, Q0056-57,* and *Q0061-62* (on hospital visits and police reports). Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 76 and Table 77 provide more information about the circumstances of bike crashes occurring on and off campus, respectively. Respondents were asked to indicate where the incident happened and could check all that apply or write in another response, as well as if the crash was "a result of colliding with someone or something," again with the option of checking all that applied. The results show that the majority of on-campus crashes (56 percent of the total), as well as 40 percent of crashes requiring a hospital visit, were the result of collisions with other bikers. Only 8 percent of on-campus crashes requiring a hospital visit involved a collision with a vehicle. By contrast, 8 percent of off-campus crashes requiring a hospital visit involved collisions with other bikers and 40 percent collisions with vehicles. About a quarter of all on-campus crashes—and about 15 percent of those requiring a hospital visit—occurred in roundabouts.

Table 76. Location and circumstances of injuries from on-campus bike crashes

	Of total injuries, percent of this type:	Percent of these requiring a hospital visit	Of those requiring a hospital visit, percent of crashes of this type	Total injuries:	
				Weighted sample	Population projection
Injuries from bike crashes on campus	100.0%	11.6%	100.0%	269	2,950
By location					
In a roadway	17.1%	17.0%	25.6%	46	506
In a bike lane (on a street shared with cars)	15.6%	15.9%	21.8%	42	459
On a bike or pedestrian path (separated from the street)	44.0%	9.4%	36.6%	118	1,297
On a sidewalk	6.0%	17.2%	9.2%	16	178
At an intersection (of any kind)	17.7%	14.9%	23.3%	48	523
At an intersection with a stop sign	3.1%	10.3%	2.9%	8	92
At a signalized intersection	1.2%	0.0%	0.0%	3	35
In a crosswalk	3.5%	0.0%	0.0%	9	102
In a roundabout	24.1%	7.1%	15.1%	65	712
In a parking lot	4.6%	0.0%	0.0%	12	137
Missing / no answer	2.2%	0.0%	0.0%	6	65
By collision type					
No collision	30.9%	18.8%	51.1%	83	911
Car or truck	3.4%	25.5%	7.5%	9	99
Bus	0.0%	0.0%	0.0%	0	0
Another biker	56.1%	8.0%	39.8%	151	1,656
Someone walking or running	8.8%	0.0%	0.0%	24	258
Animal	0.0%	0.0%	0.0%	0	0
Parked car or bike	2.3%	0.0%	0.0%	6	67
Road element	7.7%	2.8%	1.9%	21	227
Other/missing	3.7%	35.0%	5.3%	10	109

Results are based on responses to questions *Q0035* (whether experienced an injury), *Q0037* (incident location), *Q0038* (collision circumstances), and *Q0044* (hospital visits). All data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 77. Location and circumstances of injuries from off-campus bike crashes

	Of total injuries, percent of this type:	Percent of these requiring a hospital visit	Of those requiring a hospital visit, percent of crashes of this type	Total injuries:	
				Weighted sample	Population projection
Injuries from bike crashes off campus	100.0%	15.2%	100.0%	150	1,658
By location					
In a roadway	12.1%	8.0%	6.7%	18	200
In a bike lane (on a street shared with cars)	28.2%	14.8%	28.6%	42	467
On a bike or pedestrian path (separated from the street)	19.7%	22.7%	30.6%	29	326
On a sidewalk	11.0%	6.4%	4.8%	16	182
At an intersection (of any kind)	10.2%	15.1%	10.5%	15	168
At an intersection with a stop sign	3.8%	43.2%	11.4%	6	64
At a signalized intersection	8.5%	26.2%	15.3%	13	141
In a crosswalk	4.0%	0.0%	0.0%	6	66
In a roundabout	1.6%	0.0%	0.0%	2	26
In a parking lot	8.0%	0.0%	0.0%	12	132
Missing / no answer	7.0%	0.0%	0.0%	10	115
By collision type					
No collision	44.8%	8.9%	27.4%	67	742
Car or truck	14.4%	40.5%	39.9%	22	238
Bus	0.8%	0.0%	0.0%	1	13
Another biker	16.8%	6.9%	8.0%	25	278
Someone walking or running	2.7%	39.3%	7.4%	4	45
Animal	0.6%	0.0%	0.0%	1	10
Parked car or bike	0.0%	0.0%	0.0%	0	0
Road element	12.8%	11.8%	10.3%	19	211
Wrote in: leaves	2.2%	57.8%	8.6%	3	36
Wrote in: pavement	2.0%	46.1%	6.3%	3	33
Other/missing	4.4%	0.0%	0.0%	7	73

Results are based on responses to questions *Q0035* (whether experienced an injury), *Q0047* (incident location), *Q0048* (collision circumstances), and *Q0050* (hospital visits). All data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 78 shows the incidence of injuries by role group. Undergraduates are much more likely to experience injuries than others on campus, with a full quarter reporting an injury in the last year, versus 13 and 10 percent of grad students and employees respectively. The injuries experienced by staff and faculty are most likely to require a hospital visit, at 45 and 38 percent, respectively, compared with 16 and 19 percent of injuries experienced by undergraduates and grad students, respectively.

Table 78. Injuries from bike crashes, by role group

Role group	Percent "applicable" (biked in the last year)	Among applicable population, percent injured	Among injured: Percent of incidents occurring on campus	Among injured: Percent of requiring a hospital visit	Projected number of injuries requiring a hospital visit	Weighted sample	Projected population
Students	50.9%	22.9%	59.2%	16.4%	551	2,652	28,876
Undergraduate	51.5%	25.1%	60.3%	16.2%	489	2,142	23,404
Freshmen	35.6%	21.6%	65.9%	16.7%	56	393	4,335
Sophomores	71.5%	32.9%	65.8%	10.8%	113	410	4,444
Juniors	48.0%	23.7%	52.2%	14.6%	106	587	6,363
Seniors	51.6%	21.3%	58.3%	24.3%	221	751	8,262
Graduate	48.1%	13.2%	50.2%	18.5%	64	510	5,472
Masters	42.4%	14.2%	47.8%	13.3%	15	180	1,926
PhD	51.1%	12.7%	51.4%	20.7%	48	331	3,546
Employees	35.6%	10.3%	36.5%	43.6%	181	1,025	11,333
Faculty	45.2%	10.6%	47.1%	38.5%	38	180	2,081
Staff	33.5%	10.2%	33.3%	45.5%	144	845	9,252
Outside Davis	24.9%	9.7%	62.2%	32.6%	73	829	9,297
Within Davis	53.2%	21.6%	55.0%	18.0%	638	2,791	30,912
Overall	65.4%	20.2%	56.7%	18.8%	997	3,677	40,209
Weighted sample	2,404	486	276	91		3,677	
Projected population	26,282	5,313	3,015	997	997		40,209

Results are based on responses to questions *Q0035* (whether experienced an injury) and *Q0039* and *Q0050* (on hospital visits). Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Bicycle theft

Table 79 shows the number of respondents who report having been the victim of a bicycle theft on the UC Davis campus. About 19 percent of the total campus population has experienced a theft at some point (almost a quarter of those who have ever brought a bike to campus). Among those who have brought a bike on campus, about 11 percent reported that they experienced a theft in the last year, but only 23 percent reported the theft to campus police. Overall, we project about 3,710 people had a bike stolen within the last year, and that about 871 would have been reported to police. Actual records from Campus Police indicate 430 bike thefts reported during the corresponding period (November 1, 2008 through October 31, 2009).[15] UC Davis Bicycle Program Coordinator David Takemoto-Weerts and Police Lieutenant Matthew Carmichael suggested that one reason for the discrepancy might be that many people think they have reported a theft when they have not actually filed an official report. A new online reporting system may increase the number filing reports in the future.

Based on the survey results, undergraduates were most likely to experience thefts, with about a third of seniors with bikes on campus having experienced a theft, including 19 percent stolen within the last year.

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[15] Tabulation reported by Lieutenant Matthew Carmichael, UC Davis Police Department.

Table 79: Victims of bike theft, by role

| Role group | Percent ever had a bike on campus | Among applicable population, percent that: | | | Weighted sample | Projected population |
		Ever had a theft	Had a theft last year	Reported theft police last year		
Students	87.1%	22.2%	13.2%	21.6%	2,708	28,876
Undergraduate	87.6%	23.2%	14.6%	21.1%	2,186	23,404
Freshmen	89.7%	6.4%	6.0%	44.8%	400	4,335
Sophomores	94.4%	15.2%	14.1%	25.0%	419	4,444
Juniors	85.0%	28.6%	15.7%	22.2%	599	6,363
Seniors	85.0%	33.0%	19.0%	14.3%	768	8,262
Graduate	85.1%	18.2%	7.1%	26.2%	522	5,472
Masters	79.4%	15.2%	7.6%	21.7%	183	1,926
PhDs	88.2%	19.6%	6.9%	28.6%	339	3,546
Employees	74.3%	23.6%	4.8%	38.7%	1,090	11,333
Faculty	84.7%	23.9%	6.5%	47.6%	198	2,081
Staff	72.0%	23.6%	4.3%	35.3%	892	9,252
Living outside Davis	57.6%	22.8%	5.8%	29.5%	876	9,297
Living in Davis off campus	91.0%	24.9%	12.6%	21.9%	2,325	24,997
Living on campus	92.9%	13.1%	9.2%	28.4%	539	5,915
Overall	83.5%	22.6%	11.1%	23.5%	3,798	40,209
Weighted sample	3,170	716	350	82	3,798	
Projected population	33,561	7,578	3,710	871		40,209

Results are based on responses to questions *Q0063* (theft ever), *Q0064* (theft in the last year), and *Q0065* (reported to police). Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Awareness of TAPS and other transportation programs

Respondents were presented a list of services and asked to indicate, "It's new to me," "I've heard of it, but never used it," or "I've used it." Table 80 summarizes the responses for each service, and Table 81 compares responses for the past three years, for those items that appeared on each of the surveys. TAPS launched the GoClub, Zimride, and Zipcar programs in the Fall of 2009.

Table 80. Awareness of transportation services

Service	Have used it	Have only heard of it	Never heard of it	Weighted sample
GoClub program	3.2%	14.3%	82.5%	3,747
Emergency Ride Home Program for goClub members	1.0%	15.3%	83.7%	3,747
Discount Unitrans bus passes for those without a parking permit	4.7%	25.5%	69.8%	3,748
Yolo TMA "TRIP" Incentive Program	0.7%	8.2%	91.1%	3,747
Yolo TMA Emergency Ride Home Program (yolotma.org)	0.5%	9.0%	90.5%	3,744
Sacramento Region "Commuter Club"	0.6%	9.6%	89.8%	3,742
www.sacregion511.org	1.8%	10.5%	87.7%	3,741
TAPS motorist assistance program	8.5%	42.8%	48.7%	3,750
Comet in-vehicle parking meters on campus	2.9%	21.4%	75.7%	3,743
Social network for ride matching: Zimride.ucdavis.edu	1.2%	14.3%	84.6%	3,742
Zipcar carsharing program	1.5%	55.8%	42.7%	3,741
Enterprise Rental Car Voucher Program	0.9%	18.9%	80.2%	3,734
Ten bike tire air stations around campus	31.9%	23.2%	44.9%	3,746
Bike lock-cutting service	3.3%	37.6%	59.1%	3,746
UC Davis Bike Auction	8.0%	73.5%	18.5%	3,750

Results are based on responses to question *Q0071*. Data are weighted by role group based on the 3,840 valid responses to question *Q0016* (see Table 6).

Table 81. Awareness of transportation services, 2007-08 through 2009-10

Serrvice	Percent who have heard of it		
	2009-10	2008-09	2007-08
GoClub program	17.5%	n/a	n/a
Carpool/vanpool program	n/a	62.9%	56.9%
24 free parking days for carpoolers/ transitpoolers	n/a	34.1%	24.5%
Online ridematching service	n/a	32.8%	26.3%
Emergency Ride Home Program for goClub members	16.3%	n/a	n/a
Emergency ride home service	n/a	39.4%	29.7%
Discount Unitrans bus passes for those without a parking permit	30.2%	n/a	n/a
Discounted transit passes	n/a	43.8%	28.4%
Yolo TMA "TRIP" Incentive Program	8.9%	n/a	n/a
Yolo TMA Emergency Ride Home Program (yolotma.org)	9.5%	n/a	n/a
Yolo TMA Commuter Club	n/a	n/a	n/a
Sacramento Region "Commuter Club"	10.2%	n/a	n/a
www.sacregion511.org	12.3%	13.5%	10.3%
TAPS motorist assistance program	51.3%	49.0%	n/a
Comet in-vehicle parking meters on campus	24.3%	34.2%	n/a
Social network for ride matching: Zimride.ucdavis.edu	15.4%	n/a	n/a
Zipcar carsharing program	57.3%	n/a	n/a
Enterprise Rental Car Voucher Program	19.8%	n/a	n/a
Ten bike tire air stations around campus	55.1%	58.3%	n/a
Bike lock-cutting service	40.9%	49.0%	n/a
UC Davis Bike Auction	81.5%	84.3%	n/a

As in Table 80, data for 2009-10 are based on responses to question *Q0071*. See Lovejoy, et al. (2009) for results from 2008-09 and Congleton (2009) for results from 2007-08.

ACKNOWLEDGEMENTS

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Lovejoy, Kristin, Susan L. Handy, and Cliff Contreras. 2009. "Results of the Fall 2007 UC Davis Campus Travel Assessment." Institute of Transportation Studies, University of California, Davis, Research Report UCD-ITS-RR-09-43 (http://pubs.its.ucdavis.edu/publication_detail.php?id=1356).

APPENDICES

Appendix A: Survey instrument, 2009-10 Campus Travel Survey

Below is the full text of the survey instrument, shown without the formatting as it would have appeared to online survey-takers. Notes about the conditional display of questions based on respondents' prior answers are shown in brackets. Answer options that were offered as checkboxes in the online survey (allowing respondents to select more than one response) are denoted here with a ❏. Answer options that were implemented either as radio buttons or as part of a dropdown list in the online survey (allowing respondents to select only one response) are denoted here with a ❍. Questions that were required for respondents to proceed are denoted here with an asterisk (only the first three questions). Figure 18 at the end of this Appendix shows a sample screenshot of a page from the online version of the survey. On November 8, 2009, the dates of the reference week changed from Oct. 26- Nov. 1 to Nov. 2 – Nov. 8.

Welcome to the 2009-10 Campus Travel Survey!

If you already took this year's survey, thank you! But please don't take it more than once.

This survey provides campus planners with valuable feedback on how people get to campus and their experiences with various transportation programs. It should take less than 15 minutes to complete. Doing so is entirely voluntary, and we assure you that all responses are confidential and the results will only be published in the aggregate, without connection to any individual.

As a token of our appreciation, we're offering entry into a drawing for an 8GB iPod Nano to anyone who completes the survey.

Thanks for participating!

Q0001: What is your primary role at UC Davis?*
- ❍ Undergraduate student (including Post-bac)
- ❍ Graduate student
- ❍ Faculty
- ❍ Staff
- ❍ Visiting Scholar
- ❍ Post doc
- ❍ Recent graduate

[If undergraduate student]
Q0002: What year are you?*
- ❍ Freshman
- ❍ Sophomore
- ❍ Junior

❍ Senior
❍ Fifth-year senior
❍ Post-bac
❍ Visiting / exchange student
❍ Other: _____

[If graduate student]
Q0003: What type of graduate program are you in?*
❍ Master's
❍ PhD
❍ Law
❍ MBA
❍ Veterinary
❍ Ed.D. or CANDEL
❍ Other: _____

[If employee or grad student]
Q0004: Where is your office, lab, or department? (That is, wherever you usually spend your time when you travel to work or school at UC Davis)|
❍ On the Davis campus, in the **Central campus** area (including everything on this map) -- **this is most people**
❍ On the Davis campus, in the **West campus** area (west of SR 113)
❍ On the Davis campus, in the **South campus** area (south of I-80)
❍ Technically off-campus, but **within the city** of Davis
❍ **Outside of Davis**

[If located outside of Davis, ask this question, then skip to end, to "Optional" page.]
Q0005: Where outside of Davis is your office, lab, or department?

Consider your activities during the seven days last week, from Monday (Oct. 26) through Sunday (Nov. 1). If you have a day planner, it might be useful to look at the last week's activities as you complete this section.

Q0006: Did you go somewhere on campus any of the seven days last week for school or work? (If you went to a UC Davis office or lab that is technically off-campus, but within the city of Davis, please count that as well.)*
Yes, I traveled to campus destinations for school/work last week (check all that apply):
❍ Monday
❍ Tuesday
❍ Wednesday
❍ Thursday
❍ Friday
❍ Saturday
❍ Sunday
or
❍ **No**, I was away all week, Oct. 26 - Nov.1

About the days you did not travel on campus last week

[If no travel on some weekdays and an employee, for each weekday not traveled]
Q0007-11: What was the main reason you did not travel to work on campus [Monday]?
- ○ Work or school-related activities elsewhere (field work, meetings, teaching appointment, etc.)
- ○ Working from home (telecommuting) or from elsewhere
- ○ START or furlough day
- ○ Regularly scheduled day off
- ○ Day off as part of a 4/40 compressed work week
- ○ Day off as part of a 9/80 compressed work week
- ○ Day off as part of 3/36 compressed work week
- ○ Vacation
- ○ Sick or personal leave
- ○ Other: _____

[If no travel to campus all week]
Q0012: What was the main reason you did not go to campus destinations last week for school or work?
- ○ Study abroad
- ○ PELP (Planned Educational Leave Program)
- ○ Sabbatical
- ○ Temporary appointment elsewhere (internship, visiting scholar, teaching appointment, exchange program, etc.)
- ○ Telecommuting (working from home or another remote location)
- ○ Work or school-related travel or field work
- ○ Vacation
- ○ Sickness or personal leave
- ○ Other: _____

On the days you were on campus last week for school or work

[For any days that traveled]
Q0013: What time did you arrive at your first destination?

	Between 6am and 10am	Either before 6am or after 10am
Monday	○	○
Tuesday	○	○
Wednesday	○	○
Thursday	○	○
Friday	○	○
Saturday	○	○
Sunday	○	○

[If traveled at least one day last week]
Q0014: How did you get to your campus destinations last week?

[If traveled at least one day last week]
Q0015: First think back to the entire week (Monday, Oct. 26 - Sunday, Nov. 1). Please tell us
all the different means of transportation you used at some point on your way to school
or work, from the moment you left home to when you arrived at your first destination
on campus -- even if it was just for part of the way -- on any day last week. (Check all
that apply.)
- ❑ Bike
- ❑ Walk
- ❑ Skate
- ❑ Motorcycle or scooter
- ❑ Drive alone in a car (or other vehicle)
- ❑ Carpool or vanpool with others also going to campus (either as driver or passenger)
- ❑ Get a ride (someone drops you off and continues on elsewhere)
- ❑ Bus
- ❑ Train or light rail
- ❑ Other: _____

[For any days that traveled]
Q0016: Next, consider each day specifically. Please select which means of transportation you
used on your way to your first campus destination each day. (If you used more than one
means, select whatever you did for **most of the distance**.)

	Biked	Walked	Skated	Motorcycle or scooter	Drove myself (arrived alone)	Carpooled or vanpooled (arrived with others)	Got a ride (dropped off by someone going elsewhere)	Bus	Train / light rail
Monday	○	○	○	○	○	○	○	○	○
Tuesday	○	○	○	○	○	○	○	○	○
Wednesday	○	○	○	○	○	○	○	○	○
Thursday	○	○	○	○	○	○	○	○	○
Friday	○	○	○	○	○	○	○	○	○
Saturday	○	○	○	○	○	○	○	○	○
Sunday	○	○	○	○	○	○	○	○	○

[For any days that traveled]
Q0017: On any of these days, did you ride a bike on campus after traveling by some *other* means most of the distance from home to campus?

	No, because I was already biking	No, I did not bike	Yes, I switched to biking after using some other means
Monday	○	○	○
Tuesday	○	○	○
Wednesday	○	○	○
Thursday	○	○	○
Friday	○	○	○
Saturday	○	○	○
Sunday	○	○	○

[If checked carpool in Q0015]
Q0018: During the times when you carpooled with others last week, how many total people were in your carpool or vanpool (including yourself)? (If it was different on different days, please indicate what you did most often.)
- ○ 2 (you plus one other person)
- ○ 3 people
- ○ 4 people
- ○ 5 people
- ○ 6 people
- ○ 7 people
- ○ 8 or more

[If checked got a ride in Q0015]
Q0019: During the times when you got a ride on your way to campus last week, how many total people did your driver drop off? (If it was different on different days, please indicate what you did most often.)
- ○ 1 (just you)
- ○ 2 people
- ○ 3 people
- ○ 4 people
- ○ 5 people
- ○ 6 people
- ○ 7 or more

[If checked motorcycle, drove alone, carpooled, or got a ride in Q0015]
Q0020: Where did you (or whoever drove you) park? (If it was different on different days, please indicate what you did most often.)
- ○ On the UC Davis campus
- ○ Within Davis, but not on campus
- ○ Outside of Davis
- ○ I was dropped off (and the driver went elsewhere)

[If checked drove alone, carpooled, or got a ride in Q0015]
Q0021: What type of car or vehicle did you ride in on your way to campus? (If it was
different on different days, please indicate what you use most often.)
- ○ SUV
- ○ Truck
- ○ Van or minivan
- ○ Stationwagon
- ○ Other car (sedan, etc.)
- ○ Other: _____

[If checked motorcycled, drove alone, carpooled, or got a ride in Q0015]
Q0022: Was this vehicle a hybrid, alternative fuel, or electric vehicle?
- ○ **No**, it is a regular gasoline or diesel vehicle, or

  Yes, it was:
- ○ Hybrid
- ○ Plug-in hybrid
- ○ All electric
- ○ Biodiesel
- ○ Natural gas
- ○ Hydrogen fuel cell
- ○ Other: _____

[If checked bus in Q0015]
Q0023: Which bus service did you use on your way to campus last week? (Please check all
that apply.)
- ❑ Unitrans
- ❑ Yolobus
- ❑ Sacramento Regional Transit
- ❑ UCD/UCDMC Shuttle
- ❑ Fairfield Suisun Transit
- ❑ Davis Community Transit
- ❑ UC Berkeley - UC Davis Shuttle
- ❑ Amtrak motorcoach (bus)
- ❑ AC Transit
- ❑ Muni
- ❑ Other: _____

[If used Unitrans]
Q0024: Which Unitrans line(s) did you ride on your way <u>to</u> campus last week? (Check all
that apply.)
- ❑ A
- ❑ B
- ❑ C
- ❑ D
- ❑ E

- ❑ F
- ❑ G
- ❑ H
- ❑ J
- ❑ K
- ❑ L
- ❑ M
- ❑ P
- ❑ Q
- ❑ S
- ❑ T
- ❑ W

[If used Unitrans and a grad student]
Q0025: What type of Unitrans ticket did you use?
- ◯ 10-ride pass
- ◯ Monthly pass
- ◯ Quarter pass
- ◯ Annual pass
- ◯ Paid cash
- ◯ Other: _____

[If checked train in Q0015]
Q0026: Which train service did you use on your way to campus last week? (Check all that apply.)
- ❑ Amtrak Capitol Corridor
- ❑ Sacramento Regional Transit
- ❑ BART
- ❑ Muni
- ❑ Caltrain
- ❑ Other: _____

Q0027: Did you leave a bike on campus overnight any nights last week (Oct. 26 - Nov. 1)?
- ❑ **No**, not any nights last week

   Yes, I had a bike on campus overnight (check all that apply):
- ❑ Monday night
- ❑ Tuesday night
- ❑ Wednesday night
- ❑ Thursday night
- ❑ Friday night
- ❑ Saturday night
- ❑ Sunday night

[If left bike any nights last week]
Q0028: Do you typically store this bike on campus?
- ❍ Yes, I deliberately keep this bike on campus somewhat permanently
- ❍ No, I generally bring the bike home or intend to bring it home at some point
- ❍ Other: _____

[If left bike any nights last week]
Q0029: About how long has it been since you rode this bike?
- ❍ One day or less
- ❍ 2 to 7 days
- ❍ 8 to 14 days
- ❍ 15 to 30 days
- ❍ 31 days or more

Now consider your normal routine, whatever you do most often when you are in town and going to UC Davis on a regular basis.

[Everyone, even if no travel last week]
Q0030: About how many minutes does it usually take to get from where you live to your first campus destination on a given day (door-to-door)?
- ❍ 0-4 minutes
- ❍ 5-9 minutes
- ❍ 10-14 minutes
- ❍ 15-19 minutes
- ❍ 20-24 minutes
- ❍ 25-29 minutes
- ❍ 30-34 minutes
- ❍ 35-39 minutes
- ❍ 40-44 minutes
- ❍ 45-49 minutes
- ❍ 50-54 minutes
- ❍ 55-59 minutes
- ❍ 1 - 2 hours
- ❍ More than 2 hours

[Everyone, even if no travel last week]
Q0031: How many miles would you estimate it is from where you're living to the UC Davis campus (one-way)? (Please answer for where you live locally, from where you would come to school or work at UC Davis on a daily basis.)
[write-in numerical response?]

Q0032: After arriving on campus at the beginning of your day, how do you typically get around campus (or off campus) before leaving campus for the last time?

	Never	Very rarely	Sometimes	Fairly often	Very often	Always
I *walk* around between different destinations around campus.	○	○	○	○		○
I *bike* between different destinations around campus.	○	○	○	○		○
I ride in a *vehicle* to get to different destinations around campus.	○	○	○	○		○

Now consider this past summer, from June 16 - September 19, 2008.

Q0033: How much time did you spend at UC Davis over the summer? We're interested in the number of weeks you spent last summer traveling to and from campus destinations on a regular basis. Please estimate how many weeks you were on campus at least once a week during this period.
If you went to a UC Davis office or lab that is technically off-campus, but within the city of Davis, please count that as well.
(Note: There were a total of 14 weeks in the academic summer.)
[Dropdown list:]
- ○ All summer / 14 weeks (June 15 – September 18)
- ○ 13 weeks
- ○ 12 weeks (equivalent to Summer Session I and Summer Session II)
- ○ 11 weeks
- ○ …
- ○ 7 weeks
- ○ 6 weeks (equivalent to just ONE summer session, I or II)
- ○ 5 weeks
- ○ …
- ○ 1 week
- ○ None

[For any answer other "none"]
Q0034: During this period, how many days per week were you on campus, on average?
[Dropdown list:]
- ○ 1 day per week
- ○ 2 days per week
- ○ 3 days per week
- ○ 4 days per week
- ○ 5 days per week
- ○ 6 days per week
- ○ 7 days per week

Now think back on the last year, from November 1, 2008 through November 1, 2009.

Q0035: During this period, did you experience a fall or crash that resulted in <u>personal injury to you</u> while doing any of the following?

	I did this at least once in the last year, but was not injured	Yes, I was injured doing this in the last year	Not applicable: I did not do this in the last year
Walking on campus	○	○	○
Walking off campus, on my way between home and campus	○	○	○
Biking on campus	○	○	○
Biking off campus, on my way between home and campus	○	○	○
Driving or riding in a vehicle, on my way between home and campus	○	○	○

[If on-campus bike crash, shown Q0036-40]

Q0036: About your on-campus bike crash

Q0037: Where did this incident happen? (If you were in more than one crash on campus last year, please answer regarding the most serious one. Check all that apply for that incident.)
- ○ In a roadway
- ○ In a bike lane (on a street shared with cars)
- ○ On a bike or pedestrian path (separated from the street)
- ○ On a sidewalk
- ○ At an intersection (of any kind)
- ○ At an intersection with a stop sign
- ○ At a signalized intersection
- ○ In a crosswalk
- ○ In a roundabout
- ○ In a parking lot
- ○ Other: _____

Q0038: Was the crash a result of colliding with someone or something?
- ❑ **No**, the crash was not the result of a collision, or

Yes, I collided with (check all that apply):
- ❑ Car or truck
- ❑ Bus
- ❑ Another biker
- ❑ Someone walking or running
- ❑ Animal
- ❑ Parked car or bike
- ❑ Road element (curb, pole, tree, etc.)
- ❑ Other: _____

Q0039: Did you require a hospital visit?
- ❍ Yes
- ❍ No

Q0040: Was there a police report filed for this incident?
- ❍ Yes
- ❍ No

[If on-campus walking incident, shown questions Q0041-45]

Q0041: About the incident that occurred while you were walking on campus

Q0042: Where did this incident happen? (Check all that apply)
- ❍ In a roadway
- ❍ In a bike lane (on a street shared with cars)
- ❍ On a bike or pedestrian path (separated from the street)
- ❍ On a sidewalk
- ❍ At an intersection (of any kind)
- ❍ At an intersection with a stop sign
- ❍ At a signalized intersection
- ❍ In a crosswalk
- ❍ In a roundabout
- ❍ In a parking lot
- ❍ Other: _____

Q0043: Did this incident involve a collision (for instance being hit by a car)?
- ❑ **No**, this incident was not the result of a collision, or

   Yes, I collided with (check all that apply):
- ❑ Car or truck
- ❑ Bus
- ❑ Biker
- ❑ Someone else on foot (walking or running)
- ❑ Animal
- ❑ Other: _____

Q0044: Did you require a hospital visit?
- ❍ Yes
- ❍ No

Q0045: Was there a police report filed for this incident?
- ❍ Yes
- ❍ No

[If off-campus bike crash, then shown questions Q0046-51]
Q0046: About your off-campus bike crash
Q0047: Where did this incident happen? (If you were in more than one crash wile biking off-campus last year, please answer regarding the most serious one. Check all that apply for that incident.)
- ❍ In a roadway
- ❍ In a bike lane (on a street shared with cars)
- ❍ On a bike or pedestrian path (separated from the street)
- ❍ On a sidewalk
- ❍ At an intersection (of any kind)
- ❍ At an intersection with a stop sign
- ❍ At a signalized intersection
- ❍ In a crosswalk
- ❍ In a roundabout
- ❍ In a parking lot
- ❍ Other: _____

Q0048: Was it in Davis?
- ❍ Yes, it happened within the city of Davis.
- ❍ No, it happened somewhere outside of Davis.

Q0049: Was the crash a result of colliding with someone or something?
- ❑ **No**, the crash was not the result of a collision, or

   Yes, I collided with (check all that apply):
- ❑ Car or truck
- ❑ Bus
- ❑ Another biker
- ❑ Someone walking or running
- ❑ Animal
- ❑ Parked car or bike
- ❑ Road element (curb, pole, tree, etc.)
- ❑ Other: _____

Q0050: Did you require a hospital visit?
- ❍ Yes
- ❍ No

Q0051: Was there a police report filed for this incident?
- ❍ Yes
- ❍ No

[If off-campus walking incident, then shown questions Q0052-57]
Q0052: About the incident that occurred while you were walking off campus
Q0053: Where did this incident happen? (If you experienced more than one accident while walking off campus last year, please answer regarding the most serious event. Check all that apply for that incident.)
- ❍ In a roadway
- ❍ In a bike lane (on a street shared with cars)
- ❍ On a bike or pedestrian path (separated from the street)
- ❍ On a sidewalk
- ❍ At an intersection (of any kind)
- ❍ At an intersection with a stop sign
- ❍ At a signalized intersection
- ❍ In a crosswalk
- ❍ In a roundabout
- ❍ In a parking lot
- ❍ Other: _____

Q0054: Was it in Davis?
- ❍ Yes, it happened within the city of Davis.
- ❍ No, it happened somewhere outside of Davis.

Q0055: Did this incident involve a collision (for instance being hit by a car)?
- ❍ **No**, this incident was not the result of a collision, or
  Yes, I collided with (check all that apply):
- ❍ Car or truck
- ❍ Bus
- ❍ Biker
- ❍ Someone else on foot (walking or running)
- ❍ Animal
- ❍ Other: _____

Q0056: Did you require a hospital visit?
- ❍ Yes
- ❍ No

Q0057: Was there a police report filed for this incident?
- ❍ Yes
- ❍ No

[If vehicle crash, then shown questions Q0058-62]
Q0058: About your car crash
Q0059: Was this incident in Davis? (If you were in more than one crash while going to/from campus last year, please answer regarding the most serious one. Check all that apply for that incident.)
- ❍ Yes, it happened within the city of Davis.
- ❍ No, it happened somewhere outside of Davis.

Q0060: Which of the following were involved in the crash? (Check all that apply.)
- ○ Another car or truck
- ○ Bus
- ○ Biker
- ○ Someone on foot
- ○ Animal
- ○ Parked car or bike
- ○ Road element (curb, pole, tree, etc.)
- ○ Other: _____

Q0061: Did you require a hospital visit?
- ○ Yes
- ○ No

Q0062: Was there a police report filed for this incident?
- ○ Yes
- ○ No

Q0063: Have you <u>ever</u> been the victim of a bicycle theft on the UC Davis campus?
- ○ Yes
- ○ No
- ○ Not applicable: I have never had a bike on campus

[If theft ever]
Q0064: Have you been the victim of a bicycle theft on the UC Davis campus <u>within the last year</u> (November 1, 2008 through November 1, 2009)?
- ○ Yes
- ○ No
- ○ Not applicable: I haven't had a bike on campus in the last year

[If theft in the last year]
Q0065: Did you report this theft to campus police?
- ○ Yes
- ○ No

Q0066: Please indicate whether you agree or disagree with the following. Even if you don't have any experience with something (for instance biking on campus), it's okay to offer an opinion anyway or to indicate that you don't know.

	Strongly disagree	Disagree	Neutral or don't know	Agree	Strongly agree
Walking on campus is generally safe.	○	○	○	○	○
It is convenient to walk between the places I go on campus.	○	○	○	○	○
All the bikes make it unpleasant to walk places on campus.	○	○	○	○	○
Campus bike racks are an eyesore.	○	○	○	○	○

Q0067:

	Strongly disagree	Disagree	Neutral or don't know	Agree	Strongly agree
Biking off campus in the city of Davis is generally safe.	❍	❍	❍	❍	❍
Biking on campus is generally safe.	❍	❍	❍	❍	❍
It is convenient to bike between the places I go on campus.	❍	❍	❍	❍	❍
All the bikes make it unpleasant to bike places on campus.	❍	❍	❍	❍	❍
If I had a safe and convenient place to store my bike, I would bring a nicer bike to campus.	❍	❍	❍	❍	❍
If I had a safe and convenient place to store my bike, I would ride on campus more often.	❍	❍	❍	❍	❍

[For grad students only]
Q0068:

	Strongly disagree	Disagree	Neutral or don't know	Agree	Strongly agree
Unitrans buses stop close to where I'm living.	❍	❍	❍	❍	❍
Unitrans buses stop close to where I usually go on campus.	❍	❍	❍	❍	❍
I make trips across campus that I would like to use the bus for.	❍	❍	❍	❍	❍
Biking off campus in the city of Davis is generally safe.					
I would ride Unitrans, or ride more often, if it cost me less.	❍	❍	❍	❍	❍
I probably would not ride Unitrans more, even if it were free for me.	❍	❍	❍	❍	❍

[For grad students only]

Q0069: If grad students were offered unlimited access to Unitrans like undergrads are (incorporated as a part of student fees), how many times per week do you think you would ride Unitrans? [dropdown list]
- ❍ None
- ❍ 1 roundtrip per week (e.g. to and from campus one day)
- ❍ 2 roundtrips per week
- ❍ 3 roundtrips per week
- ❍ 4 roundtrips per week
- ❍ 5 roundtrips per week
- ❍ 6 roundtrips per week
- ❍ 7 roundtrips per week
- ❍ 8 roundtrips per week
- ❍ 9 roundtrips per week
- ❍ 10 or more roundtrips per week

Q0070: If you were able to purchase an unlimited-use pass for Unitrans, how much would you be willing to pay for it?

$ _____ per quarter

Q0071: Are you familiar with any of these programs?

	It's new to me	I've heard of it, but never used it	I've used it
GoClub program	○	○	○
Emergency Ride Home Program for goClub members	○	○	○
Discount Unitrans bus passes for those without a parking permit	○	○	○
Yolo TMA "TRIP" Incentive Program	○	○	○
Yolo TMA Emergency Ride Home Program (yolotma.org)	○	○	○
Sacramento Region "Commuter Club"	○	○	○
www.sacregion511.org	○	○	○
TAPS motorist assistance program	○	○	○
Comet in-vehicle parking meters on campus			
Social network for ride matching: Zimride.ucdavis.edu	○	○	○
Zipcar carsharing program	○	○	○
Enterprise Rental Car Voucher Program	○	○	○
Ten bike tire air stations around campus	○	○	○
Bike lock-cutting service	○	○	○
UC Davis Bike Auction	○	○	○

Finally, this section asks a few questions about you. We use this information to help understand travel choices and how the people taking the survey might represent the UC Davis as a whole. Your answers are confidential and will not be used for any other purposes.

Q0072: What is your gender?
- ○ Male
- ○ Female

Q0073: Where do you live?
- ○ On the UC Davis campus
- ○ Off-campus in the city of Davis
- ○ Outside of Davis

[If resides outside of Davis]
Q0074: What is your zip code?

Zip code:_____

[If resides on campus]
Q0075: What is the name of your campus residence?

[Dropdown list:]
- ○ Agrarian Effort co-op
- ○ Alder Hall

○ Atriums at La Rue Park
○ Baggins End co-op
○ Bixby Hallf
○ Castilian Hall
○ Colleges at La Rue
○ Davis Student Co-op
○ Domes
○ Emerson Hall
○ Gilmore Hall
○ Kearney Hall
○ La Rue Park living group
○ Laben Hall
○ Lysle Leach Hall
○ Malcolm Hall
○ Miller Hall
○ Orchard Park
○ Pierce Co-op
○ Pierce Hall
○ Primero Grove
○ Regan Hall
○ Russell Park
○ Ryerson Hall
○ Solano Park
○ Thille Hall
○ Thompson Hall
○ Thoreau Hall
○ Webster Hall
○ Other: _____

[If resides off campus (in Davis or outside of Davis)]

Q0076: What is an intersection near your home? (Please answer for where you live locally. This information will only be used to calculate the approximate distance you travel to campus. It will be kept confidential and will not be used in any other way.)

Your street: _____

Nearest cross-street:_____

Q0077: What best describes the place you are living? (Please answer for where you live locally.)
○ In a dorm
○ Alone in an apartment, house, or other unit
○ In an apartment, house, or other unit with roommates or housemates
○ In an apartment, house, or other unit with my family or partner (or others with whom I share some income -- not including conventional roommates)
○ In an apartment, house, or other unit with both a family/partner and roommates/housemates

[If not living in a dorm or alone]
Q0078: How many people live with you? (Please answer for where you live locally.)
- ○ 1 other person with you (2 people total)
- ○ 2 other people (3 including you)
- ○ 3 other people (4 including you)
- ○ 4 other people (5 including you)
- ○ 5 other people (6 including you)
- ○ 6 other people (7 including you)
- ○ 7 other people (8 including you)
- ○ 8 other people (9 including you)
- ○ 9 or more other people (10 or more including you)

[If not living in a dorm or alone]
Q0079: How many people of each category are there where you live (including yourself)?
(Please answer for where you live locally.)

Children, age under 6: _____
Teenagers, age 6-15: _____
Youth, age 16-17: _____
Total adults, age 18-64: _____
Elders, age 65 or older: _____

Q0080: Do you have access to a car (for driving to campus, if you wanted to use it)?
- ○ Yes
- ○ No

Q0081: Do you currently have a UC Davis parking permit?
- ○ No, I don't have one

Yes, I have:
- ○ Annual (or multi-year) permit
- ○ Monthly or quarter permit
- ○ Daily permits (such as complimentary GoClub parking permit)

[If has parking permit]
Q0082: Which type of parking permit do you have?
[Dropdown list:]
- ○ A permit
- ○ 2-person A Carpool permit
- ○ 3-person A Carpool permit
- ○ Bike commuter A permit
- ○ C permit
- ○ 2-person C Carpool permit
- ○ 3-person C Carpool permit
- ○ K permit
- ○ L permit
- ○ M permit

○ N permit
○ Vanpool permit
○ Complimentary commuter or GoClub permit
○ Disabled permit
○ Retired permit

Q0083: Do you own (or have access to) a functioning bike?
○ Yes
○ No

[If owns a bike]
Q0084: Approximately how much did you spend on your bike? If you have more than one,
please tell us about the bike you would use for transportation to/on campus.
○ Nothing
○ $1 to $50
○ $51 to $100
○ $100 to $200
○ $201 to $300
○ $300 to $400
○ $400 to $500
○ $500 or more

Q0085: How would you rate your ability to ride a bike? In particular, we are interested
whether you know how or are physically able to ride a bike, regardless of whether it is
practical or desirable for you to do so as a means of transportation to campus.
○ I cannot ride a bike at all because I do not know how
○ I cannot ride a bike at all because I am physically unable to do so
○ I can ride a bike, but I am not very confident doing so
○ I am somewhat confident riding a bike
○ I am very confident riding a bike

Q0086: How many years have you been at UC Davis (in any role)?
○ 0 (this is my first)
○ 1 year
○ 2 years
○ 3 years
○ [… each year listed …]
○ 18 years
○ 19 years
○ 20 years or more

[For students only]
Q0087: As a student, are you also a paid employee of UC Davis?
○ Yes
○ No

Q0088: What year were you born?
[Dropdown list:]
- 1930
- 1931
- 1932
- 1933
- [… all years listed between…]
- 1991
- 1992

Q0089: What is your highest level of education?
- No formal education
- Some grade school or high school
- High school diploma or equivalent
- Some college
- Associate degree or technical school certificates
- Bachelors' degree
- Some graduate school
- Graduate degree(s)

[For employees only]
Q0090: What is the approximate total annual combined income of all the working adults in your household?
- $0 - $19,999
- $20,000 - $39,999
- $40,000 - $59,999
- $60,000 - $79,999
- $80,000 - $99,999
- $100,000 - $119,999
- $120,000 - $139,999
- $140,000 - $159,999
- $160,000 - $179,999
- $180,000 - $199,999
- $200,000 or more

[If indicated that work/school location is outside Davis (in Q0004)]
Q0091: Since your office or department is outside of Davis, we do not need any further information from you at this time. But thanks for volunteering to participate! You are still eligible to enter the drawing for the iPod nano, if you wish.

[If indicated that recently graduated (in Q0001)]

Q0092: Since your office or department is outside of Davis, we do not need any further information from you at this time. But thanks for volunteering to participate! You are still eligible to enter the drawing for the iPod nano, if you wish.

Q0093: Is it okay for us to contact you again in the future? Please check all that apply:
- ❑ No, I prefer not to be contacted again.
- ❑ Yes, with questions about my survey.
- ❑ Yes, if I win the drawing for the iPod nano.

[If yes, okay to contact]

Q0094: If you answered "yes" to any of the above questions, please provide the following contact information. This information will ONLY be used for the purposes you specified.

Name: _____

Daytime phone number: _____

Email address: _____

Q0095: Optional: Is there anything else you would like to tell us about transportation at UC Davis? We welcome any additional comments in the space below.

Figure 18. Sample screenshot of a page from the online survey

Appendix B: Changes in the 2009-10 survey instrument and suggestions for the future

The following changes were new in the 2009-10 survey:

- Role questions (*Q0001* through *Q0003*): We offered more categories in initial question of primary role (post-bac, visiting scholar, post doc, recent graduate; the latter was disqualifying). In the future we should also included "retiree," as another criteria for disqualification. We also offered more categories for undergraduate role (adding explicit options for fifth-year senior, post-bac, and visiting/exchange student) and for graduate role (adding explicit options for Law, MBA, Veterinary, and Ed.D. or CANDEL).

- In 2008-09 we used the screening question, "Do you go to the Davis campus regularly, either for work or classes?" but felt it was problematic because it was unclear what "regularly" meant and if it applied to just this quarter or more permanently. This year, we replaced this question with a question about office/lab/department location, only among employees or grad students (question *Q0004*). It is assumed all undergraduates regular travel to campus. Grad/employees can indicate where their office is, captured in *Q0005*, giving us some idea of the range of locations unintentionally included in the sample (see discussion on eligibility in this report). Anyone whose main office/lab is in Davis, but is away all quarter (so not coming in regularly these days, but only temporarily stationed away), is retained in the sample and the fact and nature of their absence is captured in question *Q0012*. In the future, may refine options for indicating why they were away all week (question *Q0012*) to distinguish between those permanently/normally away from campus and those temporarily away from campus.

- We added a question regarding office/lab location, whether in central campus or elsewhere in Davis (question *Q0004*; see Table 13.)

- Regarding respondents' reasons for not traveling to campus for just some of the weekdays, we decided to only ask the reason among employees (questions *Q0007* through *Q0011*). This is because the question is cumbersome and not as relevant for students. It is required that we ask it of employees in order to estimate CWW and telecommuting days for the calculation of AVR. In addition, we changed the options offered, adding "START or furlough day," encompassing "personal leave" as part of sick, and amending off-site work description. For those away all week (question *Q0012*, asked of both students and employees), we added options incorporating all-quarter commitments, including Study Abroad, PELP, Sabbatical, Off-site appointments, in addition to other options, and removed the option "regularly scheduled days off.".A field for writing in "other" reasons was provided for questions *Q0007* through *Q0012*.

- Among the mode choice options listed in questions *Q0015* and *Q0016*, we added "motorcycle or scooter" as an explicit separate choice, rather than assuming people would report this as driving alone, although for most analyses in this report, we group these with those driving alone.

- The 2008-09 survey included an entire section on "typical" travel, in addition to questions

about primary means of travel each day during the reference week. That section included detailed questions about multiple modes used during the trip to campus, transit agencies used, and time spent on each leg of the trip. This entire section was omitted this year because it was cumbersome and we thought that multi-modalism is captured to some extent with comparison of responses to question *Q0015* and *Q0016*, plus newly added question *Q0017* (see below).

- We added question *Q0017* regarding biking as a circulator mode for each day during the reference week. A related question is *Q0032*, about typical circulator mode, which we realize in retrospect suffers from the problem of not knowing how much people travel around during the day. (Compare to questions 6.0 and 6.1 from the 2007-08 survey.)

- We changed the answer options in question *Q0022* to encompass more detailed vehicle-type choices. The purpose was to capture more specific alternative-fuel vehicles, as well as to be able to identify truly zero-emissions vehicles for adjustment of AVR (all-electric and hydrogen fuel cell), versus hybrids, plug-in hybrids, etc. In practice, no respondents reported using qualifying vehicles.

- We reduced the maximum vehicle occupancy respondents could report in question *Q0018* to "8 or more" for carpools (instead of 16 or more, as suggested by the AQMD) and increased the maximum vehicle occupancy could report in question *Q0019* to the equivalent number of "7 or more" for those getting a ride.

- We made separate the questions regarding bus and train agencies used (questions *Q0023* and *Q0026*) rather than having them combined in a single question, in addition to adding more detail about Unitrans use (which lines, type of ticket among grad students, the latter upon request of the Graduate Student Association for a special analysis this year).

- We replaced the question on bike source from the 2008-09 survey with a question about bike purchase price (question *Q0084*). These are related, but they tell different pieces of information.

- As a part of continued evolution of how to better understand abandoned bikes and how to ask about bikes (intentionally) left on campus overnight (see 6.3.3 in 2007-08; questions Q0061 through Q0065 on the 2008-09 survey), rather than asking whether respondents "regularly leave a bike on campus overnight," we used a similar measure as for mode choice and asked about bikes on campus overnight for each of the nights of the reference week. This allows us to calculate the number on campus overnight on an average weekday, and to combine this information with circulator mode and primary mode choice for that respondent on each day (see Table 36). Question *Q0028* was intended to capture reasons for leaving bikes, but the language of "generally bring it home" is too vague to give much information about behavior and neither answer choice gives much information about motivations. This should be revised. (Compare to questions *Q0064* and *Q0065* on the 2008-09 survey.)

- Regarding crashes, as in 2008-09, we again asked about crashes by bike, walk, and car occurring within the last year, but asked for much more detail this year, including distinguishing between on- and off-campus bike and walk incidents, asking where the incident occurred, what else was involved in the collision, if it required a hospital visit, and if a police

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report was filed. (Compare *Q0068* through *Q0071* on the 2008-09 survey with questions *Q0036* through *Q0062* on the 2009-10 survey.) A change in the question format may have resulted in respondents erroneously indicating "Not applicable" in question *Q0035* if they were in no injury incident ("I did this at least once" sounds confusingly like they fell at least once.) The multiple choice options offered for the location of the incident and what they collided with were new this year, and may be reviewed for relevance for next year's survey.

- Regarding bike theft, in 2008-09 we only asked if respondents had "ever" been the victim of bike theft; this year we asked "ever," and then also "if in the last year," specifying the dates November 1, 2008-November 1, 2009. We may consider changing the reference year to calendar years to better correspond with police records, currently compiled by calendar year. In addition, we added a question about whether reported to campus police, removed question about total number of bikes ever stolen, and about the origin of the stolen bike.

- The attitudinal questions *Q0066* through *Q0068* are unique to the 2009-10 survey (replacing *Q0072* in the 2008-09 survey).

- Question *Q0073* was moved to the end of the survey rather than the beginning (in the past it was in the beginning because of survey branching that relied on these responses; because the branching no longer depends on it, we moved it to the sociodemographic section). However, as a result of attrition, response rate is lower for this question this year than in past year's survey. If it's important information, for instance for partitioning results, we may consider moving it (and any other important partitioning questions) earlier in the survey.

- In *Q0075*, we made the improvement of asking respondents about their residence halls as drop-down list rather than as a write-in response

- We added a questions about biking ability (question *Q0085*). We also altered the question about bike and car access (questions *Q0083* and *Q0080*) to be Yes/No rather than checkboxes to avoid ambiguity about non-response (compare to Q0086 on the 2008-09 survey). In addition, phrasing the car-access question as "access" in lieu of ownership is new.

- We added back question *Q0081* about parking permits, which was included in the 2007-08 survey but not the 2008-09 survey, for better calibrating with TAPS data on parking permits purchased.

- We added a question *Q0087* about students being paid employees of UC Davis for AVR calculation.

A few on-going challenges include the following:
- How to measure multimodal travel, without the survey becoming too cumbersome.

- How to measure daily transit ridership by agency, without the survey becoming too cumbersome.

- How to properly define telecommuting, perhaps an increasingly fuzzy concept as more people work anywhere, anytime without thinking of it as replacing a physical trip. Assessing the

extent that remote work replaces a physical trip is challenging, as is finding appropriate language for referencing this kind of work. Some of the write-in answers for respondents reasons for not traveling to campus included explanations such as "no reason to be there" or "Worked at my office (off campus)," which may qualify as telecommuting.

- In trying to evaluate the relative safety of different modes, how to measure exposure levels (as a denominator) for each mode. For instance, should it be per mile or per hour spent? How can we know this from just the reference-week travel information? Walking is especially difficult to measure, since clearly almost everyone does it almost all the time.

Appendix C: Text of the recruitment emails

Initial recruitment email:
From: Campus Travel Survey <travelsurvey@ucdavis.edu>
To: <...@ucdavis.edu>
Subject: 2009-10 Campus Travel Survey

Dear UC Davis Student [Employee],
You have been selected as part of a small group of students, faculty, and staff to participate in the 2009-2010 UC Davis Campus Travel Survey. This survey provides campus planners with valuable feedback on how people get to campus and their experiences with transportation programs. It should take less than 15 minutes to complete. As a token of our appreciation, we're offering entry into a drawing for an 8GB iPod Nano for those completing the survey.

To start the survey, click on the link below:
http://survey.its.ucdavis.edu

Thanks for your participation in this year's survey!

Best regards,
Kristin Lovejoy, Graduate student, Institute of Transportation Studies
Susan Handy, Professor, Institute of Transportation Studies
Cliff Contreras, Director, Transportation and Parking Services

Reminder recruitment email
From: Campus Travel Survey <travelsurvey@ucdavis.edu>
To: <...@ucdavis.edu>
Subject: 2009-10 Campus Travel Survey

Dear UC Davis Student [Employee],
Last week we invited you to take the 2009-10 Campus Travel Survey. If you have already done so, thank you! And you can disregard this message. If not, I would like to encourage you to take the survey.

Your responses will provide valuable feedback on how people get to campus and their experiences with transportation programs. It should take less than 10 minutes to complete. Because the survey asks about your activities last week, the sooner you take it, the easier it might be to recall those answers. As a token of our appreciation, we're offering entry into a drawing for an 8GB iPod Nano for those completing the survey.

To start the survey…
[The remainder was identical to the initial recruitment email.]

Appendix D: Calculation of Average Vehicle Ridership (AVR)

AVR (average vehicle ridership) is a ratio of the number of person-arrivals to private-vehicle-arrivals. If everyone drove by themselves to campus, the campus AVR would be 1.0. Higher AVR values (greater than 1.0) indicate more carpooling and/or use of alternative modes of transportation.

To compare AVR statistics on the Davis campus with other UC campuses, we calculate AVR using a standard formula developed by the South Coast Air Quality Management District (AQMD) in "Rule 2202 – On Road Motor Vehicle Mitigation Options."[16] We attempt to adhere to the AQMD formula, although our overall survey methodology deviates to some extent from that prescribed by the AQMD.[17] The AQMD formula excludes weekend travel (considering Monday through Friday only) and excludes on-campus residents (considering travel among off-campus residents only). It includes adjustments for vehicle occupancy and the use of zero-emissions vehicles (ZEV).

In particular, we use the following formula:

$$AVR = \frac{\text{Total weekly arrivals}}{\text{Weekly vehicle arrivals}} = \frac{(\text{Arrivals by all modes}) + (\text{Employee telecommuting days}) + (\text{CWW days})}{(\text{Drive alone arrivals}) + (\text{Fractional carpool arrivals})}$$

with:

Arrivals by all modes = a count of all respondents arriving by bus, driving, carpooling, getting a ride, walking, biking, skating, and riding transit on Monday, plus the same for Tuesday, Wednesday, etc. through Friday (using question *Q0016* in the 2009-10 survey).

Employee telecommuting days = a count of respondents telecommuting on Monday, plus those doing so on Tuesday, etc. through Friday. These are based on responses to questions *Q0007* through *Q0011* for any respondents who traveled some days and telecommuted other days. But for respondents who indicated <u>no</u> travel during any of the eight days of the reference week (in *Q0006*) and then indicated the reason for no travel was telecommuting (in *Q0012*), we assume the respondent telecommuted all five days of the reference week.

Employee CWW days = a count of respondents reporting that they did not travel on Monday because they had a CWW (compressed work week) day off, plus those who did so for Tuesday, Wednesday, etc. through Friday (using responses to questions *Q0007* through *Q0011*).

Drive-alone arrivals = a count of respondents arriving by driving alone on Monday, plus

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[16] As of May 1, 2010, this rule is available online (at http://www.aqmd.gov/trans/doc/regform/all_registration.pdf).
[17] For instance, the AQMD specifies that response to the survey must be 90 percent response rate, whereas we rely on surveying only a sample and weighting the responses.

those doing so on Tuesday, Wednesday, etc. through Friday (using responses to *Q0016*). As an adjustment for the use of ZEV vehicles, we exclude from the count any arrivals by a respondent who has indicated using an all electric vehicle for their travel during the reference week (in question *Q0022*). (We would have also excluded those indicating use of a hydrogen fuel cell vehicle in question *Q0022*, but none did.)

Fractional carpool arrivals = A count of the fractions of vehicle-arrivals accounted for those arriving in carpools (or getting rides) for each day Monday through Friday. In particular, for each day a respondent carpools (or gets a ride, using *Q0016*) we add to the arrival count a fraction equal to one divided by the total number of people in the carpool (using *Q0018*) or the number of passengers dropped off by the driver (using *Q0019*). We exclude from the count any arrivals by a respondent who has indicated using an all-electric vehicle (in question *Q0022*).

In all cases, the estimated number of arrivals for the entire campus community is a projection. In particular, we weight (and expand) the sample responses by role, based on the 3,840 valid responses to question *Q0016* (see Table 6).

We calculate AVR both excluding and including on-campus residents, and by each role group. The AQMD and most other UC campuses exclude on-campus residents and most only calculate AVR for employees rather than for students. The inclusion of student employees can greatly change AVR statistics, though to a different extent at different campuses. For the first time this year, we included a question about whether student respondents are also a paid employees of UC Davis (question *Q0087*) to allow us to estimate AVR including student employees.

Appendix E: Geocoding and network distances

We used the ESRI Streetmap USA dataset to do all of the geocoding and network route assignments. It is based on the TIGER/Line 2000 streets dataset produced by the U.S. Census Bureau, and has been enhanced by ESRI and Tele Atlas. The Streetmap dataset was released by ESRI in 2006, but it only represents the ground condition as of 2000. As a result, parts of some rapidly developing areas such as Natomas, West Sacramento, and Elk Grove are not fully represented. This made it difficult to geocode some of the addresses in these areas. However, in all of these locations there were at least some roads present before the most recent development occurred. If the exact street was not available, then we geocoded the point to the nearest pre-existing road. In all cases, the differences were minor and expected to be negligible.

Geocoding residential locations
We used address information to geocode points to the ESRI Streetmap USA dataset. First, we imported all of the data into Microsoft Access and used a series of queries to filter out empty records, divide the data into separate tables for each subcategory (Campus, Davis, and Outside Davis), and concatenate the street names into a single field. This allowed us to input the data into an appropriate address locator that would be able to automatically geocode as many addresses as possible.

Inputting the data directly into an address locator resulted in successful matching of about half the addresses (matched automatically, see Table 82). Because there was the potential for a small percentage of addresses to be matched incorrectly by the address locator, we also manually verified that the match address was the same as the input address. We geocoded unmatched addresses by manually placing points in the correct locations, or by modifying the input addresses so that they matched correctly using an automatic address locator. In total, about 88 percent of the sample provided addresses that we could successfully geocode.

Table 82. Geocoding results

	Number of records (unweighted sample)	Percent of records
Matched automatically	2,059	50.2%
Matched manually	1,543	37.6%
Total matched	3,602	87.9%
Unmatched	498	12.1%
Total	4,100	100.0%

Network distance
The network route assignments were created using the ArcGIS Network Analyst extension and the ESRI Streetmap USA dataset (the same dataset used to geocode the residential locations). All distances were calculated from the residential location points to a point located on the UC Davis campus at the corner of Hutchison Drive and California Avenue, near the Silo. The network route assignments were calculated by optimizing for the fastest travel times (based on assumptions about the expected speed of travel on each facility type), which was deemed to produce more realistic routes than optimizing for distance, because it produces routes that favor major roads

and highways where possible. While this is especially appropriate for those traveling by car, manual inspection of alternative routes indicated that the shortest-time routes also seemed to be more realistic for bike and walk trips, where differences existed. Note that in this analysis, we used the street network, which was *not* augmented to include additional bike- and pedestrian-only links, which are especially prevalent in Davis.

Comparability with results from previous surveys
We used the same procedures to geocode and calculate network distances as was used in the 2008-09 Campus Travel Survey, and so results from the 2009-10 and 2008-09 surveys should be comparable. Because the 07-08 survey employed a different method both to collect data on the respondents' residential locations (allowing respondents to click on a map versus typing cross streets into a text field); to geocode points; and to calculate network distances, the estimated distances and calculations based on them (miles traveled and emissions) are not comparable to later survey years.

Appendix F: Fuel energy assumptions used for calculation of CO_2 emissions

We calculate pounds equivalent of carbon per gallon of fuel = mass of carbon per unit energy × energy per gallon of fuel × oxidation rate × molecular weight of carbon, as done by the Environmental Protection Agency (see http://www.epa.gov/otaq/climate/420f05001.htm#carbon). We assume inputs for this formula as shown in Table 83.

Table 83. Fuel energy assumptions used for calculating carbon emissions

Item	Value	Source
Mass of carbon per unit energy for diesel fuel	19.95 Tg Carbon / QBtu	U.S. Environmental Protection Agency, *2009 U.S. Greenhouse Gas Inventory Report*, Table A-39 (Distillate Fuel), available online: http://epa.gov/climatechange/emissions/usinventoryreport.html
Mass of carbon per unit energy for CNG	14.47 Tg Carbon / QBtu	U.S. Environmental Protection Agency, *2009 U.S. Greenhouse Gas Inventory Report*, Table A-31 (Natural Gas), available online: http://epa.gov/climatechange/emissions/usinventoryreport.html
Energy per gallon diesel	138,691 Btu/gallon	U.S. Department of Energy, Energy Information Administration, online Energy Calculator, available online: http://www.eia.doe.gov/kids/energyfacts/science/energy_calculator.html
Energy per cubic ft CNG	1,028 Btu/ cubic foot	U.S. Department of Energy, Energy Information Administration, online Energy Calculator, available online: http://www.eia.doe.gov/kids/energyfacts/science/energy_calculator.html
Oxidation rate	0.99	U.S. Environmental Protection Agency, Emission Facts (EPA420-F-05-001 February 2005), available online: http://www.epa.gov/otaq/climate/420f05001.htm#carbon
Molecular weight of carbon	$44/12 \approx 3.667$	U.S. Environmental Protection Agency, Emission Facts (EPA420-F-05-001 February 2005), available online: http://www.epa.gov/otaq/climate/420f05001.htm#carbon