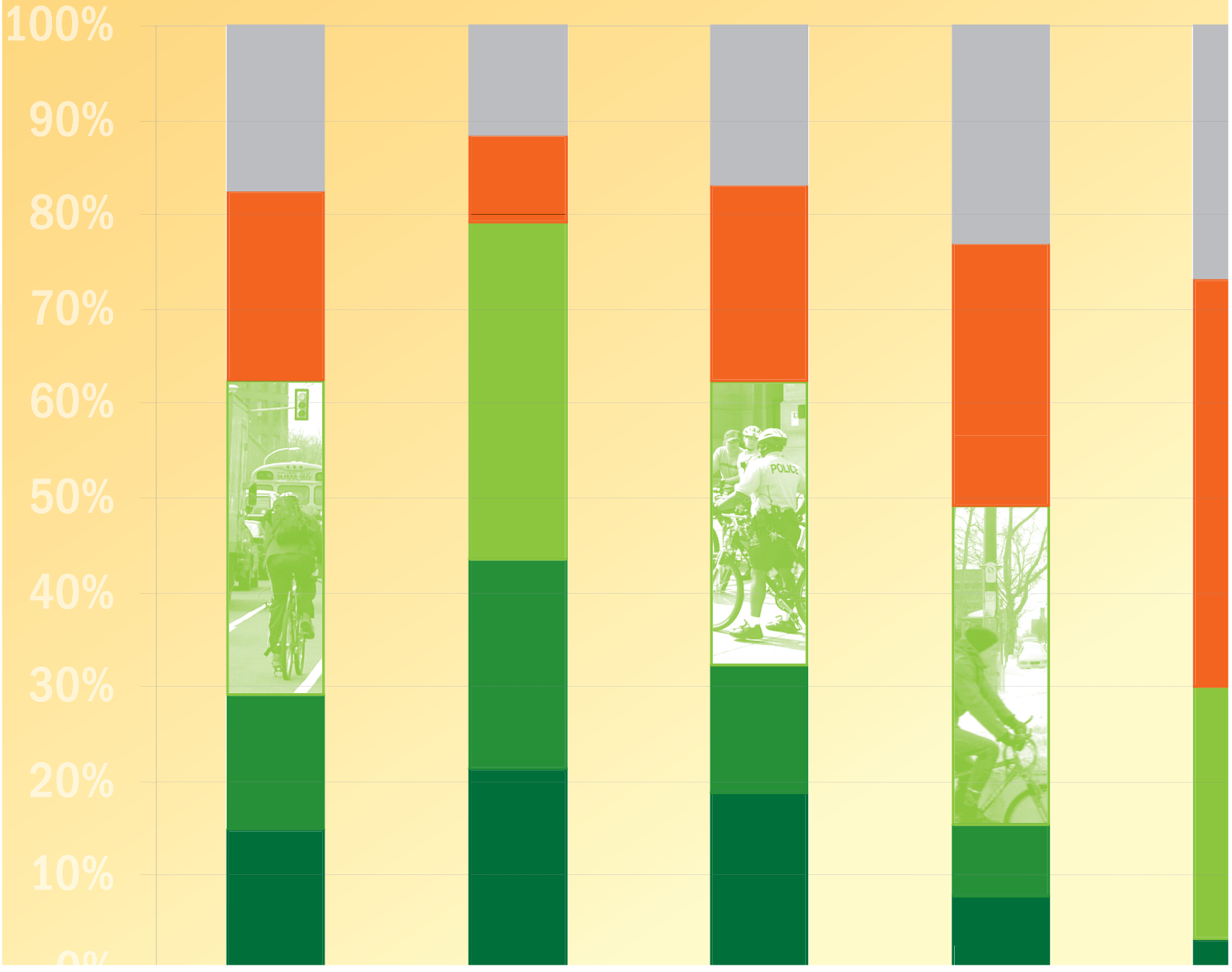
DELAWARE VALLEY
REGIONAL PLANNING
COMMISSION

2007

BICYCLING *in the* DELAWARE VALLEY *in* 2005

USE, SAFETY AND DEMOGRAPHICS



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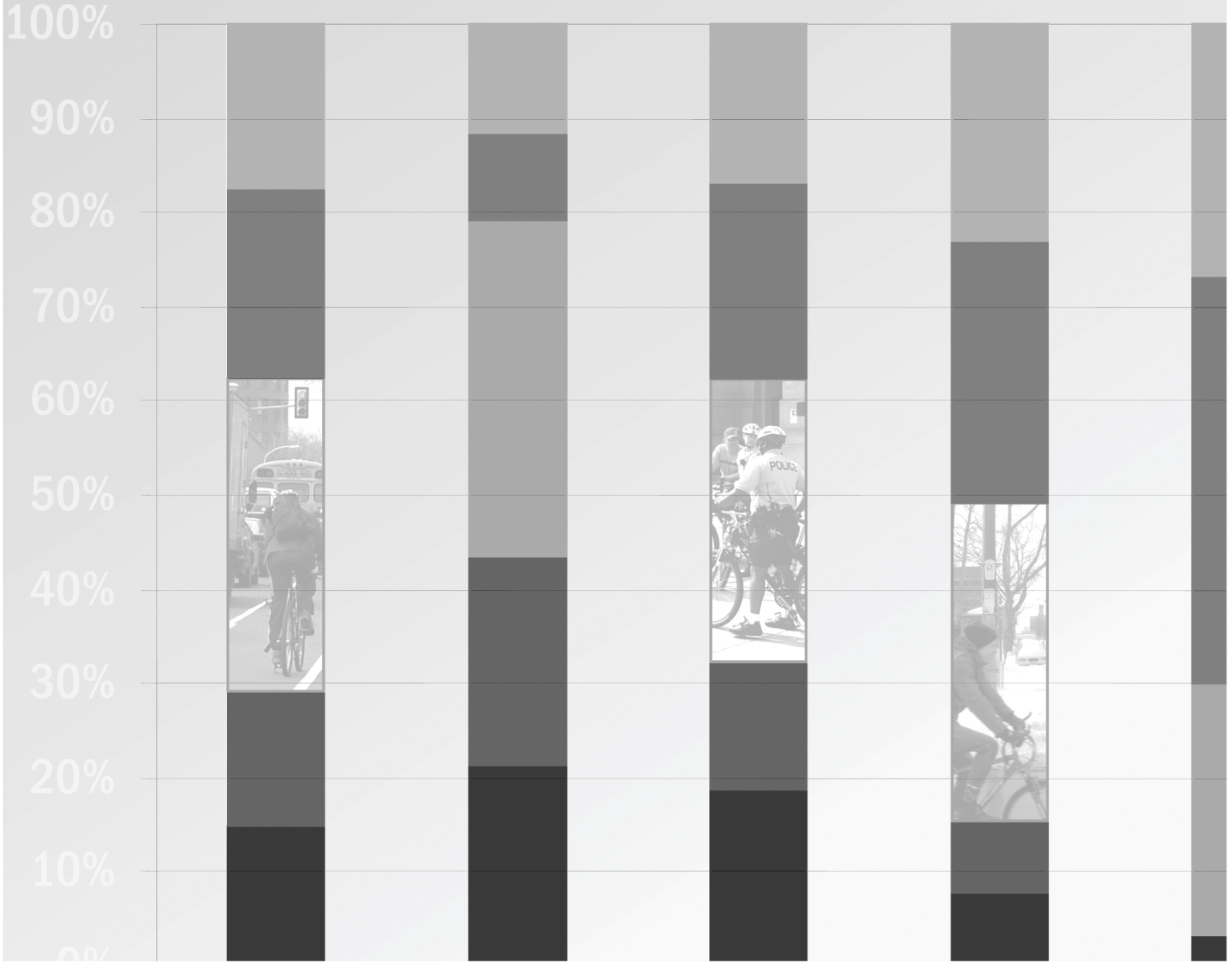

Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency that provides continuing, comprehensive and coordinated planning to shape a vision for the future growth of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties, as well as the City of Philadelphia, in Pennsylvania; and Burlington, Camden, Gloucester and Mercer counties in New Jersey. DVRPC provides technical assistance and services; conducts high-priority studies that respond to the requests and demands of member state and local governments; fosters cooperation among various constituents to forge a consensus on diverse regional issues; determines and meets the needs of the private sector; and practices public outreach efforts to promote two-way communication and public awareness of regional issues and the Commission.

Our logo is adapted from the official DVRPC seal, and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole, while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

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Executive Summary

This report presents the principal findings of an analysis of the data collected during the 2005 Philadelphia Metropolitan Bicycle Travel Survey. The goals of the survey were to generate data on the characteristics of adult bicyclists and the trips they make by bicycle, and to ascertain bicyclists' travel behavior, attitudes and desires. This survey is the most comprehensive look at bicycling ever conducted in the region.

The survey drew a sample of the region's estimated 133,000 daily bicycle trips and 1 million active bicyclists aged 16 years and older. Bicycle trip data was collected by intercepting a limited number of passing bicyclists at select locations and administering a short interview; bicyclist information was concurrently obtained through distribution of a postage-paid mail-back questionnaire to as many passing bicyclists as possible; by attaching them to parked bicycles in select areas; at club rides; and by volunteers.

The intercept phase was administered September 28 to October 8, 2005 at 36 locations across the region. The second wave mail-back distribution phase was administered November 1 to November 13, 2005, including distribution at 11 club rides over two consecutive weekends.

Field staff conducted 372 interviews and distributed 4,225 questionnaires. A total of 1,227 usable returned questionnaires yielded a response rate of 29 percent of distributed questionnaires and 17 percent of the initial distribution target of 7,000 questionnaires. The trip roadside interview survey has a margin of error of ±5.1 percent. The mail-back survey of bicyclists has a ±2.8 percent margin of error. Both error margins are at the 95 percent confidence level.

Results of an analysis of both the interview and questionnaire responses are presented for the entire sample. A system of classifying traffic analysis zones by "area type" based on population and employment density, developed for travel demand modeling, proved to be a powerful tool in interpreting the survey data. Patterns of response to many questions were found to vary significantly across area types in which the bicyclist was intercepted and appear to be a function of density. Where significant variation was found, results are presented by area type.

Analysis of the survey data reveals that:

- Nearly two thirds of daily bicycle trips are for utilitarian transportation purposes, rather than for exercise or recreation;
- Utilitarian bicycle use correlates strongly with density as reflected by area type, ranging from 90 percent of daily trips in the Philadelphia, Camden and Trenton central business districts (CBDs) and their fringes, to 61 percent in suburban areas and 12 percent in the rural and open rural areas;
- Utilitarian bicycle trips average between 2.4 and 5.7 miles in distance depending on purpose. The average length for exercise or recreation trips is more than twice as long as that made for the longest utilitarian purpose, the work commute;
- Six percent of daily bicycle trips are made by people on-the-job including police and security personnel on patrol, food delivery workers and

messengers. Such trips are 15 percent of all daily trips in the CBDs and their fringes;

- Trips where bicycles are carried aboard a train or bus for part of the trip constitute 12 percent of daily bicycle trips. Similarly, trips involving carrying a bicycle via private motor vehicle are also 12 percent of daily bicycle trips;
- Approximately 60 percent of adult bicyclists were observed without a helmet;
- Bicyclists are, as a group, older, better educated and more affluent, and own fewer cars, than the general population;
- Men outnumber women bicyclists by more than two to one. The ratio of men to women bicyclists increases with age;
- One out of three bicyclists reported having been in a crash or fall in the preceding year and slightly more than one in six were involved in a crash with a motor vehicle;
- Bicyclists choose the bicycle over other modes overwhelmingly for reasons relating to health, pleasure and personal well-being. Pragmatic and altruistic reasons are secondary; and
- Bicycle lanes are favored by bicyclists over any other facility type, and over any other action to induce more bicycling. Just behind bike lanes in popularity are wide roadway shoulders and education of motorists on sharing the road.

1. Introduction

This report presents highlights of the 2005 Philadelphia Metropolitan Bicycle Travel Survey. The goals of the survey were to generate data on the characteristics of adult bicyclists and the trips they make by bicycle, and to ascertain bicyclists' travel behavior, attitudes and desires. This survey is the first of its kind conducted in the region and may be the largest of its kind ever conducted in the United States.

The regional year 2030 long-range plan goals for bicycling and walking, based on those adopted by the USDOT, call for a doubling of trips by foot and bicycle while reducing the number of injuries and fatalities suffered by bicyclists and pedestrians by 10 percent from current levels. The survey findings, which should be viewed as a benchmark of bicycling travel, behaviors and attitudes, will help planners and policymakers better understand the underlying trends in bicycling which may affect progress toward regional goals for bicycle transportation.

Regional investment in bicycle transportation is substantial. A review of the 2003 Transportation Improvement Program revealed $372.7 million worth of projects of primary benefit to bicyclists or pedestrians, mostly for multi-use trails and streetscape enhancements, in the project development pipeline. More current estimates have 238 miles of trails planned, and 370 miles proposed, for addition to the region's existing 250 miles of trails. While trails provide benefits beyond the reduction of traffic congestion and emissions, the survey data may be useful in more accurately estimating the travel benefits of these investments accruing from a shift of motor vehicle trips to bicycle.

The survey intentionally focused on current bicyclists rather than potential bicyclists or the general population. An understanding of who currently bicycles, and why, does not currently inform transportation planning. Such data could be used to generate travel demand model outputs which more accurately reflect bicycle travel. This survey is intended to address this need.

While the sociodemographic profile of adult bicyclists differs from that of the general population, bicyclists are by no means a homogeneous group. Many bicyclists use their bikes mostly for utilitarian trips, while others bike purely for recreation. Getting recreational bicyclists to increase utilitarian bicycle use may hold promise as a strategy for meeting long-range transportation goals; the survey data may be useful in figuring out how to exploit this potential.

The results of this survey should be viewed as a "snapshot" of bicycling in the Delaware Valley in 2005. It is unreasonable to expect the findings to remain valid indefinitely, as the population and its travel habits are ever changing. The useful life of the data is extended when it can be compared against results from future surveys. A periodic repetition of this survey will help planners track progress toward regional transportation goals.

Photo: John Boyle

2. Survey design

The survey drew a sample of the region's estimated 133,000 daily bicycle trips[1] and 1 million active bicyclists aged 16 years and older[2], stratified by county, area type and weekday vs. weekend survey day. Bicycle trip data was collected by intercepting a limited number of passing bicyclists at select locations and administering a short interview; bicyclist information was obtained through intercept distribution of a postage-paid mail-back questionnaire to as many passing bicyclists as possible at the intercept locations, concurrent with the administration of interviews.

The survey asked questions on the following topics:

Bicycle trips (interview)

- Purpose
- Land use of trip origin & destination
- Length and duration of trip
- Regularity of trip
- Use of supplemental modes (transit, private vehicle)
- Gender of rider (observed)
- Riding behavior and helmet use (observed)
- Type of bicycle ridden (observed)

Bicyclists (mail-back questionnaire)

- Land use of current trip origin & destination
- Regularity of current trip
- Frequency of bicycle travel by trip purpose
- Reasons for riding
- Miles ridden per month, by season
- Use of bikes-on-transit services
- Crash experience
- Safety habits & attitudes
- Perceptions of risk
- Impediments to increased bike use
- Facility and policy preferences
- Sociodemographics

The intercept phase was administered during the period of September 28 to October 8, 2005. The survey was administered at 36 locations for a total of 12 hours at each location, from 7 a.m. to 7 p.m. A second wave mail-back distribution phase was administered during the period of November 1 to November 13, 2005, including attachment to parked bicycles in select areas and distribution at 11 club rides held during the weekends of November 5-6 and 12-13. A list of the survey sites with descriptions, the survey instruments and field manual are presented as appendices.

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[1] Estimate derived by multiplying the regional bicycle mode split, 0.9 percent (0.009), by 14,735,586 regional daily trips (from *Transportation for the 21st Century Household Travel Survey: Travel Survey Results for the DVRPC Region,* DVRPC, NuStats Research & Consulting, and Cambridge Systematics, Philadelphia, May 2001).

[2] Active adult bicyclists are defined as persons age 16 years and older who bicycle at least once a month, May through October. The estimate was derived by multiplying an estimate of the regional adult population derived from the 2000 Census, 3,912,168, by .27, the percent of the American adult population who are active bicyclists (from *National Survey of Pedestrian and Bicyclist Attitudes and Behaviors,* Bureau of Transportation Statistics and National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington, DC, 2002).

Field staff conducted 372 interviews and distributed 2,605 questionnaires during the first phase. An additional 1,620 questionnaires distributed during the second phase resulted in a total distribution of 4,225 questionnaires. A total of 1,227 usable questionnaires were returned, yielding a response rate of 29 percent; or an overall response rate of 17 percent of the initial distribution target of 7,019 questionnaires. The trip survey has a margin of error of ±5.1 percent. The mail-back survey of bicyclists has a ±2.8 percent margin of error. Detailed response rates are presented in appendix 2.

Locations where bicyclists might be expected were identified as candidate survey sites. Sites in the Center City and University City areas of Philadelphia were identified based on available bicycle counts and through staff familiarity with areas of high bicycle traffic. A very limited number of bicycle counts have been conducted elsewhere in the region. Assuming that where there are bicycle crashes there must be bicyclists, roadway segments with a history of bicyclist-involved motor vehicle crashes were mapped using data from the Pennsylvania and New Jersey DOTs. Other candidates included multi-use trail locations and commuter rail stations where parked bicycles are common. Rough estimates of daily bicycle traffic made by staff served as the basis for interview and distribution targets prepared for each location. A final list of 38 sites was selected to achieve the overall interview and distribution targets, balanced across counties and area types; dates were selected to achieve a weekday/ weekend balance. See Figure 1 for a map of the region's area types and survey locations.

To encourage response to the survey, a program of pre-survey publicity was conducted, gift bags were distributed along with the questionnaires and a prize drawing was advertised. To increase bicyclist expectancy of the survey, the survey was publicized during the month of September through the distribution of flyers to businesses and community centers in neighborhoods near survey sites; and a press release went to local newspapers. To encourage participation by people of limited English proficiency, questionnaires were prepared in Spanish, Mandarin, Vietnamese and Cambodian. Out of an estimated 170 Spanish, 50 Mandarin Chinese, and a handful of Vietnamese and Cambodian questionnaires distributed, three Spanish language and six Mandarin language questionnaires were returned.

Analysis

A system of area types developed for purposes of travel demand modeling served as a framework for analyzing the survey data.[3] Each traffic analysis zone (or TAZ, usually corresponding to a census tract) in the region has been assigned an area type based on the intensity of travel activity occurring within it. This intensity of activity is measured by computing the following factor for each zone:

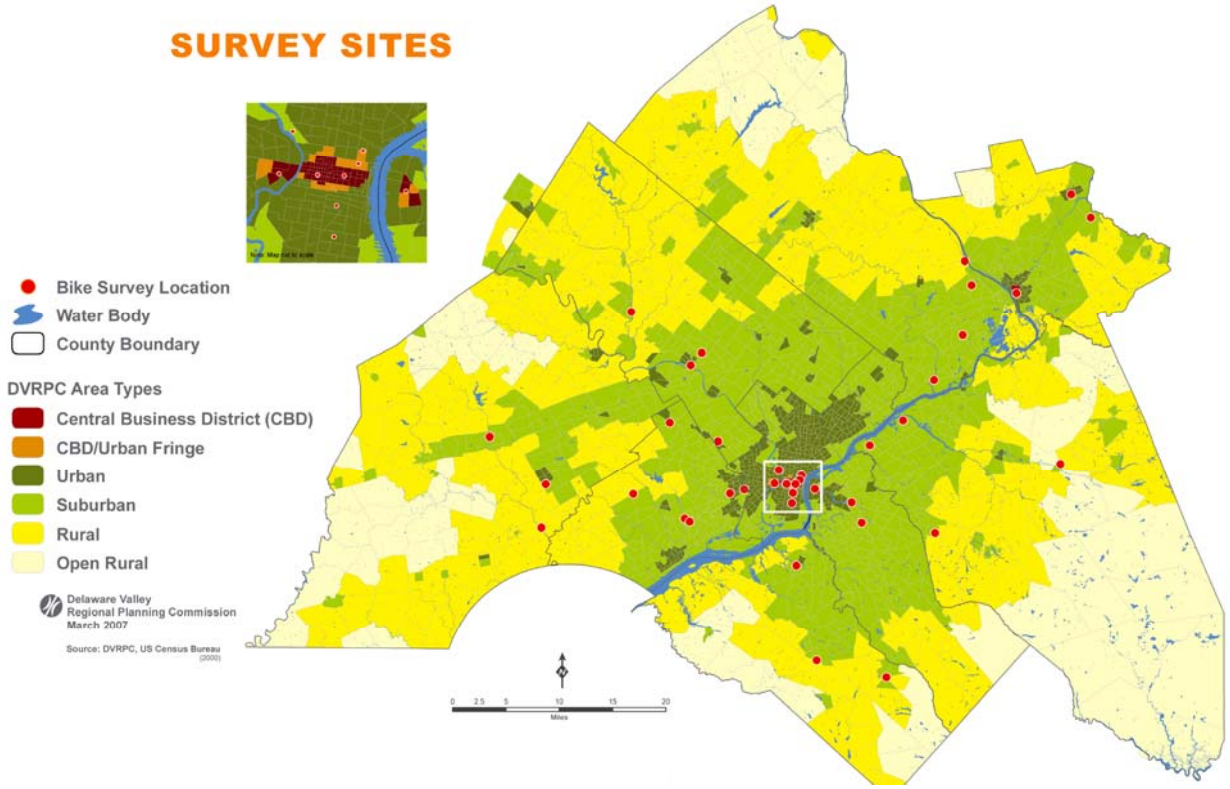
$$\text{Factor}, \alpha = \frac{(\text{Population}) + 2.37 * (\text{Employment})}{(\text{Land Area, in Acres})}$$

Each area type represents a range of factor values. Ordered along a spectrum from most to least travel intensive, the area types are:

1 Central Business District (CBD)
2 CBD Fringe
3 Urban
4 Suburban
5 Rural
6 Open Rural

[3] *1997 Travel Simulation for the Delaware Valley Region.* DVRPC, January 2000, 13-14.

Figure 1



Source: DVRPC, 2007

Each location where bicyclists received the survey is associated with an area type. For this analysis, area types 1 and 2, Central Business District and CBD Fringe (including Center City Philadelphia as well as the Trenton and Camden CBDs), are aggregated as "CBD/Fringe"; area types 5 and 6, Rural and Open Rural, are aggregated as "Rural/Open Rural." See Figure 1, above, for a map of the region's area types and survey locations. Figure 2 (right) illustrates the distribution of interviews and questionnaire responses by the area type where the survey was administered. When reference is made to bicyclists of one area type or another, the area type refers to the location where the bicyclists were interviewed or handed the questionnaire, rather than to the bicyclists' place of residence.

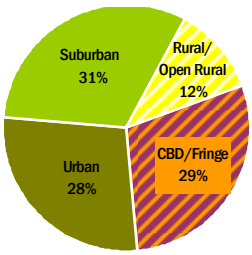
The area type system provides a useful means for interpreting the survey data. Much of the survey data has been broken down and analyzed across area types. Reference is made throughout the report to the "area type spectrum." Many of the survey response tabulations are found to vary in a linear way along this spectrum.

Key findings of an analysis of the data are presented in the body of this report. Full survey response tabulations are presented as appendices.

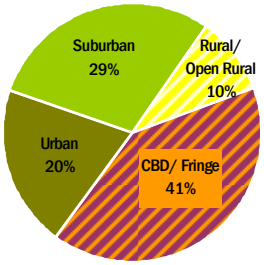
Figure 2

Response by area type

INTERVIEWS



QUESTIONNAIRES



Source: DVRPC, 2007

Possible sources of error

The margins of error for both the bicycle trip (interview) and the bicyclist (mail-back questionnaire) surveys -- ±5.1 percent and ±2.8 respectively – refers to random sampling error, or the "luck of the draw" of individuals surveyed on the particular survey date. No two surveys conducted in identical fashion will yield the exact same results, simply because of the random probability that the two samples will be comprised of different individuals or that respondents give slightly different answers at any given time.

Other errors, which are common to nearly all surveys and typically attributed to human error, include those introduced during data collection, response coding, and data editing. Efforts to limit these types of error included training of field staff and design of the database entry form to minimize data entry errors. In addition, following the completion of data entry, a sample of the returned mail-back questionnaires was checked against their coded responses for quality control. The error rate was negligible.

As with any survey, non-respondents are a source of error. Differences between respondent and non-respondent populations remain unknown.

The skills brought to the effort by the survey staff are also a source of error. Interpersonal skills, especially the ability to connect with individuals perceived as different, influence response rates. A level of assertiveness was required to get bicyclists to stop and take the survey. No one on the field staff was fluent in Spanish or Chinese, despite the significant numbers of bicyclists at some locations who speak only those languages; therefore, non-English-speaking bicyclists could not be interviewed. Lack of foreign language skills among field personnel may also have negatively affected mail-back response rates among foreign-language-speaking populations.

Error may also have been introduced by the survey design. The survey intercept locations were not chosen at random, but rather reflect the survey manager's informed opinion regarding locations likely to present a level of bicycle traffic and the number of sites sufficient to generate an adequate sample given the available field staff. Trips in the vast areas where bicycling is infrequent were not surveyed. In addition, the survey has a built-in bias toward longer bicycle trips and more frequent bicyclists. Longer trips had a greater probability of passing a survey location; and more frequent bicyclists had a greater probability of riding during the survey. The effect of these errors has not been quantified.

Neither the interview nor mail-back questionnaires were pre-tested; however, grossly inconsistent results characteristic of a general misunderstanding of a question were not found in the data. Deliberate or unconscious lying or false reporting by respondents, common to many surveys, can be exacerbated by questionnaire design and wording. The extent of this effect, if any, on the survey results is unknown.

Temporal events and external factors also shape survey results. A national debate on immigration reform was in full swing during the survey. Consequently, a fear of deportation may have prevented undocumented Mexican immigrant bicyclists from responding to a government survey.[4] The number of such individuals is likely significant. City transit workers were on strike during the survey, shutting down SEPTA's City Transit Division. This strike led undoubtedly to a temporary increase in utilitarian bicycling. Unusually mild weather during Phase 2, in early November, may also have affected results.

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[4] Less than two months following the end of the survey, an immigration sweep was conducted in Philadelphia. See Taussig, Doron. "The Big Miedo: How rumors of an immigration sweep crippled city restaurants and scared local Mexicans into hiding." *Philadelphia City Paper,* 2/9/06, 20-22.

Photo: John Boyle

3. Findings: Bicycle Trips

Trip purpose, duration and distance

Bicycle trips for utilitarian purposes[5] outnumber trips made solely for recreation or exercise by nearly two to one. However, the average recreation/ exercise trip is more than twice the length of the average commute trip, and about five times the distance of other utilitarian trips. Table 1, right, presents the distribution of trip purposes with mean duration and distance.

Table 1

Trip purpose	Percent of all trips	Mean duration, minutes	Mean distance, miles
Exercise or recreation	35	76.1	12.6
Work commute	29	28.6	5.5
Shopping, appointments, errands	15	24.3	2.4
Work-related (on-the-job)	6	30.2	3.1
School commute	6	14.7	2.4
Social visit	5	29.7	5.7
Other	3		

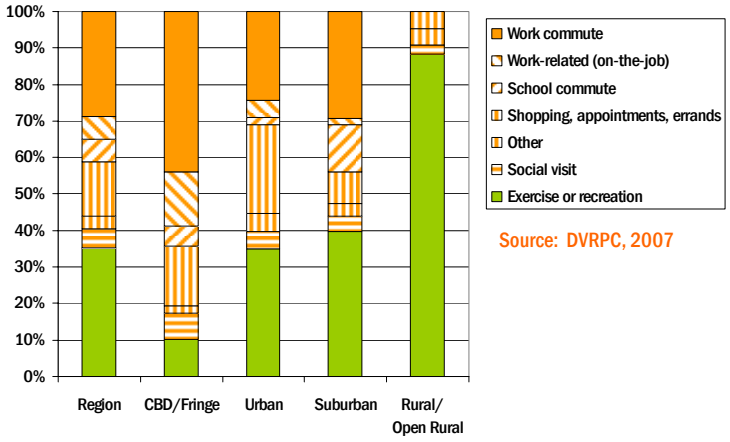
Source: DVRPC, 2007

The mean bicyclist commute time of 28.6 minutes compares with the region's mean travel time to work for all modes, 28.7 minutes; but is significantly higher than the 15.4 minutes reported in the 2000 Census for those who stated the bicycle as the primary commute mode.[6] A possible explanation for this discrepancy may lie with the season. The 2000 Census reflects the primary commute mode taken by respondents during the last week of March. The survey was conducted during the first week of October. While the two periods have comparable hours of daylight, the survey period is considerably warmer; thereby perhaps more conducive to longer bike commutes.

Utilitarian bicycle travel appears to be strongly positively correlated with overall travel intensity as reflected in area types. Figure 3, right, illustrates the relationship between trip purposes and area type. The greater the travel intensity, the higher the percentage of bicycle trips that are utilitarian: 90 percent of surveyed trips in CBD/Fringe were utilitarian, dropping to 65 percent, 61 percent and 12 percent across the successively less travel-dense urban, suburban and rural/open rural areas respectively. This pattern held true for both weekday and weekend trips.

Figure 3

Trip purpose by area type



Source: DVRPC, 2007

[5] Utilitarian trips include commuting to school or work; work-related (on-the-job) bicycling; social visits; and trips for shopping, appointments and errands.

[6] Workers 16 years and over who did not work at home, Philadelphia PMSA, 2000. United States and Puerto Rico --Metropolitan Area GCT-P12. Employment Status and Commuting to Work: 2000 Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data, http://factfinder.census.gov/, accessed 6/7/2007.

Origins and destinations

"Home" was the most frequently stated destination of bicycle travelers (40 percent) followed by recreation facilities ("Park/field": 14 percent) and office buildings (11 percent) (Table 2, below left). Home to home trips (as when a bicyclist is out for a recreation ride) accounted for 23 percent of trips (Table 3, below right). Trips between office buildings and home accounted for 15 percent of trips; and between home and a factory or warehouse, 4 percent. Trips between home and retail locations were 8 percent of all trips; another 4 percent were between homes and restaurants.

Table 2
Destinations

Destination	Percent of all trips
Home	40
Park/field	14
Office building	11
Other	9
School/campus	6
Mall/strip mall/shopping center	5
Factory/warehouse	4
Grocery/drug/convenience store	3
Restaurant	3
Someone else's home	2
Train/subway/bus station	2

Source: DVRPC, 2007

Table 3
Origin-destination pairs

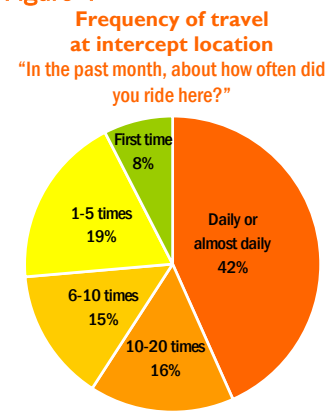
Origin	Destination	Percent of all trips
Home	Home	23
Home	Office building	9
Park/field	Park/field	8
Home	Other	8
Office building	Home	6
Home	School/campus	5
Home	Park/field	5
Home	Mall/strip mall/shopping center	4
School/campus	Home	4
Home	Factory/warehouse	3
Home	Restaurant	3
Home	Grocery/drug/convenience store	2
Home	Someone else's home	2
Home	Train/subway/bus station	2
Other	Home	2
Office building	Park/field	2
School/campus	School/campus	1
Mall/strip mall/shopping center	Home	1
Other	Other	1
Grocery/drug/convenience store	Home	1
Factory/warehouse	Home	1
Restaurant	Home	1
Office building	Office building	1
School/campus	Mall/strip mall/shopping center	1
Someone else's home	Home	1
All other origin/destination pairs		5

Source: DVRPC, 2007

Frequency of trip

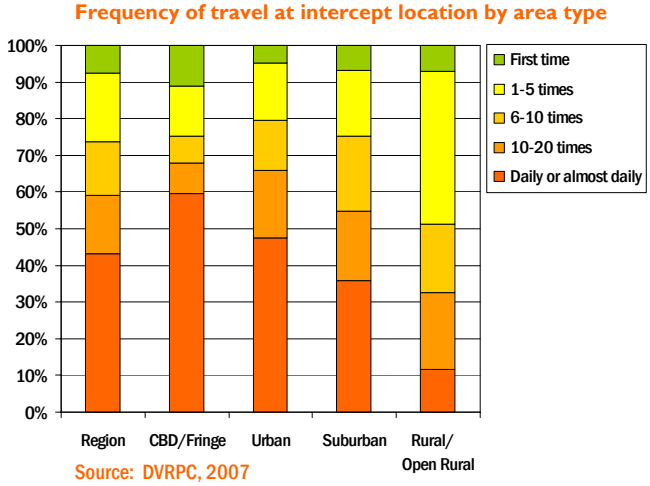
When asked "In the past month, about how often did you ride here?" 43 percent of respondents chose "daily or almost daily" as their response (Figure 4, below left). That percentage declines steeply across area types: from a high 60 percent for CBD/Fringe bicyclists, it declines to 48 percent of urban bicyclists, 36 percent of suburban bicyclists and 12 percent of rural/open rural bicyclists (Figure 5, below right).

Figure 4



Source: DVRPC, 2007

Figure 5

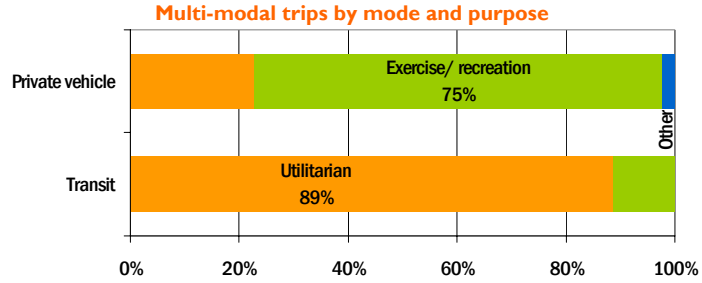


Source: DVRPC, 2007

Use of supplemental modes

Bicyclists were asked if they had or intended to bring their bike aboard a transit vehicle during their current trip; and whether they had transported their bike on a private motor vehicle during their current trip. Approximately 12 percent responded affirmatively to each question. For those responding yes to the transit question, nearly 9 out of 10 were making a utilitarian trip, with half of those commuting to work; while of those who first carried their bike on a car, three out of four were making a trip for recreation or exercise (Figure 6, below).

Figure 6



Source: DVRPC, 2007

Riding behavior & helmet use

Table 4
Observed behavior

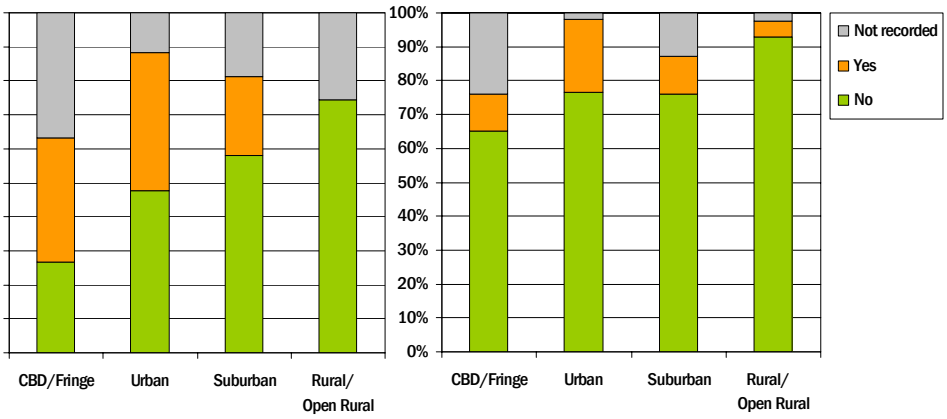
Not wearing helmet	57%
Riding on sidewalk	29%
Wrong way	13%

Source: DVRPC, 2007

Survey workers observed and noted the riding behavior of bicyclists as they approached the survey station. Approximately 57 percent of bicyclists interviewed were not wearing a helmet; 29 percent were observed riding on the sidewalk; and 13 percent were observed riding against traffic (Table 4, left). Sidewalk riding was as much as 30 points higher in the innermost area types (CBD/Fringe and Urban) as in the outer two area types; however, this observation was not recorded for significant numbers of bicyclists across area types. Wrong-way riding appears to peak among Urban riders; however, this observation was not recorded for a quarter of CBD/Fringe bicyclists (Figure 7, below). Helmet use hovered around 40 percent among the CBD/Fringe and Urban bicyclists, and showed higher rates among suburban and rural/open rural bicyclists (Figure 8, at bottom).

Figure 7

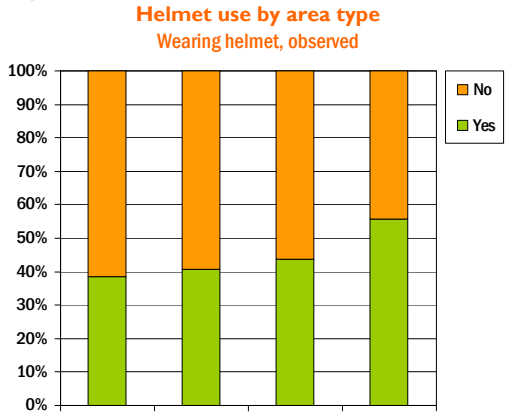
Sidewalk and wrong way riding by area type



Source: DVRPC, 2007

Figure 8

Helmet use by area type

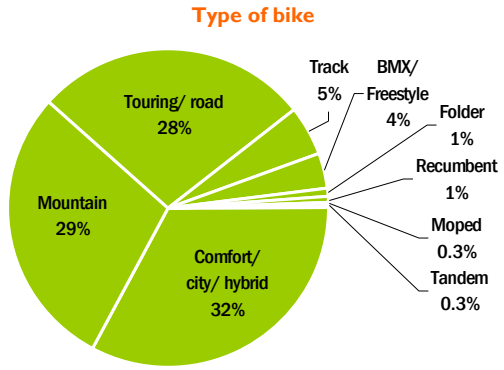


Source: DVRPC, 2007

Type of bicycle

Touring/road bikes, mountain bikes and comforts/hybrids each accounted for about 30 percent of the bikes on the road (Figure 9, below). Fixed gear bikes (which typically do not have brakes) were five percent of bikes seen during the survey. BMX and freestyle bikes, not designed for road use, made up four percent of bikes observed during the survey.

Figure 9



Source: DVRPC, 2007

Photo: Mike Dannemiller

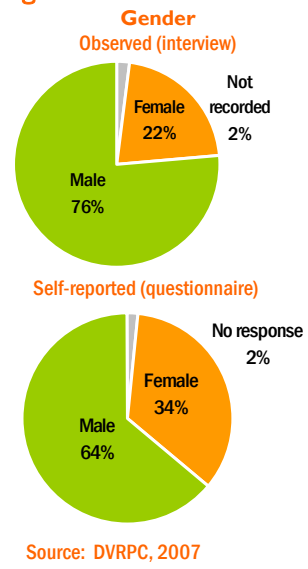
4. Findings: Bicyclists

4.1 Who bikes? Bicyclist demographics

Age and gender

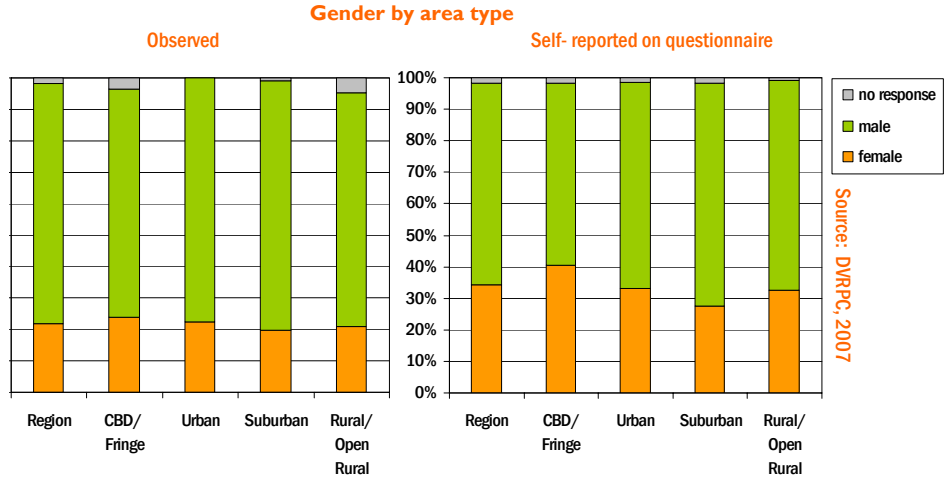
Just over three-quarters of the bicyclists interviewed are men. A somewhat more equitable 34 percent of the questionnaire respondents are women (Figure 10, right). CBD/Fringe has the highest female to male bicyclist ratio of the area types: 24 percent of interview respondents, and 40 percent of questionnaire respondents, were women (Figure 11, below).

Figure 10



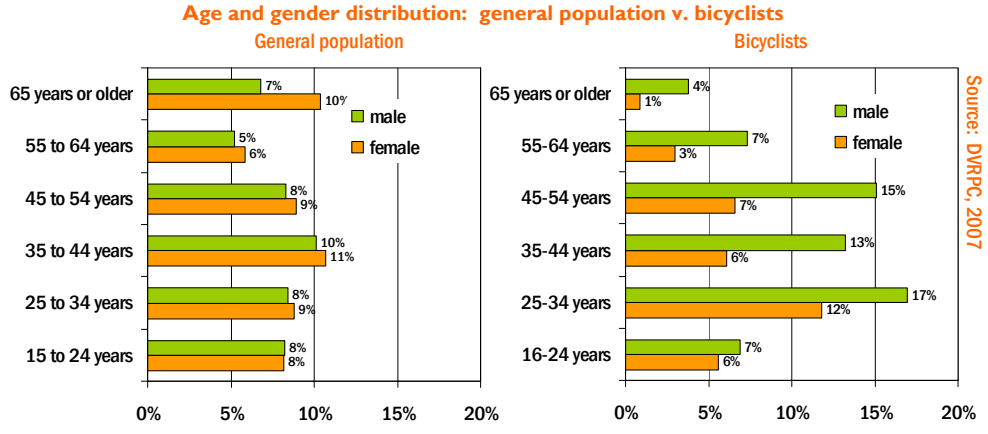
Source: DVRPC, 2007

Figure 11



In comparison to the general population the region's bicyclists are overrepresented by men aged 25 to 64 years, and by women aged 25 to 34 years; they are underrepresented by persons ages 65 years and older (Figure 12, below).

Figure 12

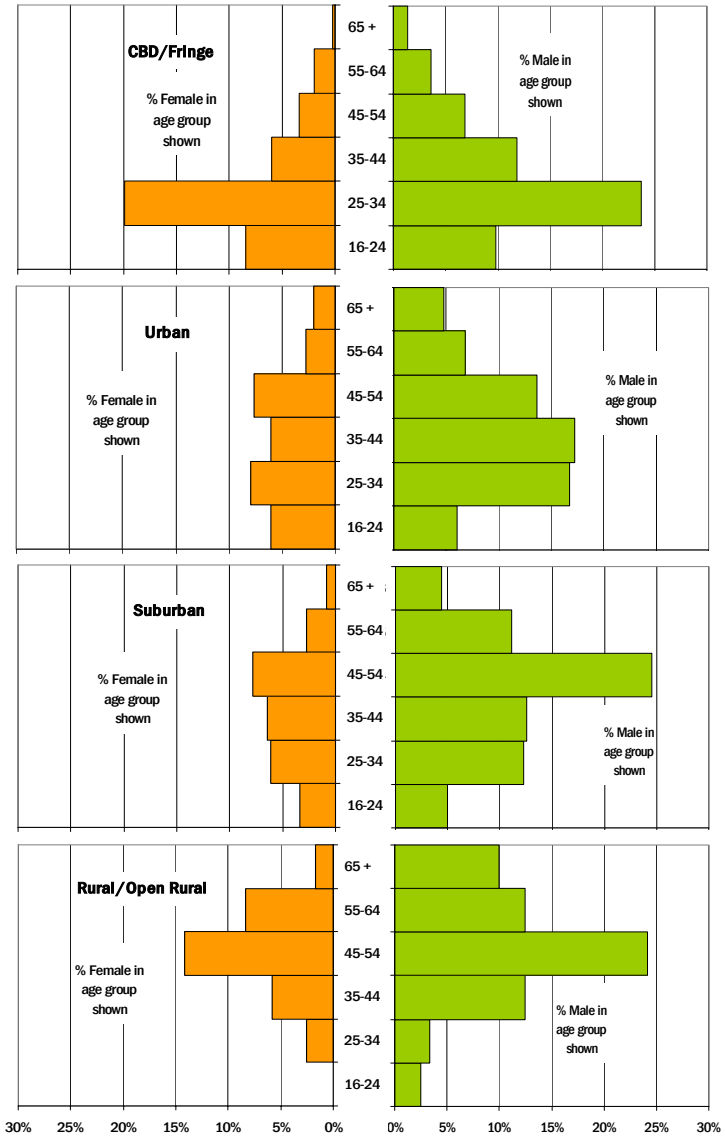


Percentages are of total population represented in each chart, rounded to nearest whole number.

Sources: US Census Bureau, 2000; DVRPC, 2007

Figure 13

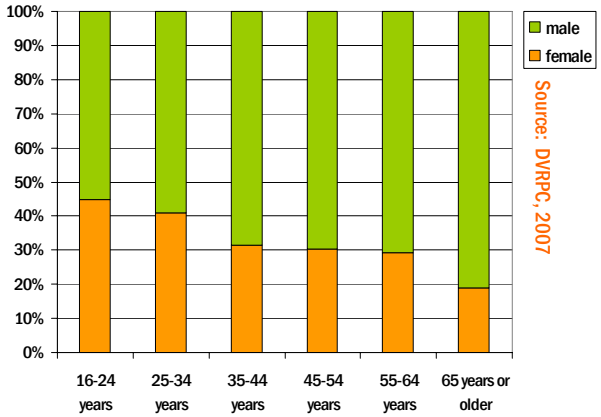
Bicyclist age/sex pyramids by area type



Source: DVRPC, 2007

Figure 14

Gender participation in bicycling by age cohort



Source: DVRPC, 2007

The bicycling population gets progressively older and more male across the density spectrum of area types, as illustrated in the age-sex pyramids for each area type presented in Figure 13, left. Bicyclists' median age appears to rise from about 30 in CBD/Fringe to about 40 years among Urban cyclists, to well over 45 years among Suburban cyclists. More than half of Rural/Open Rural bicyclists were age 45 years and older.

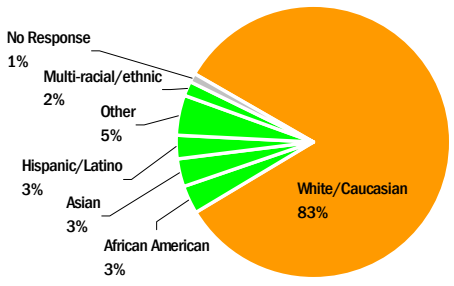
Female participation in cycling decreases with age relative to male participation, from 45 percent of the 16-24 year cohort, to 19 percent among the 65 year and older cohort. The steepest declines are from the 25-34 year old group to the 35-44 year old group and from the 55-64 year old group to the 65 and older group (Figure 14, bottom left).

Ethnicity

When compared with the general population, whites are overrepresented among the bicycling population; while African Americans are severely under-represented. While whites made up 74 percent of the region's population age 18 and older in the year 2000, they were 83 percent of the survey respondents. Similarly, while African Americans were 19 percent of the region's adult population, they made up just 3 percent of bicyclists. Other racial/ethnic groups were represented in the survey sample in proportions nearly equal to those of the general population (Figure 15, below).

Figure 15

Race/origin



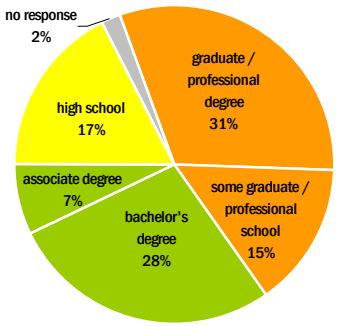
Source: DVRPC, 2007

Education and employment

The region's bicyclists are as a group far more educated than the general population. More than one in four earned up to a bachelor's degree, half of them have had post-graduate schooling and nearly a third has advanced degrees (Figure 16, right). For comparison, among the adult population age 25 years and older in the year 2000, only 17 percent earned a bachelor's degree and 11 percent earned an advanced degree.[7]

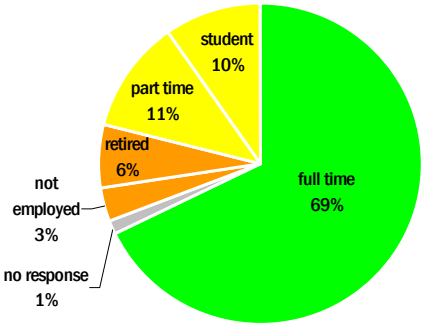
Approximately 69 percent of the region's bicyclists are employed full time; 21 percent are either part time workers or students; and nine percent are retired or otherwise not employed (Figure 17, far right).

Figure 16
Level of formal education



Source: DVRPC, 2007

Figure 17
Employment status



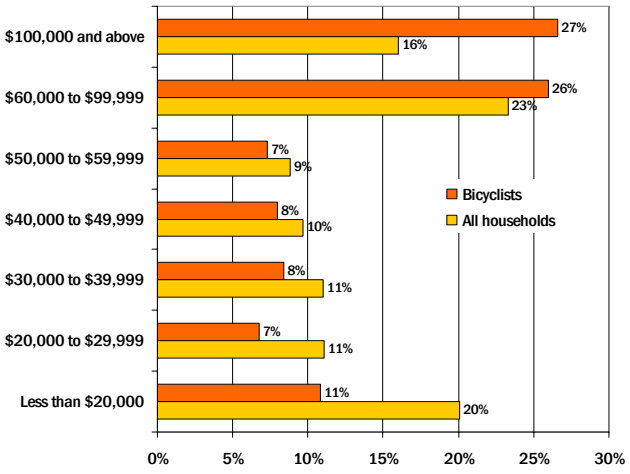
Source: DVRPC, 2007

Household annual income

As a group, the region's bicyclists are significantly more affluent that the general adult population. The median annual income of bicyclist households is between $60,000 and $69,000. The distribution of responses to the income question is illustrated in Figure 18, below left. When compared with all households, bicyclist households are underrepresented in every income category under $60,000; and over-represented in every category $60,000 and higher. Households with incomes of $100,000 or above are 27 percent of all bicyclist households, compared with 16 percent of all households. Although the Census data lags that of the survey by six years, inflation is not a plausible explanation for the wide difference in incomes.

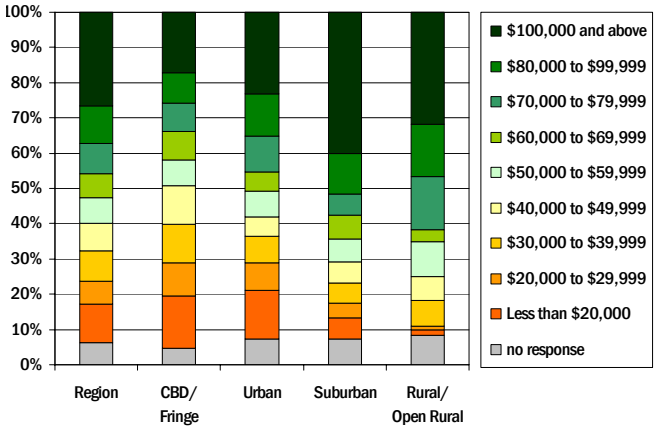
The income distribution of bicyclist households varies significantly across area types, as illustrated in Figure 19, below right. The overall affluence of bicyclist households increases in a steady progression from the most (CBD/Fringe) to the least (Rural/Open Rural) travel-intense area types.

Figure 18
Household annual income: bicyclists v. all households



Sources: DVRPC, 2007; US Census Bureau, 2000

Figure 19
Household annual income by area type



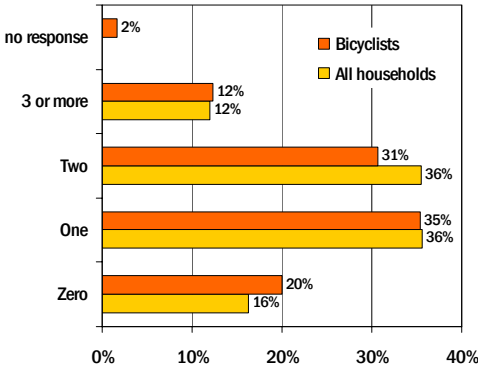
Source: DVRPC, 2007

[7] DVRPC, June 2003, derived from U.S. Census Bureau, 2000 Census of Population and Housing, Summary File 3.

Vehicles in household, household size and type of home

Figure 20

Vehicles in household



Sources: DVRPC, 2007; US Census Bureau, 2000

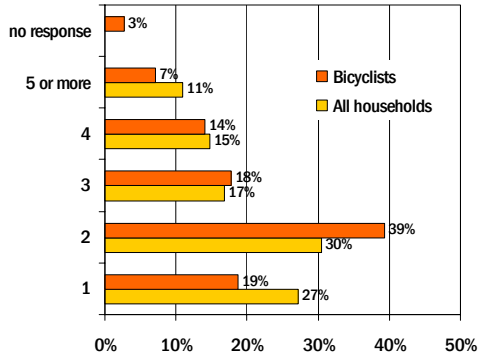
Compared with all the region's households, Delaware Valley bicyclists are slightly more likely to live in zero-vehicle households (20 percent versus 16 percent) and slightly less likely to live in two-vehicle households (31 percent versus 36 percent) (Figure 20, left).

A greater share of the region's bicyclists live in two-person households (30 percent to 39 percent), and a smaller share live alone (19 percent to 27 percent) than the general population (Figure 21, below left).[8]

The types of housing lived in by bicyclists matches closely those of the general population. Whereas single-family units house about 74 percent of all households regionally, they house 71 percent of bicyclist households (Figure 22, below).[9] As might be expected, the mix of bicyclist housing types varies greatly across area types, with apartment buildings and condominiums predominating in CBD/Fringe, rowhomes/townhomes predominating among Urban bicyclists and single-family detached housing predominating among Suburban and Rural/Open Rural respondents.

Figure 21

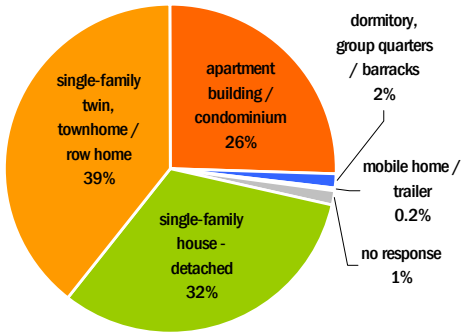
Household size



Source: DVRPC, 2007; US Census Bureau, 2000

Figure 22

Type of home



Source: DVRPC, 2007

[8] Percent one-person households, Philadelphia PMSA, 2000: 27.1; average household size: 2.58 persons. Source: United States and Puerto Rico -- Metropolitan Area, GCT-H6. Occupied Housing Characteristics: 2000. Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data, http://factfinder.census.gov/, accessed 6/7/2007.

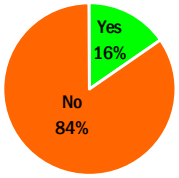
[9] 1 unit, detached or attached, as percent of all housing units, Philadelphia PMSA, 2000. Source: United States and Puerto Rico -- Metropolitan Area GCT-H7. Structural and Facility Characteristics of All Housing Units: 2000 Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data, http://factfinder.census.gov/, accessed 6/7/2007.

Other bicyclists in household; bicycle ownership

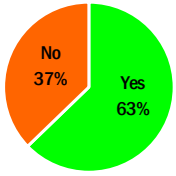
Nearly two-thirds of bicyclists reported living with one or more additional adults who also ride a bicycle; but only one out of six reported having one or more child bicyclists in the home (Figure 23, right).

More than half of bicyclists reported having three or more bicycles in the household including children's bikes. The rates of bicycle ownership vary across area types, with CBD/Fringe bicyclists having the fewest per household, and the Rural/Open Rural bicyclists having the most (Figure 24, below). When asked about bicycles owned only by adult household members, just under half reported ownership of three or more bicycles (Figure 25, at bottom). The rates of adult bicycle ownership vary similarly across area types, with Rural/Open Rural bicyclists having the most bikes.

Figure 23
Other bicyclists in household
Under 16 years of age

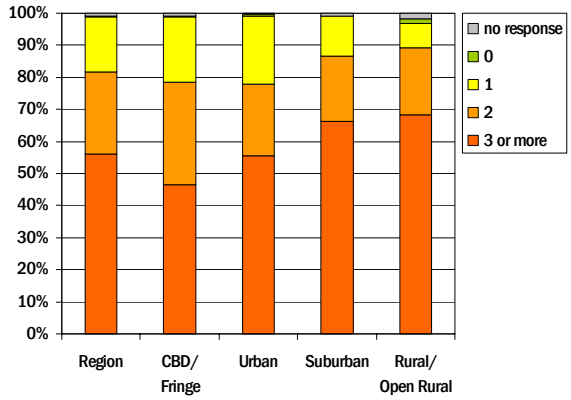


Age 16 or older



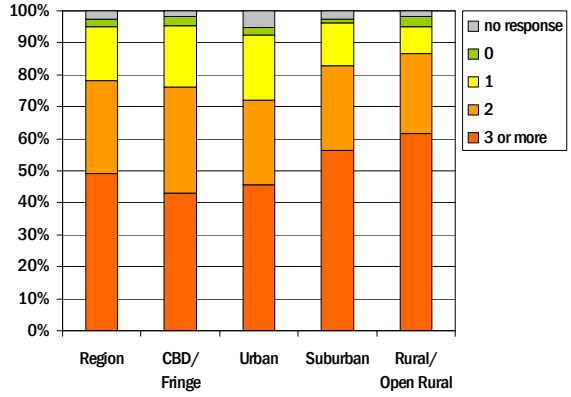
Source: DVRPC, 2007

Figure 24
Bicycles in household by area type
"How many bicycles do you and other members of your household own?"



Source: DVRPC, 2007

Figure 25
Bicycles in household owned by adults by area type
"How many bicycles do you and other members of your household age 16 years and older own?"



Source: DVRPC, 2007

4.2 How much, and why, do bicyclists ride? Patterns of bicycle use

Origins and destinations of current trip; frequency of travel at intercept location

Table 5

Destinations from questionnaire	Percent of all trips
home	35%
office building	20%
school/campus	11%
other	10%
park/playground/ballfield	9%
train/subway/bus station	5%
someone else's home	3%
restaurant	3%
grocery /drugstore/convenience store	2%
mall/strip mall/shopping center	2%
factory/warehouse	1%
no response	1%

Source: DVRPC, 2007

The mail-back questionnaire posed some questions about the respondent's current bicycle trip. These questions were included for two reasons:

1. To detect and evaluate any differences between interview and questionnaire respondents; and
2. To detect non-bicyclists among the questionnaire respondents.

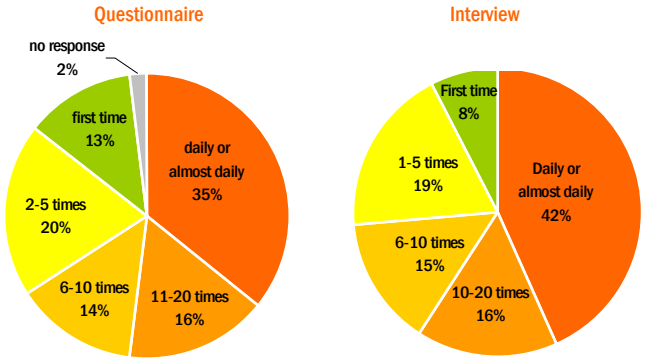
Responses to the question "Where will you end this trip?" are presented in Table 5, left. "Home" received 5 percent fewer responses than received during the interviews (35 percent v. 40 percent), as did trips to recreation facilities (parks and ballfields; 9 v. 14 percent). Trips to office buildings, schools/campuses, and transit stations received higher percentage responses, but none by greater than nine percent. Trips to retail centers, factories and warehouses were slightly less than reported by interviewees.

Mail-back respondents and interviewees alike were asked how often they passed the intercept location on their bike during the past month. Questionnaire respondents were seven percentage points less likely to have passed the location "daily or almost daily" and five percentage points more likely to have passed it for the first time, than the roadside interviewees (Figure 26, below left).

Responses varied significantly across area types (Figure 27, below). The frequency of response for "daily or almost daily" declines sharply from CBD/Fringe (47 percent) across the spectrum to Rural/Open Rural (four percent).

Figure 26

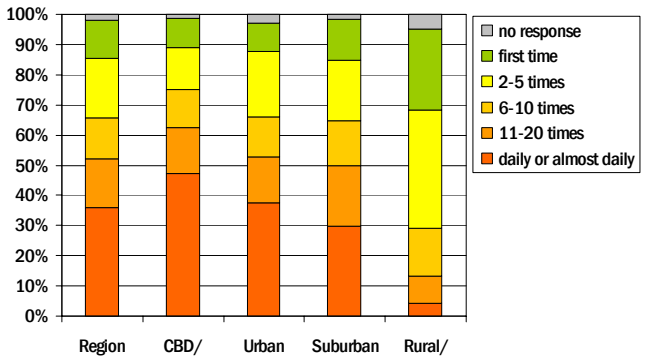
Frequency of travel at intercept location during past month



Source: DVRPC, 2007

Figure 27

Frequency of travel at intercept location during past month by area type



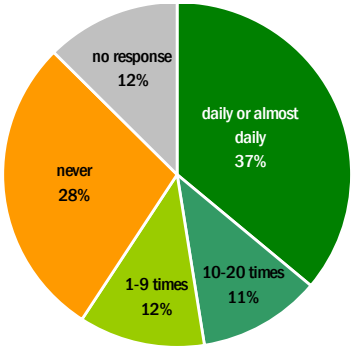
Source: DVRPC, 2007

Commuting to work

The majority of survey respondents, three in five, indicated that they biked to work at least once in the month preceding the survey; and more than one in three commuted by bike daily or almost daily (Figure 28, below left). The percentage of bicyclists who commuted daily or almost daily declines steeply across the area type spectrum, from a high of 52 percent of bicyclists intercepted in CBD/Fringe to virtually none in the Rural/Open Rural parts of the region (Figure 29, below right).

Figure 28

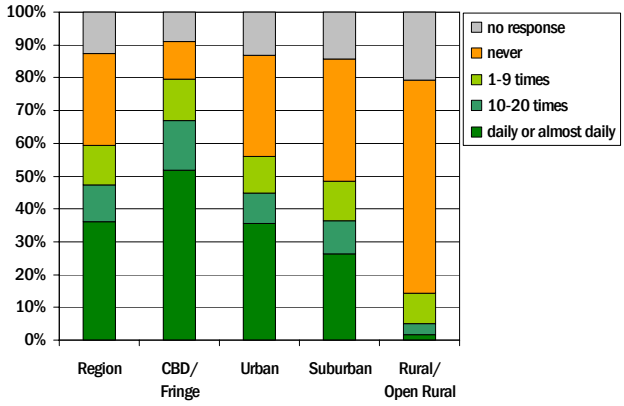
Frequency of bicycling to work during past month



Source: DVRPC, 2007

Figure 29

Frequency of bicycling to work during past month by area type



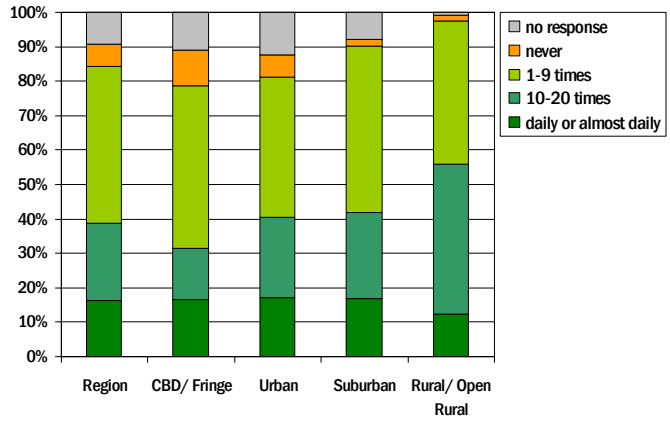
Source: DVRPC, 2007

Bicycling for exercise or recreation

Nearly 85 percent of bicyclists biked for exercise or recreation at least once in the preceding month. Those who bike for such reasons daily or almost daily number roughly 16 percent of all bicyclists, regardless of area type. However, those who indicated "never" or did not respond to the question decreases with density, ranging from 22 and 18 percent respectively among CBD/Fringe and Urban bicyclists to 10 and 3 percent respectively among Suburban and Rural/Open Rural bicyclists (Figure 30, below).

Figure 30

Frequency of bicycling for exercise or recreation during past month by area type

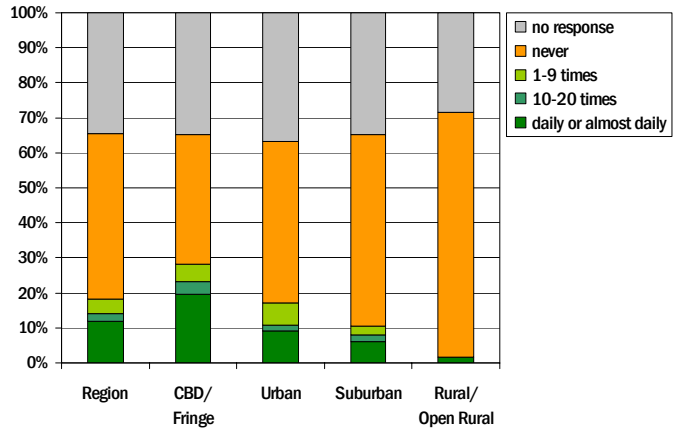


Source: DVRPC, 2007

Commuting to school

The percentage and frequency of bicyclists commuting to school is rather small regionally; fewer than one in five has biked for this purpose at least once in the preceding month. The percentage declines across area types. About 35 percent of survey respondents did not answer this question (Figure 31, below).

Figure 31
Frequency of bicycling to school during past month by area type



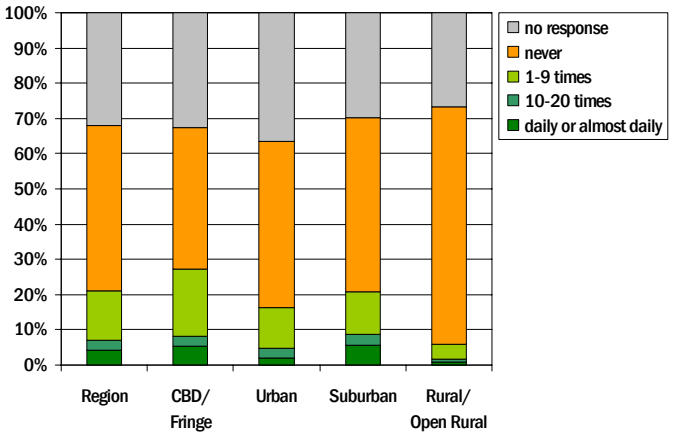
Source: DVRPC, 2007

Bikes and transit

About 21 percent of bicyclists used their bikes to connect with transit at least once in the month preceding the survey. A far smaller percentage indicated that they do this on a daily basis. There is modest variation across area types (Figure 32, bottom left).

With varying restrictions all commuter rail carriers in the region permit bikes on board rail vehicles. Additionally, virtually the region's entire transit bus fleet is now equipped to carry bicycles. Respondents were asked if they brought a bike aboard a train or a bus in the preceding month, how often and by which carrier. About one in four of the region's bicyclists boarded a train with their bike; and about one in ten brought a bike aboard a bus. The highest rates of bike-on-transit utilization, for both train and bus, are among CBD/Fringe bicyclists; the rates decline across the area type spectrum (Table 6, below).

Figure 32
Frequency of bicycling to connect with transit during past month by area type



Source: DVRPC, 2007

Table 6
Taken bike aboard transit in past month

Area Type	TRAIN	BUS
CBD/ Fringe	30%	15%
Urban	23%	9%
Suburban	19%	8%
Rural/ Open Rural	14%	6%
Region	24%	11%

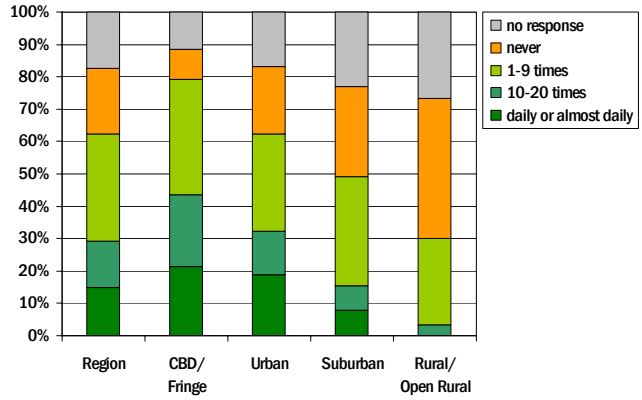
Source: DVRPC, 2007

Utilitarian bicycling other than commutes

More than three in five of the region's bicyclists used their bike to go shopping, go to appointments, run errands or to go to religious services at least once in the month preceding the survey. That proportion, roughly four in five among CBD/Fringe bicyclists, declines across the area type spectrum. The proportion indicating such use 1 to 9 times during the month, roughly one-third, is nearly constant across area types (Figure 33, below).

Figure 33

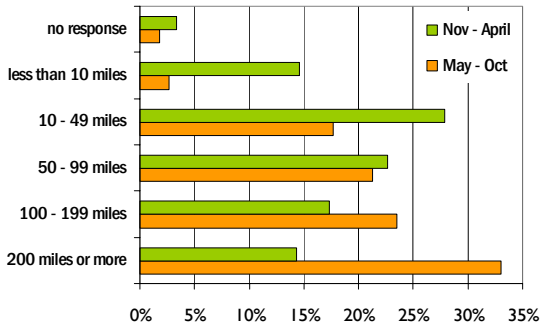
Frequency of bicycling for shopping, appointments, religious, errands during past month by area type



Source: DVRPC, 2007

Figure 34

Miles typically ridden in a month by season



Source: DVRPC, 2007

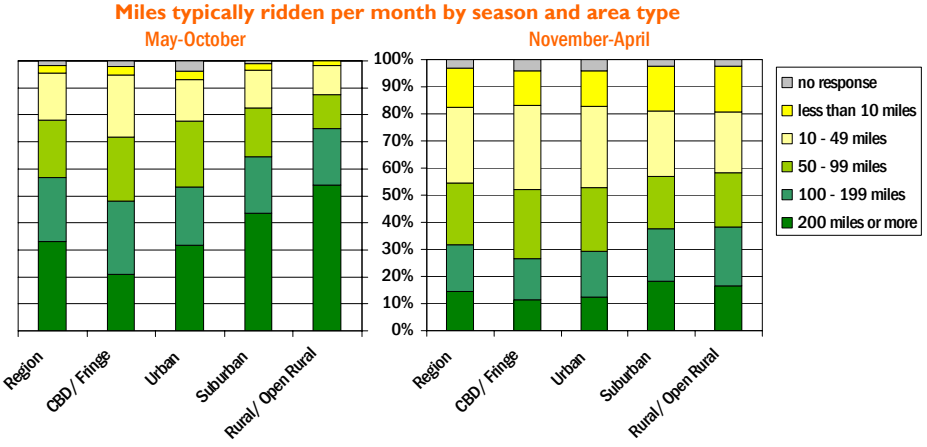
Seasonal variation in bicycling

Respondents were asked to estimate how many miles they biked per month typically from May through October (the "warm" season typically associated with increased bicycling) and from November through April (the "cold" season). The responses indicate an expected seasonal shift in miles ridden, illustrated in Figure 34, above right: the mode (most frequent) response, 10-49 miles in the cold season, moves up to 200 or more miles during the warm season.

Generally speaking, a bicyclist's monthly mileage increases with decreasing density. Bicyclists logging 200 or more miles per month during the warm months comprise about 21 percent of CBD/Fringe bicyclists. That percentage steps up to 32 percent of Urban bicyclists, 43 percent of Suburban bicyclists and 54 percent of Rural/Open Rural bicyclists. The pronounced warm season variation across area types is not seen with cold season bicycling: Surburban and Rural/Open Rural bicyclists ride only slightly more miles than do CBD/Fringe and Urban bicyclists during the cold months (Figure 35, right).

Figure 35

Miles typically ridden per month by season and area type



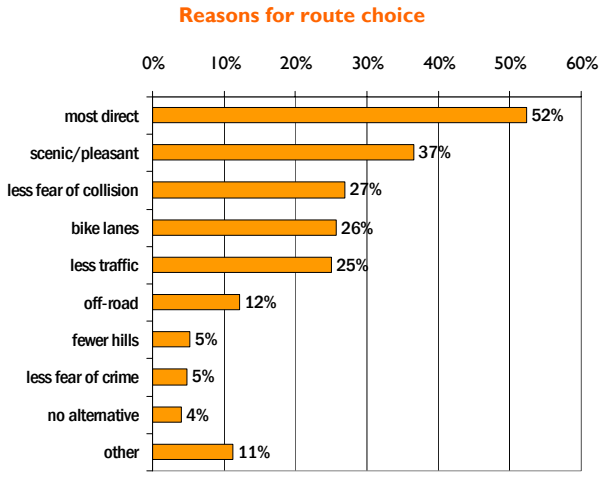
Source: DVRPC, 2007

Factors in route selection

Presented with a list of reasons for choosing a route, respondents were asked to select those which apply to their choice of the route they were taking when they received the questionnaire. Multiple selections were permitted. Directness of route was by far the most frequently cited reason for choice of route, selected by more than half of all respondents. Bike lanes, reduced traffic and less fear of collision were each cited by a quarter or more of bicyclists (Figure 36, below).

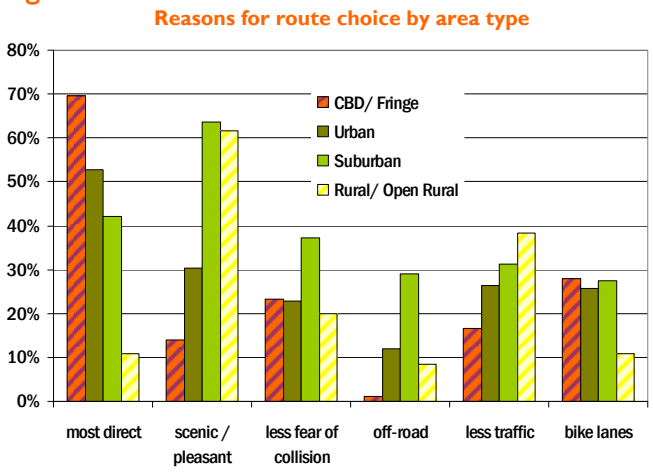
These aggregate numbers obscure deep variations across area types. This effect is illustrated in Figure 37 at bottom. The most dramatic cross-area differences are seen for the two most cited reasons: "most direct" and "scenic/pleasant." Selection of "direct" plunges from 70 percent of CBD/Fringe bicyclists to 11 percent of Rural/Open Rural bicyclists in a seemingly linear fashion. A near mirror image of this distribution is found for "scenic/pleasant." Therefore one sees a reversal of the route selection priorities of bicyclists moving from the center outward. "Avoidance of traffic" increases in importance among bicyclists as density decreases.

Figure 36



Source: DVRPC, 2007

Figure 37



Source: DVRPC, 2007

Factors in the choice of the bicycle mode

"Fitness and health" is the most frequently cited reason among bicyclists for bicycling, followed by enjoyment or recreation. Large majorities of bicyclists chose these reasons (Figure 38, below). Viewed from another perspective, reasons related to health or personal well-being are the most popular; pragmatic reasons (saving time, saving money) are secondary; altruism (care for the environment) ranks third; and necessity ranks last.

Aggregate numbers, again, fail to tell the whole story. Priorities vary significantly across the area type spectrum (Figure 39, at bottom). Majorities of CBD bicyclists are motivated by pragmatism (saving time and money; avoiding congestion); such motives decrease in importance along with decreasing densities. These patterns are perhaps reflective of the fact that the bicycle is increasing practical with higher densities. Reasons related to personal well-being order from low to high across the area type spectrum, but are both relatively high regardless of area type.

Figure 38

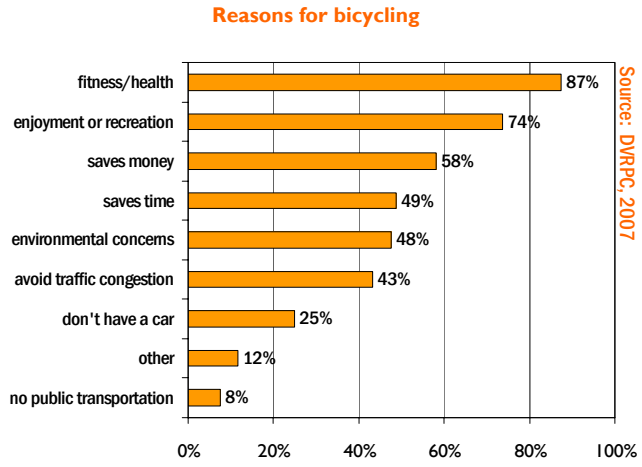
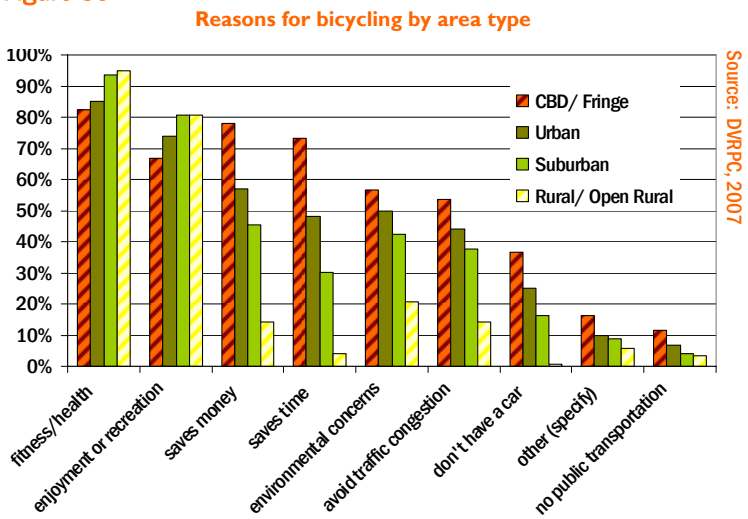


Figure 39



Reasons for not biking more

Weather is cited by three out of five bicyclists as a discouragement to bicycling more often. Reasons relating to operating conditions (unsafe road conditions, traffic speed and volume, lack of bikeways) are each cited by from 38 to 46 percent of bicyclists (Figure 40, below). Again, the percentages responding to some of the reasons vary across area types typically in a linear fashion. "Speed and volume of traffic" increases as a concern with decreasing travel intensity (from CBD/Fringe to Rural/Open Rural), along with "not enough time" (Figure 41, at bottom). Curiously, percentages citing "destinations are too far away" vary directly with area type; distance as an impediment decreases with decreasing density.

Figure 40

Discouragements to more frequent bicycling

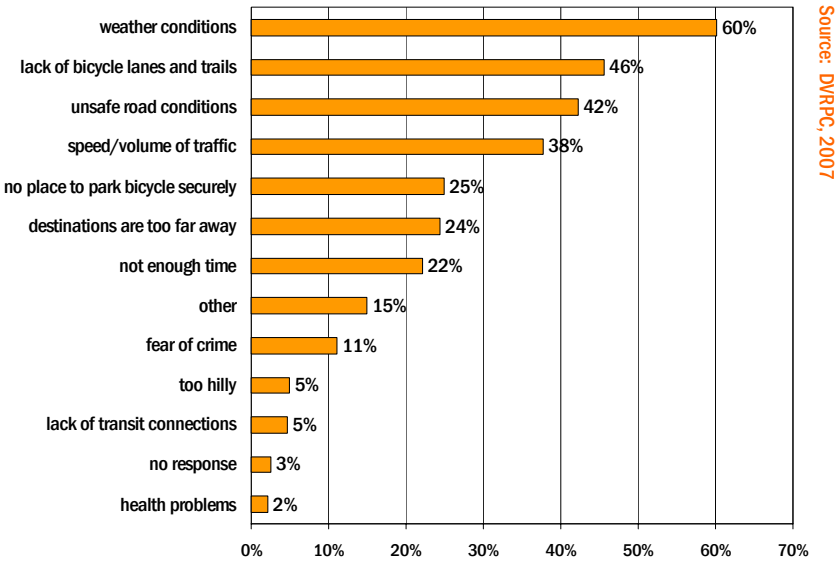
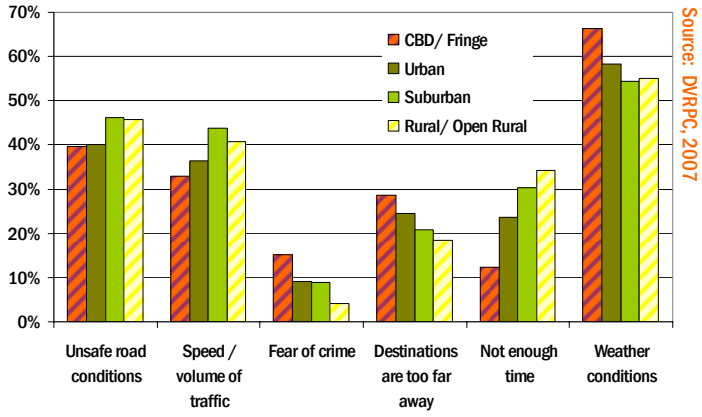


Figure 41

Discouragements to more frequent bicycling by area type



4.3 How safe are bicyclists? Crash experience, habits and attitudes

Crash experience

One out of three bicyclists was involved in at least one crash during the preceding year. About 15 percent of bicyclists collided with an object or an animal; 14 percent collided with a motor vehicle (Figure 42, below left). Rates among CBD/Fringe bicyclists are 37 percent for any type of crash; 20 percent crashed with a motor vehicle (Figure 43, below right). Percentages of bicyclists who were involved in a crash, particularly with a motor vehicle, increases with increasing density.

Of those persons who crashed, 22 percent were involved in two crashes and 14 percent were involved in three or more crashes (overall, 36 percent were involved in more than one crash) (Figure 44, bottom left). Percentages of repeat crashers ranged in the 40s among CBD/Fringe and Urban crash victims, to 23 percent of Suburban bicyclists who have crashed (Figure 46, next page, top right).

Figure 42

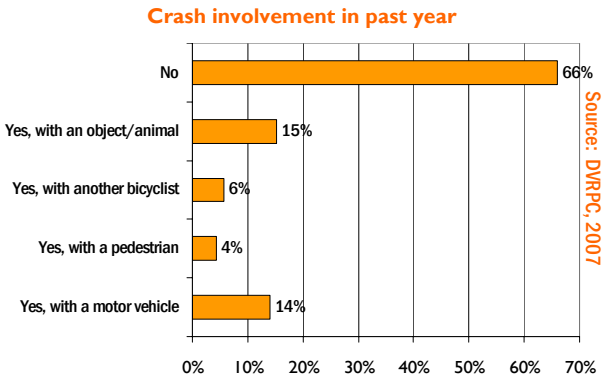


Figure 43

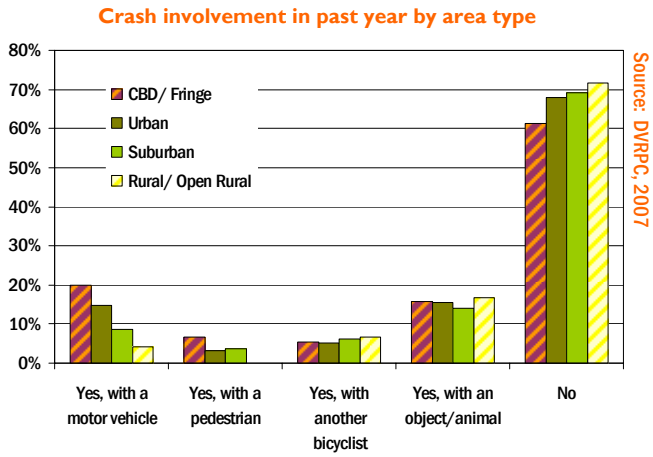


Figure 44

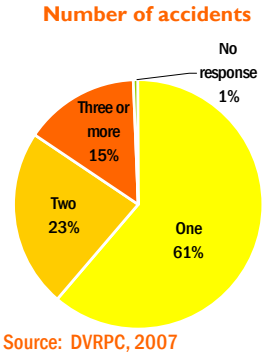
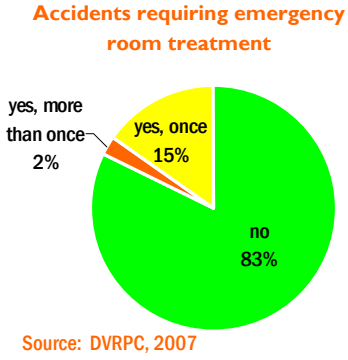


Figure 45



Overall, 17 percent of those involved in a crash were treated in a hospital emergency room; two percent of those, more than once (Figure 45, above right). CBD/Fringe bicyclists who crashed were slightly less likely to have visited the ER for crash injuries than those in other area types. Suburban bicyclists, however, were slightly more likely to have visited the ER and on multiple occasions (Figure 47, next page, top left).

Figure 46

Number of accidents during past year by area type

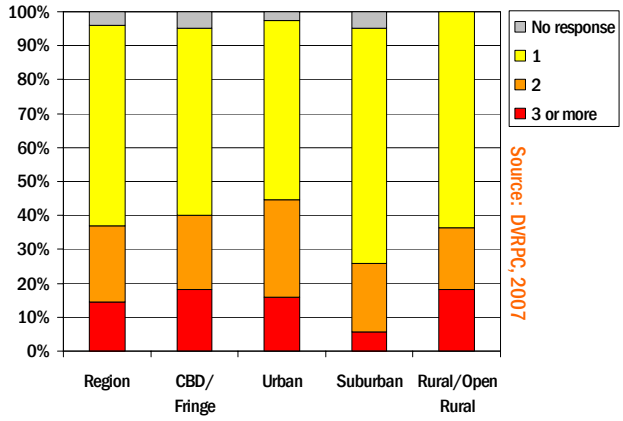


Figure 47

Emergency room treatment by area type

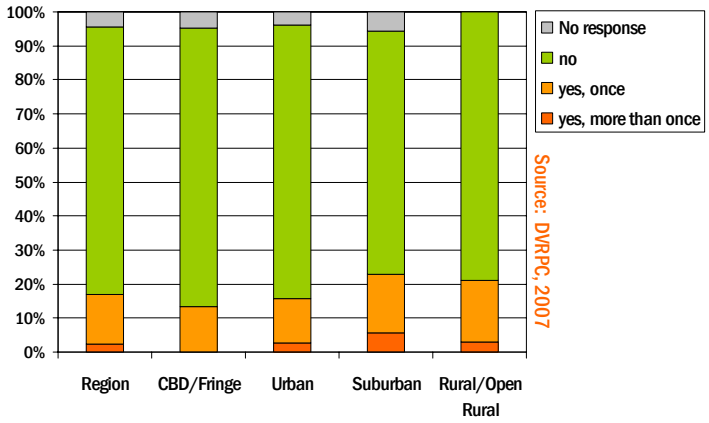
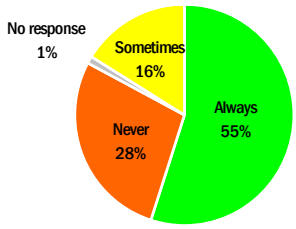


Figure 48

Frequency of helmet use



Source: DVRPC, 2007

Safety habits

A slim majority of bicyclists report that they always wear a helmet, while 28 percent report that they never do (Figure 48, left). Self-reported helmet usage varies across the area type spectrum, from a low of 40 percent always wearing a helmet in CBD/Fringe, rising to 86 percent of Rural/Open Rural bicyclists (Figure 49, below left). The practice of riding at night without a headlight displays a similar pattern across area types: 27 percent reported never riding without a light in CBD/Fringe; the percentage rises linearly from Urban to Suburban to Rural/Open Rural, where 87 percent of bicyclists never ride at night without a headlight (Figure 50, below right).

Figure 49

Frequency of helmet use by area type

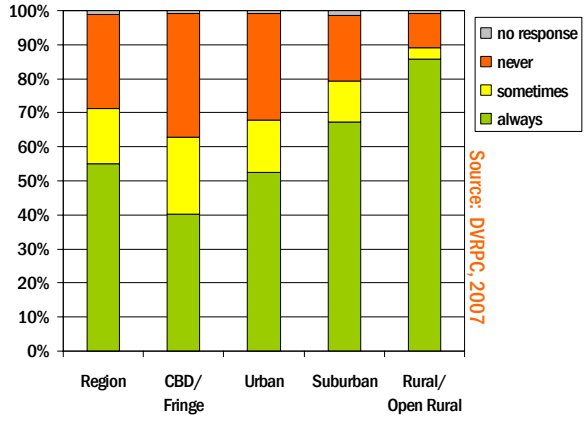


Figure 50

Frequency of riding at night without headlight by area type

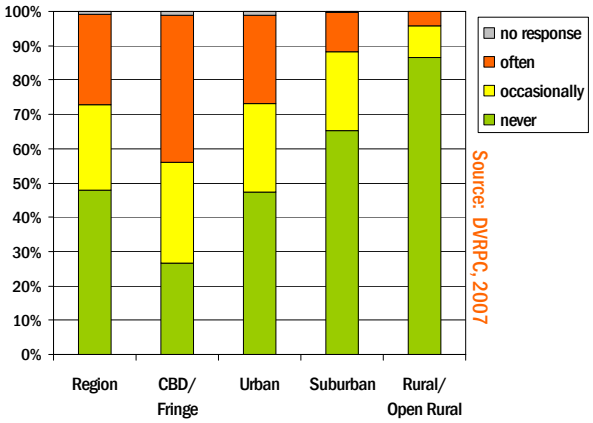
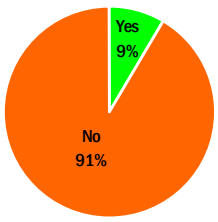


Figure 51

Ever had on-road bicycle instruction



Source: DVRPC, 2007

The League of American Bicyclists has been rolling out a program of on-road bicycle courses in recent years. It is believed that the increased availability of such courses will increase the number of bicyclists who feel confident in most traffic situations, thereby increasing the amount of bicycle travel. Nine percent of survey respondents indicated having taken a course with on-road bicycle instruction (Figure 51, left). The percentage varies with area type, ranging from 6 percent among CBD/Fringe bicyclists, rising across the Urban and Suburban groups, to 14 percent among Rural/Open Rural bicyclists.

Compliance with traffic laws

Bicyclists were asked how often they obeyed certain traffic laws. The results to this question are presented in Figure 52, below. Self-reported compliance is weakest for stopping at stop signs and waiting for a red light to turn green (40 and 36 percent reported complying "sometimes" or "never" with these laws, respectively). Self-reported compliance for each of the laws presented, with the sole exception of stopping for pedestrians in a crosswalk, varies along the area type spectrum, with CBD/Fringe bicyclists showing the lowest rates of compliance (Figures 53, below; Figures 54 & 55, next page). Cumulative percentages of those who always or usually ride on the right side of the street are above 90 percent; the percentage of bicyclists always riding on the right varies significantly across area types (Figure 55, next page, bottom).

Figure 52

Frequency of compliance with traffic laws

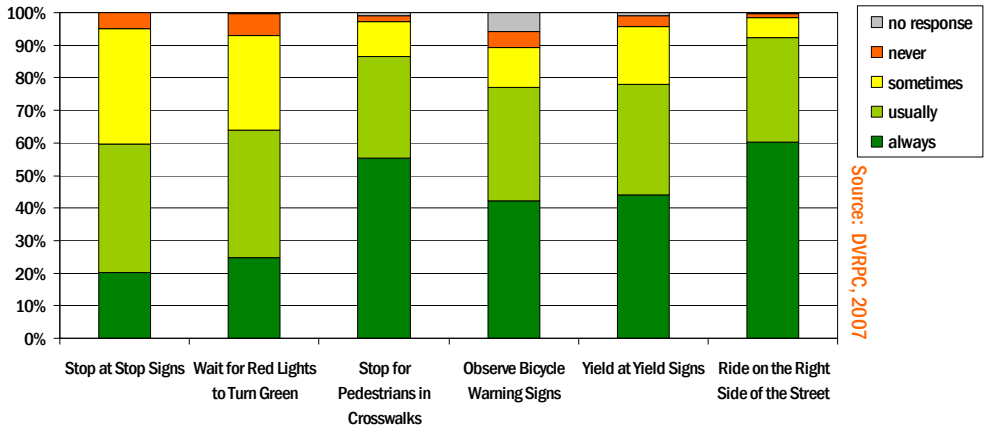


Figure 53

Frequency of compliance with traffic controls by area type

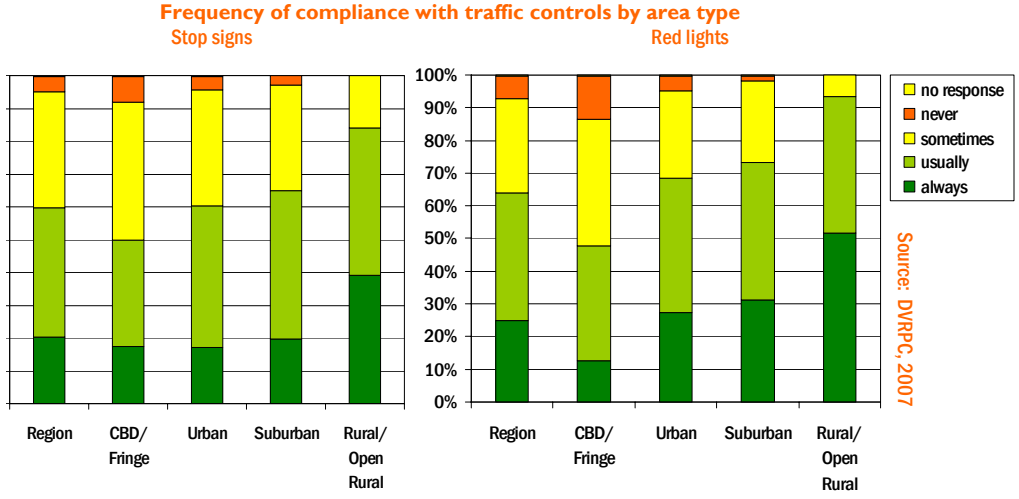


Figure 54

Frequency of compliance with yield and bicycle warning signs by area type

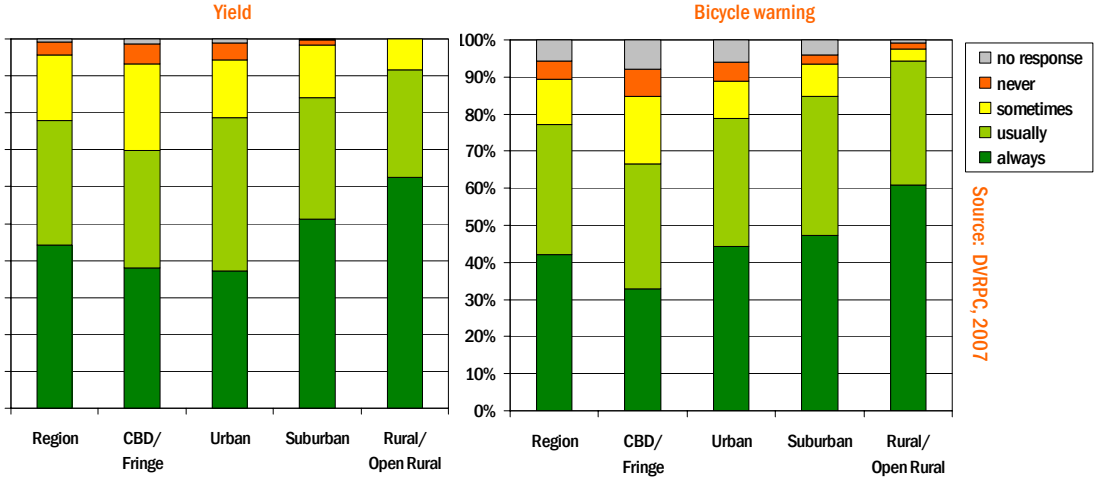
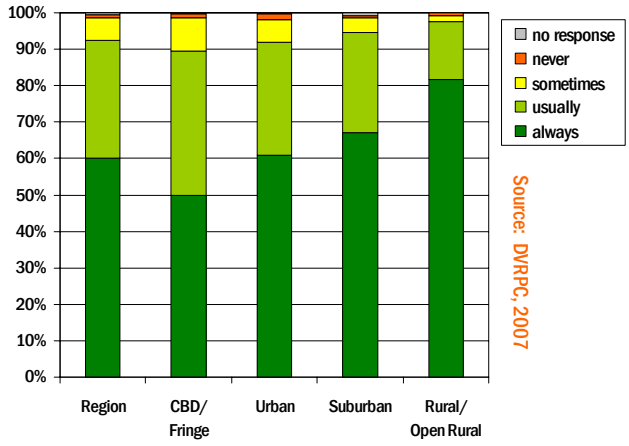


Figure 55

Frequency of riding on the right with traffic by area type



4.4 Bicyclists' perception of risk

Perception of risk is a key determinant of behavior. Road users are much more likely to violate a traffic law if they see little or no risk in doing so. Perceptions of risk often do not correspond with the actual risk posed by a particular activity: some things seem more risky than they actually are and others seem less risky than the facts suggest. Risk is an important determinant in bicyclist behavior and the decision to bicycle.

Weather and road conditions

Large majorities of bicyclists associate higher levels of risk with road surface conditions including snow, ice, potholes and debris. Less than 40 percent of bicyclists believe that bicycling in the rain is "risky" or "very risky" (Figure 56, below left). Percentages believing bicycling with "snow and ice on roads" to be "very risky" vary across area types: the lowest being 59 percent among CBD/Fringe bicyclists, increasing to 78 percent among Rural/Open Rural bicyclists (Figure 57, below right).

Figure 56

Bicyclists' perception of risk: weather and road conditions

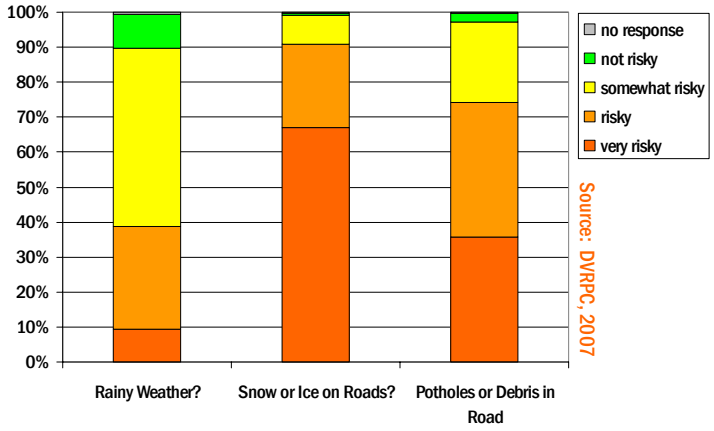
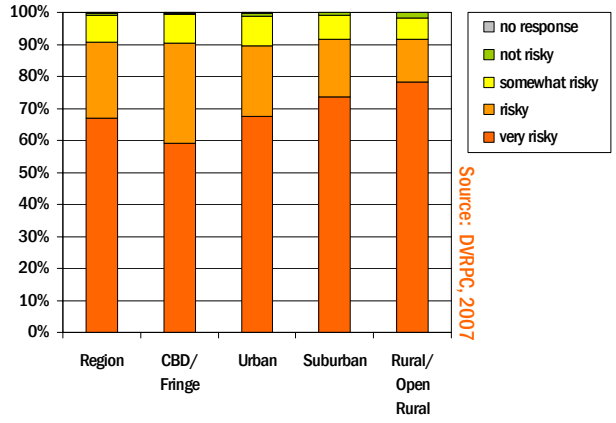


Figure 57

Risk from biking with snow or ice on road by area type



Operating environment and facilities

Bicyclists link higher levels of risk mostly with riding on the left facing traffic. Majorities of bicyclists associated higher levels of risk with higher traffic volumes and posted speeds, with a significant margin viewing speed as the greater risk. Bicyclists associated about the same levels of risk to riding on roads with no shoulders, as to roads with high posted speed limits. Conversely, large majorities of bicyclists associated low to no risk with riding on what is perceived to be segregated facilities; although sidewalk riding was perceived somewhat more risky than riding in bike lanes or paths (Figure 58, below).

Responses vary moderately across area types regarding roads with high posted speed limits and high traffic volumes and riding facing traffic, with lower perceptions of risk among CBD/Fringe bicyclists (Figure 59, below; Figure 60, next page). The greatest variability across area types concerned heavy traffic volume.

Figure 58

Bicyclists' perception of risk: operating environment and facilities

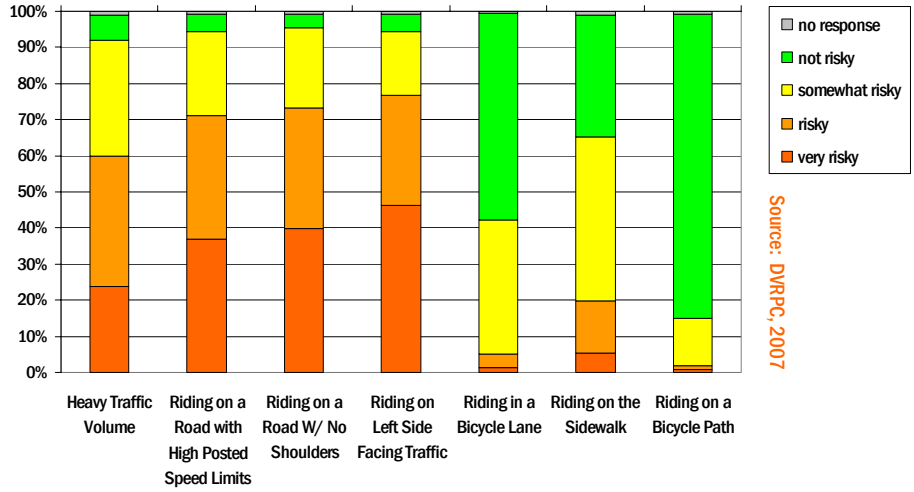


Figure 59

Risk from biking on roads by area type

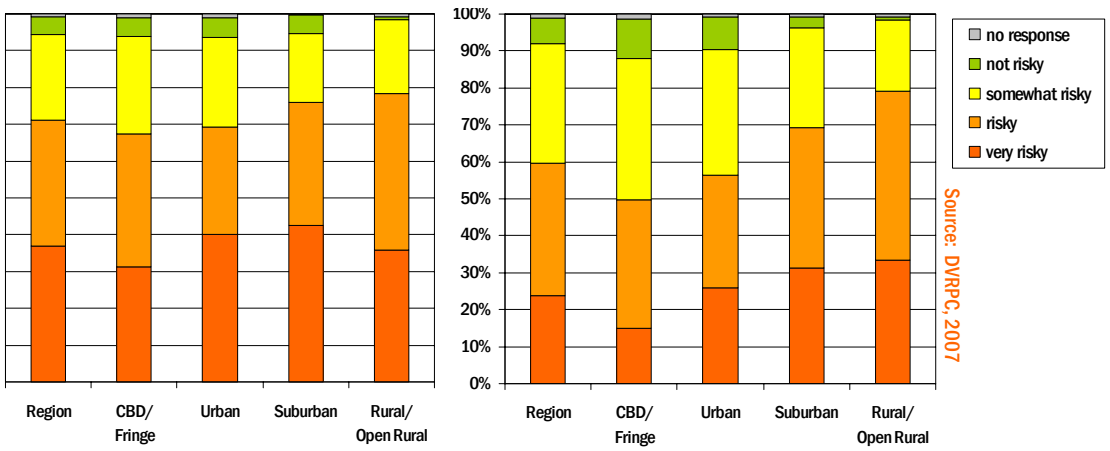
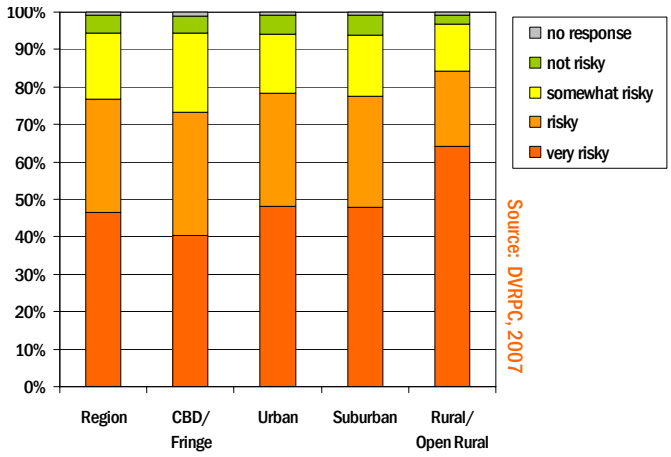


Figure 60

Risk from riding on the left facing traffic by area type



Safety infractions

Not stopping for a stop sign is seen as "risky" or "very risky" by a narrow majority of bicyclists. Close to three-quarters of bicyclists feel the same way about stopping for a red traffic light. Bicyclists associated riding at night without a headlight as having about the same levels of risk as for not stopping for a red traffic light. Nearly a third of bicyclists associated no risk with riding at night with a headlight (Figure 61, left).

Risk regarding headlights or not (Figure 62, below) and not stopping for a red light (Figure 63, at bottom), show a clear progression across area types, with considerably less risk felt among CBD/Fringe bicyclists. There is no such progression regarding stopping at stop signs, although CBD/Fringe bicyclists see considerably less risk in violating that law than do bicyclists surveyed in other area types.

Figure 61

Bicyclists' perception of risk: safety infractions

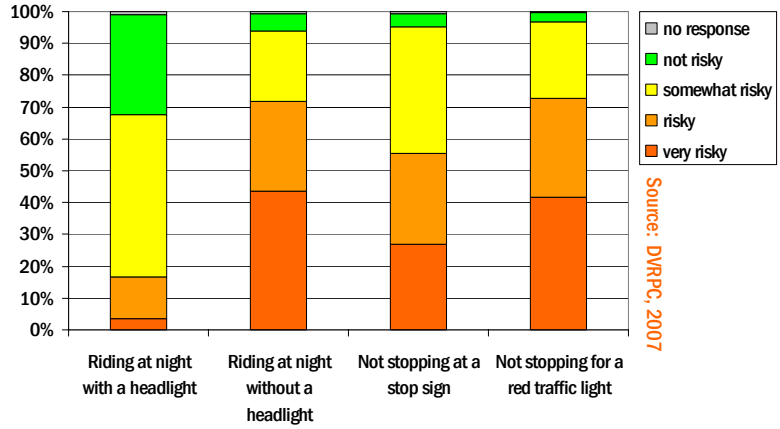


Figure 62

Risk from riding at night with and without headlight by area type

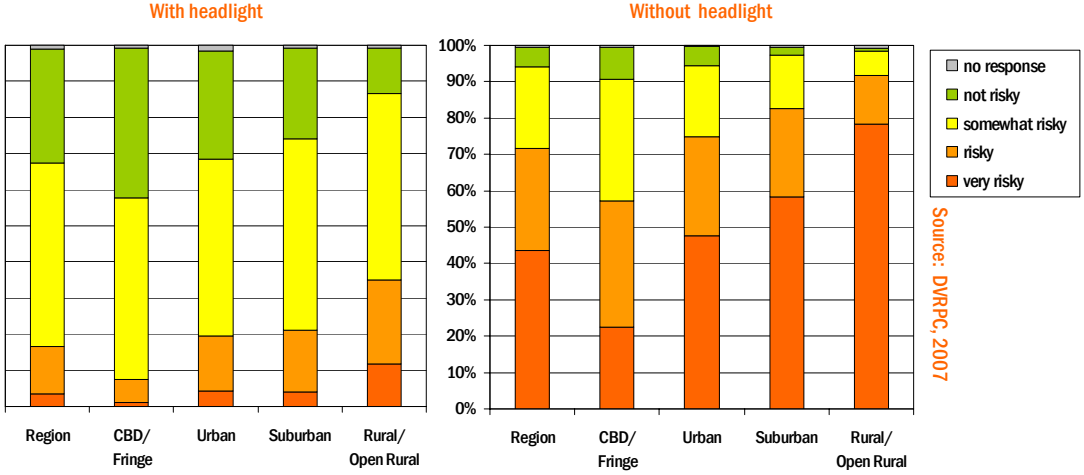
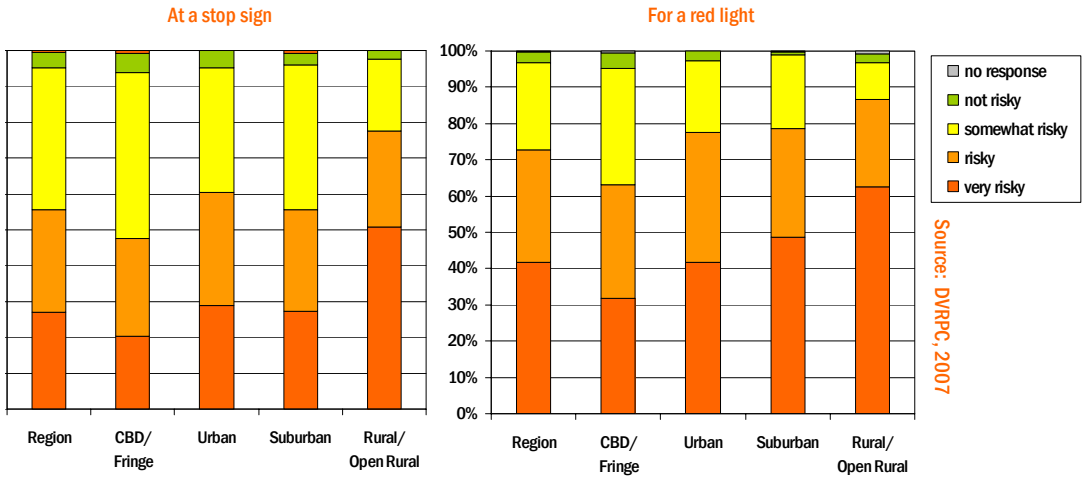


Figure 63

Risk from failing to stop by area type



4.5 What do bicyclists want? Policy preferences

Facilities

Bicyclists show a stronger preference for bike lanes than for any other facility type. More than four in five indicated that they were "important" or "very important" in encouraging them to bike more often; bicyclists that viewed them as "very important" were almost 60 percent of all respondents. Next in preference are wide shoulders and wide travel lanes, showing cumulative "important" and "very important" responses of 80 percent and 72 percent, respectively. However, wide shoulders and travel lanes were seen by fewer bicyclists as "very important" than were sidepaths or greenway trails. Those types of facilities were each seen as "very important" by approximately 45 percent of all respondents. In no case did more than 18 percent of bicyclists view any facility as "not important"; nor did fewer than 51 percent of bicyclists view any facility as "important" or "very important." The non-response rate was very low (Figure 64, below).

The importance ascribed to wide travel lanes and wide shoulders showed the greatest variation across area types (Figure 65, next page, top). CBD/Fringe bicyclists gave them the least importance, with roughly 30 percent of them believing them to be "very important." The percentages rise across Urban to Suburban, where they are 40 percent for wide travel lanes and 47 percent for wide shoulders. Roughly 65 percent of CBD/Fringe bicyclists see bike lanes as "very important"; that percentage drops to 55 and 58 percent among Urban and Suburban bicyclists, respectively. Only slight variation is seen across area types regarding the importance of sidepaths and greenway trails; however, CBD/Fringe bicyclists view greenway trails as somewhat less important than do bicyclists elsewhere (Figure 66, next page, center).

"Share the Road" warning signs are viewed with slightly decreasing importance across area types, with those viewing them as "very important" dropping from 30 percent in CBD/Fringe to 23 percent of Suburban bicyclists (Figure 67, next page, at bottom).

Figure 64

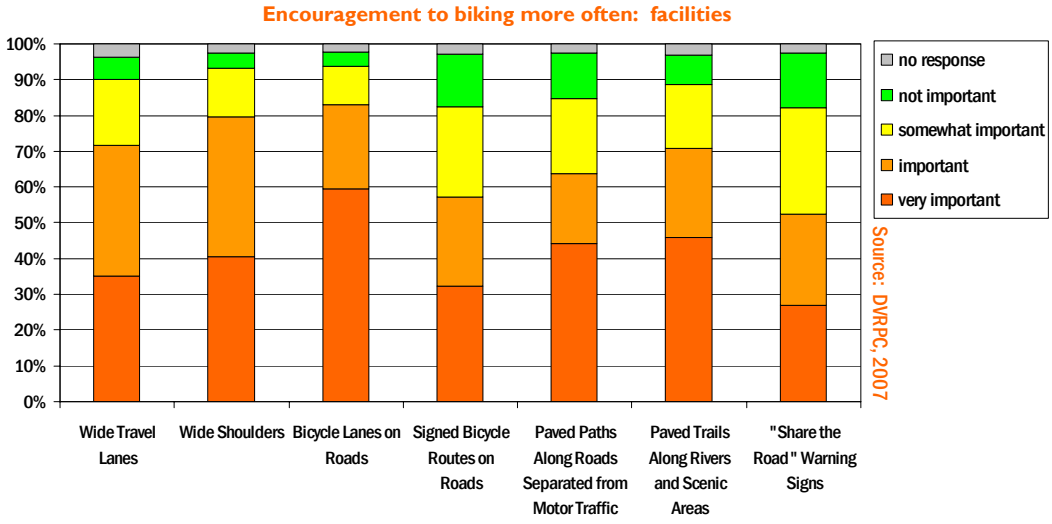


Figure 65

Wide travel lanes and wide shoulders as encouragement by area type

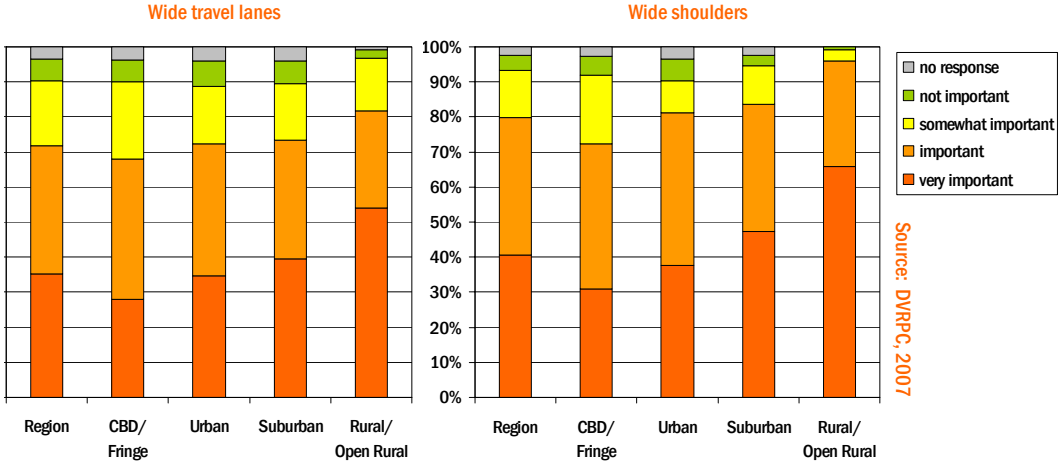


Figure 66

Sidepaths and greenway trails as encouragement by area type

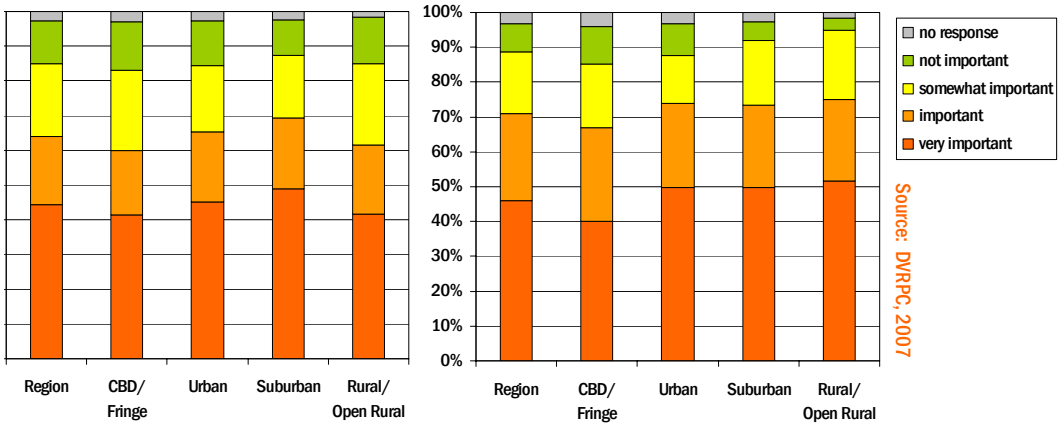
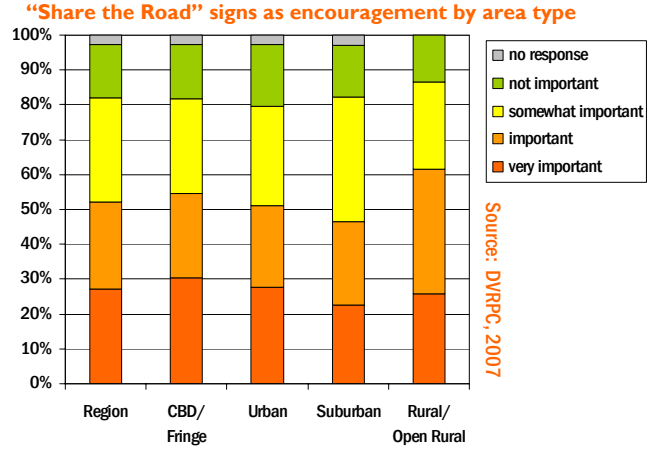


Figure 67

"Share the Road" signs as encouragement by area type



Education and enforcement

Three out of four bicyclists feel that the education of motorists about bicycling is either "important" or "very important" as a condition for riding more often, with nearly 50 percent feeling that it is "very important." Just over 60 percent of bicyclists ascribe the same levels of importance to the increased enforcement of traffic laws. Fewer than half of all bicyclists see the education of bicyclists on how to deal with drivers as important or very important; nearly 20 percent give it no importance (Figure 68).

Response to the question of bicyclist education mildly correlates with area type, with slightly fewer CBD/Fringe bicyclists giving it moderate or high importance than their Urban or Suburban counterparts.

Figure 68

Encouragement to biking more often: education and enforcement

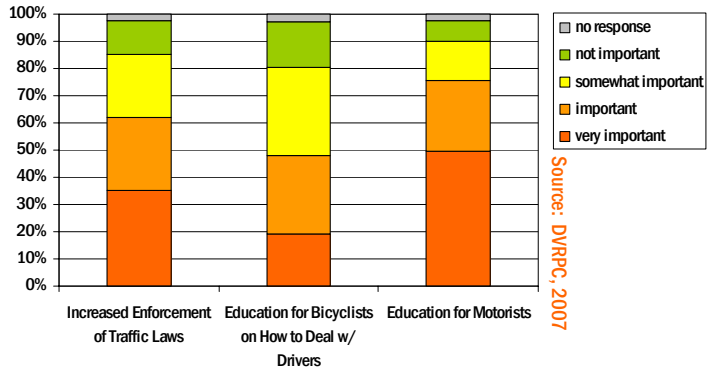
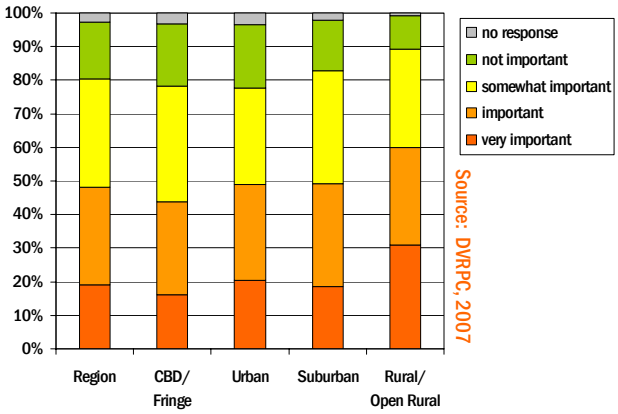


Figure 69

Bicyclist education as encouragement by area type



Amenities and other factors

More than 70 percent of Delaware Valley bicyclists gave moderate to high importance to secure bicycle parking as an inducement to bike more. Slightly more than 50 percent gave high importance to more trail amenities. Shower and changing facilities at the workplace, less criminal activity, increased driving costs and increased transit fares were all seen as important or very important by fewer than half of the region's bicyclists (Figure 70, below).

As might be expected, secure bicycle parking and increased transit fares are valued differently across area types, with greater importance placed on them by CBD/Fringe bicyclists and their importance declining across the area type spectrum (Figure 71, at bottom). These variations are relatively slight, however.

Figure 70

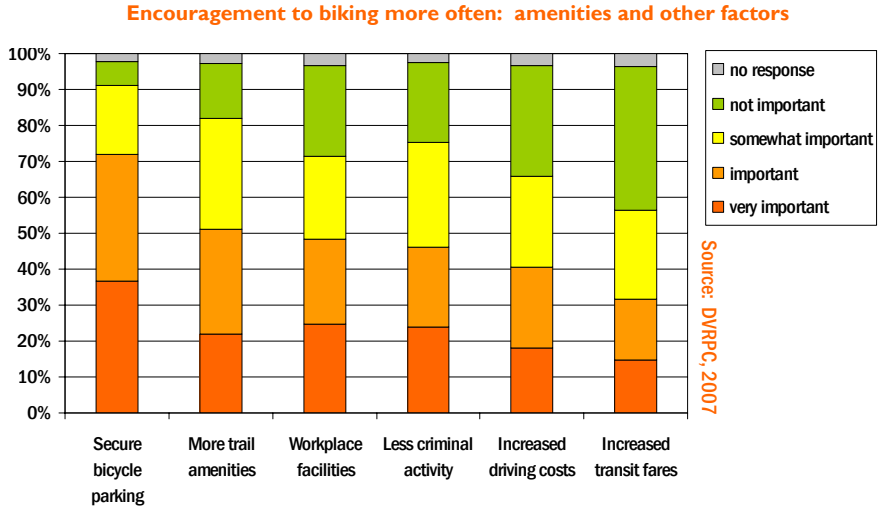
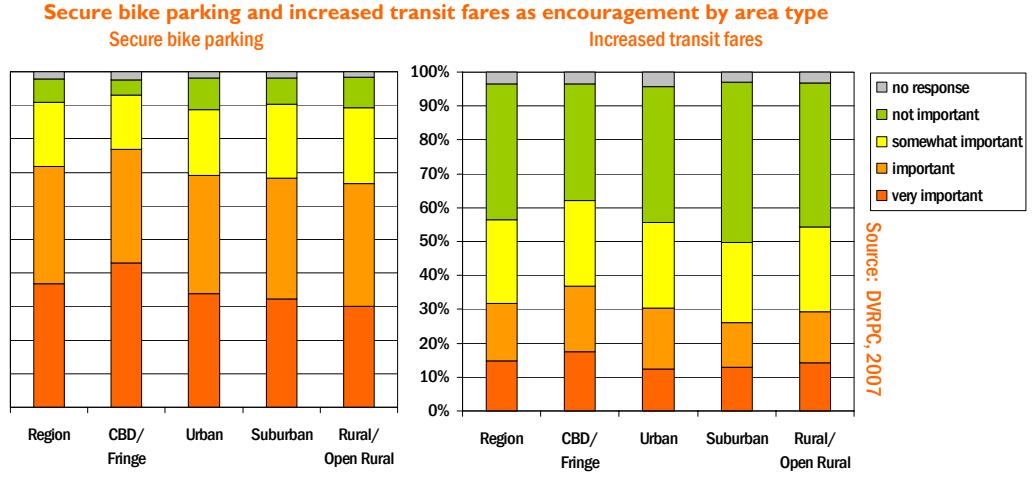


Figure 71



4.6 Open-ended comments

Space was provided at the end of the questionnaire for written comments and suggestions. A total of 407 bicyclists, one-third of all respondents, wrote comments.

Appreciation or gratitude was expressed in 29 percent of the comments for the survey, the gifts or both. Comments about motorists, and in particular the problems presented to bicyclists by inconsiderate drivers, comprised 17 percent of all comments. Bike lanes (appreciation of, desire for more, motorist lack of respect for, need for enforcement) were mentioned in 16 percent of the comments; trails (more paths and trails in general; praise and appreciation for specific trails and the Schuylkill River Trail in particular) were mentioned in 14 percent of the comments.

Photo: John Boyle

5. Conclusions

Comparison with other surveys

Much of the findings presented here are generally consistent with data from other metropolitan and national surveys taken in the US and abroad. There are many notable exceptions, however. Trips for work commuting and exercise and recreation are a combined total of 64 percent of bicycle trips in the Delaware Valley, compared to 65 percent in the nation; however, broken down, work commutes represent a greater share of bike trips here than in the nation, 29 percent versus 16 percent. Trips for social visits are six percent locally versus five percent nationally; trips for shopping and personal errands are 15 percent of all bike trips here, but 22 percent nationally.[10]

The average trip length in the Delaware Valley, 7.5 miles,[11] is nearly double the national average of 3.9 miles.[12] Trips taken for exercise or recreation here are more than twice as long as the national average, 12.6 versus 5.6 miles. At 4.4 miles, the regional average for non-recreational trips is twice the national average of 2.2 miles. The average typical trip lengths reported in the mail-back questionnaires are marginally shorter than those recorded during the interviews: 5.8 miles for all trips, 11.5 miles for exercise and recreation and 3.9 miles for other purposes.

The trip data obtained through roadside interviews found bicycle trip durations somewhat longer than those reported in the Year 2000 Delaware Valley Regional Household Travel Survey (HTS). The survey recorded an average duration for home-based work commutes of 30.2 minutes, marginally longer than the 28.8 minute average found in the HTS. The average duration of bicycle trips of any purpose (excluding home-to-home trips primarily for exercise and recreation) is 29.6 minutes, compared with 18.6 minutes found in the HTS. For home-based non-work trips, the averages are 15.7 minutes (bike survey) versus 16.9 minutes (HTS). The average durations for non-home based trips diverge markedly: 60.1 minutes and 13.8 minutes in the bike survey and the HTS respectively. Included in the bike survey average are some leisurely tours without pre-planned stops; several work-related trips where the trip time is recorded as the entire work shift; and a significant number of long recreational rides.

Perhaps the most interesting and relevant comparisons are with other large metropolitan areas. Compared with the regional 28 percent of bicycle trips, the journey to work comprises 48 percent of bicycle trips in London.[13] Melbourne, Australia, provides an interesting comparison.[14] Trips destined for home are roughly the same percentage here as in Melbourne, Australia (35 percent), where the ratio of male to female bicyclists is also similar; moreover, the male/female ratio is lower (more equitable) in the central part of the metropolitan region, similar to the Delaware Valley. However, bicyclist average age displays the opposite pattern: whereas here the average age of adult bicyclists increases with distance from the CBD, the opposite is true in Melbourne. Bicyclist household income in Melbourne is

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[10] Federal Highway Administration, *2001 National Household Travel Survey (NHTS)*

[11] Exclusive of trips involving use of transit or private motor vehicle for part of the trip.

[12] National Highway Traffic Safety Administration (NHTSA) and Bureau of Transportation Statistics (BTS), USDOT, *National Survey of Pedestrian and Bicyclist Attitudes and Behaviors,* 2002

[13] *Creating a Chain Reaction: the London Cycling Action Plan.* London: Transport for London, February 2004, 12.

[14] *Cycling in Melbourne: Ownership, Use and Demographics.* Kew, Victoria, Australia: VicRoads, 1999.

about the same as for the general population; whereas in both the Delaware Valley and London, adults with lower incomes are less likely to bicycle than those with higher incomes.

A national survey of adult bicyclists conducted in 1998 found that 9 percent reported having had a serious crash (involving medical expense or at least $50 in property damage) during the previous year.[15] This is comparable with the experience of the region's bicyclists, 11 percent of whom reported having gone to a hospital for treatment of crash-related injuries during the preceding 12 months.

Main finding: density matters

A system of area type classification of traffic analysis zones developed for travel demand modeling proved useful in interpreting the survey data. As a reflection of population and employment density, area type proved to be a powerful predictor of responses to many questions, and hence a potent tool for the analysis of the survey data.

The key variable relating to utilitarian bicycling appears to be density. Density of jobs and housing is inversely related to motor vehicle speeds and directly related to the cost of parking. As density increases, the advantages of motor vehicle travel over bicycle travel, as measured by speed, convenience and cost diminish; and bicycling becomes an increasingly convenient option for more people.

The true picture may be a bit more complex. Responses to the majority of both the interview and mail-back questions show a relationship with area type, and hence density, including age/sex distribution, household income, reasons for biking, impediments to more biking, safe riding behavior, helmet use and policy preferences. The relationship between density, sociodemographics and bicycling calls for further analysis.

Topics for further analysis

The rich volume of data collected during the 2005 Philadelphia Metropolitan Bicycle Travel Survey is fertile ground for inquiry. The data can provide answers to several important questions deserving of further investigation:

- Who is involved in crashes? Is there a relationship between factors like self-reported unsafe behavior (e.g. frequency of running a red light) or miles ridden per month and crash involvement? What measures are practical in reducing crashes?
- How do the genders differ in their attitudes, behavior and preferences? Why do more men than women ride? What measures can be taken to increase bicycle use among women?
- How do trail users differ from other bicyclists? To what degree are trails used for utilitarian trips?
- How do the results from random telephone surveys, such as the regional household travel survey, differ from those of intercept surveys such as this one? Do intercept surveys have a built-in bias toward longer trips and more frequent bicyclists? Can this bias be quantified?

The data collected may be sufficient for the development of a tentative bicycling demand model which could predict bicycle trips at the traffic analysis zone level. Other unpublished work by DVRPC shows a relationship between roadway Bicycle

[15] William E. Moritz, Ph.D., "Adult Bicyclists In The United States Characteristics And Riding Experience In 1996," TRB Preprint Paper, 1998

Level of Service (BLOS)[16] and bicycle crash frequency, suggesting that roads with a higher BLOS may tend to attract more bicycling. A sample of bicycle counts could establish and verify this relationship. Hence, the rudiments of trip generation and route assignment models, components of a predictive model of bicycle use for proposed facilities, are in place. Such a model, if developed, would be more robust than any available to date.

Conducting follow-up surveys on a regular schedule will enable planners to determine if their efforts are successful in increasing utilitarian bicycle travel and making it safer; and if not, why. Future surveys will also allow planners to keep current with the changing needs and desires of bicyclists.

[16] See Landis, Bruce W. et. al., "Real Time Human Perceptions: Toward a Bicycle Level of Service." *Transportation Research Record 1578,* Transportation Research Board, Washington DC, 1997, p. 127.

Appendix A

Survey site characteristics

Appendix A: Survey site characteristics

Phase I Intercept sites

Loc. No	Day	Date	LOCATION	Municipality	Area Type	County	Highway	Crash	Trail	Transit	Bike lanes	College	Scenic	Club ride
001	Sa	1-Oct	Edgewood Rd @ Oxford Valley Rd	Lower Makefield Twp	Suburban	Bucks			x					
002	Sa	1-Oct	Pemberton Tr @ Fort Dix Rd (CR 616)	Pemberton Boro	Rural/Open Rural	Burl			x			x	x	
004	Sa	1-Oct	Black Horse Pike @ Poplar St (US 322)	Monroe Twp	Suburban	Glo	x	x						
005	Sa	1-Oct	Perkiomen Tr @ E Main St	Collegeville Boro	Suburban	Mont			x					
006	Sa	1-Oct	Cobbs Cr Rec Path @ Baltimore Ave	Philadelphia City	Urban	Phila	x		x		x		x	
007	We	28-Sep	US 13 @ Newportville Rd	Bristol Twp	Suburban	Bucks	x	x						
008	We	28-Sep	E Main St @ Willow Bend Rd	Evesham Twp	Suburban	Burl	x				x			
009	We	28-Sep	New St @ Rosedale St	West Chester Boro	Urban	Chester	x					x		
010	We	28-Sep	Baltimore Pike @ Lansdowne Ave	Lansdowne Boro	Urban	Del	x	x						
011	We	28-Sep	Princeton Jct Sta/Princeton Sta	W Windsor Twp/Princeton Boro	Suburban	Mercer				x		x		
012	We	28-Sep	Lancaster Ave (SR 30) @ Ardmore Ave	Lower Merion Twp	Urban	Mont	x	x				x		
013	We	28-Sep	Ben Franklin Bridge N Walk PA entry	Philadelphia City	CBD/Fringe	Phila			x				x	
014	Th	6-Oct	St Mihiel St @ Fairview St	Riverside Boro	Suburban	Burl	x			x				
016	Th	6-Oct	P & W Trail @ Iven Ave	Radnor Twp	Suburban	Del			x					
017	Th	6-Oct	Nassau St (SR 27) @ Witherspoon St	Princeton Boro	Urban	Mercer	x	x				x		
018	Th	6-Oct	DeKalb St (SR 202) @ Johnson Hwy	Norristown Boro	Urban	Mont	x	x				x		
019	Th	6-Oct	South St @ Convention Ave	Philadelphia City	CBD/Fringe	Phila	x							
020	Fr	30-Sep	D & L Canal Tr @ Woodside Rd	Lower Makefield Twp	Rural/Open Rural	Bucks			x				x	
021	Fr	30-Sep	Walter Rand TC	Camden City	CBD/Fringe	Camden	x	x		x		x		
121	Fr	30-Sep	Haddonfield PATCO	Haddonfield Boro	Suburban	Camden				x				
022	Fr	30-Sep	Swarthmore Sta	Swarthmore Boro	Suburban	Del	x			x		x		
122	Fr	30-Sep	Yale Ave @ Park Ave	Swarthmore Boro	Suburban	Del	x							
023	Fr	30-Sep	Broad St (SR 45) @ Delaware St	Woodbury City	Suburban	Glo	x	x						
024	Fr	30-Sep	Schuylkill R Tr @ Norristown TC	Norristown Boro	Urban	Mont			x	x				
025	Fr	30-Sep	Schuylkill R Tr @ Lloyd Hall	Philadelphia City	Suburban	Phila			x					

Appendix A: Survey site characteristics (continued)

026	Tu	4-Oct	New Falls Rd & Woodbourne Rd	Bristol Twp	Suburban	Bucks	x	x						
027	Tu	4-Oct	River Rd @ Cinnaminson Ave	Palmyra Boro	Suburban	Burl			x					
029	Tu	4-Oct	Mullica Hill Rd (US 322) @ Rowan U	Glassboro Boro	Suburban	Glo	x					x		
030	Tu	4-Oct	Broad St (US 206) @ Hamilton Ave	Trenton City	CBD/Fringe	Mercer	x	x						
031	Tu	4-Oct	Washington Ave @ 10th St	Philadelphia City	Urban	Phila	x	x			x			
032	Tu	4-Oct	Walnut St @ 18th St	Philadelphia City	CBD/Fringe	Phila	x					x	x	
033	Sa	8-Oct	North Park Dr @ Cuthbert Blvd	Cherry Hill Twp	Urban	Camden	x							
034	Sa	8-Oct	Forge Rd @ Painter Rd, Ridley Cr SP	Edgmont Twp	Rural/Open Rural	Del			x				x	
036	Sa	8-Oct	Spring Garden St @ 4th St	Philadelphia City	CBD/Fringe	Phila	x				x			
037	Sa	8-Oct	Chestnut St @ 9th St	Philadelphia City	CBD/Fringe	Phila	x				x	x		
038	Sa	8-Oct	Snyder Ave (SR 2002) @ 9th St	Philadelphia City	Urban	Phila	x	x			x			

Source: DVRPC, 2007

Appendix A: Survey site characteristics (continued)

Phase 2 Distribution areas

Loc. No	Date	DISTRIBUTION AREAS	Area Type	County	Highway	Crash	Transit	College	Club ride
101	6-Nov	CBBC rides	Rural/Open Rural	Bucks	x				x
102	4-Nov	West Chester CBD; WCU campus	Suburban	Chester	x				
103	5-Nov	DVBC rides	Suburban	Chester	x				x
104	4-Nov	69th St; Main Line colleges	Urban	Del	x				
105	6-Nov	DVBC rides	Suburban	Del	x				x
106	4-Nov	Tyler School of Art; Arcadia U; Jenkintown; Ambler	Suburban	Mont	x		x	x	
107	6-Nov	SBU rides	Suburban	Mont	x				x
108	1-Nov	Center City	CBD/Fringe	Phila	x	x			
109	1-Nov	University City	CBD/Fringe	Phila	x	x	x	x	
110	3-Nov	Main St Manayunk; 52nd St; Frankford Ave; Calle de Oro (Fairhill); South St; Bella Vista	Urban	Phila	x				
111	6-Nov	Phila ride	Urban	Phila	x				x
201	6-Nov	OCSJ rides, Medford area	Rural/Open Rural	Burl	x				x
202	2-Nov	Rail stations, business districts, US 30/Haddon Ave, Atco-Collingswood	Suburban	Camden	x	x	x		
203	6-Nov	OCSJ ride, Cherry Hill	Suburban	Camden	x				x
205	2-Nov	Trenton CBD; Greenwood Ave; Trenton, Hamilton rail stations	Urban	Mercer	x		x		

Source: DVRPC, 2007

CBBC – Central Bucks Bicycle Club
DVBC – Delaware Valley Bicycle Club
OCSJ – Outdoor Club of South Jersey
SBU – Suburban Bicyclists Unlimited

Appendix B

Roadside interview response rates

Appendix B: Roadside interview response rates

Area Type	Interview target	Interviews conducted	Response rate	Pct. of total
CBD/Fringe	80	109	136%	29%
Urban	85	103	121%	28%
Suburban	85	117	138%	31%
Rural/Open Rural	30	43	143%	12%
Total	280	372	133%	100%

County				
Bucks	15	32	213%	9%
Burlington	15	21	140%	6%
Camden	25	20	80%	5%
Chester	20	3	15%	1%
Delaware	25	65	260%	17%
Gloucester	20	24	120%	6%
Mercer	30	20	67%	5%
Montgomery	20	39	195%	10%
Philadelphia	110	148	135%	40%
Total	280	372	133%	100%

Weekday/weekend				
Weekday	180	270	150%	73%
Saturday	100	102	102%	27%

Source: DVRPC, 2007

Appendix C

Mail-back questionnaire response rates

Appendix C: Mail-back questionnaire response rates

County	Distribution target	Questionnaires distributed	Questionnaires returned	Percent of target returned	Response rate	Pct. of total
Bucks	312	105	58	19%	55%	5%
Burlington	313	129	52	17%	40%	4%
Camden	470	299	51	11%	17%	4%
Chester	363	82	21	6%	26%	2%
Delaware	631	212	108	17%	51%	9%
Gloucester	180	59	2	1%	3%	0%
Mercer	645	309	69	11%	22%	6%
Montgomery	585	398	131	22%	33%	11%
Philadelphia	3520	2632	735	21%	28%	60%
Total	7019	4225	1227	17%	29%	100%
Phase						
1	4500	2605	780	17%	30%	64%
2	2519	1620	447	18%	28%	36%
Weekday/weekend						
Weekend	1962	937	300	15%	32%	24%
Weekday	5057	3288	927	18%	28%	76%
Area Type						
CBD/Fringe	2514	2033	498	20%	24%	41%
Urban	2021	1044	250	12%	24%	20%
Suburban	1694	886	359	21%	41%	29%
Rural/Open Rural	310	245	120	39%	49%	10%

Area Type	Distribution target	Questionnaires distributed	Questionnaires returned	Percent of target returned	Response rate
On or near a multi-use trail					
CBD/Fringe	80	34	11	14%	32%
Urban	260	216	57	22%	26%
Suburban	620	475	229	37%	48%
Rural/Open Rural	390	123	59	15%	48%
Total	1350	848	356	26%	42%
Near a college or university					
CBD/Fringe	1205	861	246	20%	29%
Urban	420	234	52	12%	22%
Suburban	305	199	38	12%	19%
Rural/Open Rural	60	29	3	5%	10%
Total	1990	1323	339	17%	26%

Source: DVRPC, 2007

Appendix C: Mail-back questionnaire response rates (continued)

Area Type	Distribution target	Questionnaires distributed	Questionnaires returned	Percent of target returned	Response rate
Locations with history of crashes involving bicyclists					
CBD/Fringe	1554	1260	261	17%	21%
Urban	780	529	129	17%	24%
Suburban	120	72	22	18%	31%
Total	2454	1861	412	17%	22%
Club rides					
Urban	6	Unknown	3	50%	Unknown
Suburban	141	103	36	26%	35%
Rural/Open Rural	145	122	61	42%	50%
Total	292	225	100	34%	44%
Roads with bike lanes					
CBD/Fringe	400	220	71	18%	32%
Urban	460	359	65	14%	18%
Total	860	579	136	16%	23%

Source: DVRPC, 2007

Appendix D

Roadside interview response tabulations

Appendix D: Roadside interview response tabulations

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q4: What is the main purpose of this trip?										
Not recorded	1	0%	0	0%	0	0%	1	1%	0	0%
Exercise or recreation	131	35%	11	10%	36	35%	46	39%	38	88%
Other	13	3%	2	2%	5	5%	4	3%	2	5%
School commute	23	6%	6	6%	2	2%	15	13%	0	0%
Shopping, appointments, errands	55	15%	18	17%	25	24%	10	9%	2	5%
Social visit	19	5%	8	7%	5	5%	5	4%	1	2%
Work commute	107	29%	48	44%	25	24%	34	29%	0	0%
Work-related (on-the-job)	23	6%	16	15%	5	5%	2	2%	0	0%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%
Q5: Where did you start this trip?										
Factory/warehouse	6	2%	0	0%	0	0%	6	5%	0	0%
Grocery/drug/convenience store	4	1%	2	2%	2	2%	0	0%	0	0%
Home	245	66%	74	68%	72	70%	70	60%	29	67%
Mall/strip mall/shopping center	4	1%	1	1%	3	3%	0	0%	0	0%
Office building	32	9%	16	15%	7	7%	8	7%	1	2%
Other	11	3%	3	3%	3	3%	4	3%	1	2%
Park/field	31	8%	1	1%	5	5%	14	12%	11	26%
Restaurant	3	1%	0	0%	2	2%	1	1%	0	0%
School/campus	28	8%	9	8%	5	5%	13	11%	1	2%
Someone else's home	5	1%	0	0%	4	4%	1	1%	0	0%
Train/subway/bus station	3	1%	3	3%	0	0%	0	0%	0	0%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%
Q6: What is your destination?										
Factory/warehouse	14	4%	7	6%	2	2%	5	4%	0	0%
Grocery/drug/convenience store	12	3%	5	5%	4	4%	3	3%	0	0%
Home	147	40%	21	19%	44	43%	55	47%	27	63%
Mall/strip mall/shopping center	19	5%	5	5%	11	11%	3	3%	0	0%
Office building	41	11%	20	18%	10	10%	10	9%	1	2%
Other	35	9%	16	15%	11	11%	7	6%	1	2%
Park/field	53	14%	16	15%	8	8%	16	14%	13	30%
Restaurant	11	3%	7	6%	4	4%	0	0%	0	0%
School/campus	24	6%	10	9%	6	6%	7	6%	1	2%
Someone else's home	9	2%	2	2%	3	3%	4	3%	0	0%
Train/subway/bus station	7	2%	0	0%	0	0%	7	6%	0	0%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%

Source: DVRPC, 2007

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q7: In the past month, about how often did you ride here?										
Daily or almost daily	161	43%	65	60%	49	48%	42	36%	5	12%
10-20 times	59	16%	9	8%	19	18%	22	19%	9	21%
6-10 times	54	15%	8	7%	14	14%	24	21%	8	19%
1-5 times	70	19%	15	14%	16	16%	21	18%	18	42%
First time	28	8%	12	11%	5	5%	8	7%	3	7%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%
Q8: Did or will you take your bicycle on board a bus or train during part of your trip?										
TRUE	44	12%	28	26%	5	5%	11	9%	0	0%
FALSE	328	88%	81	74%	98	95%	106	91%	43	100%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%
Q8a: If yes, on which carrier?										
None	329	88%	82	75%	98	95%	106	91%	43	100%
NJT	17	5%	8	7%	0	0%	9	8%	0	0%
Other	2	1%	2	2%	0	0%	0	0%	0	0%
PATCO	7	2%	5	5%	2	2%	0	0%	0	0%
SEPTA	17	5%	12	11%	3	3%	2	2%	0	0%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%
Q9: Did you first carry your bike via private motor vehicle to the location where you began your bike trip, for example to a trailhead parking area?										
TRUE	45	12%	7	6%	12	12%	13	11%	13	30%
FALSE	327	88%	102	94%	91	88%	104	89%	30	70%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%
Q10: How long does this one-way bicycle trip typically take?	Miles, mean	Minutes, mean	Miles, mean	Minutes, mean	Miles, mean	Minutes, mean	Miles, mean	Minutes, mean	Miles, mean	Minutes, mean
Not recorded	12.0	180.0	ND	ND	ND	ND	12.0	180.0	ND	ND
Exercise or recreation	12.6	76.1	10.9	46.1	13.2	68.2	9.6	87.8	16.2	77.8
Other	15.7	69.3	2.1	77.5	2.0	12.2	4.9	13.8	85.0	315.0
School commute	2.4	14.7	4.0	22.5	5.0	31.5	1.4	9.4	ND	ND
Shopping, appointments, errands	2.4	24.3	3.2	36.4	1.4	14.0	3.6	29.5	1.5	17.5
Social visit	5.7	29.7	9.6	50.3	1.6	14.0	4.3	15.6	2.0	15.0
Work commute	5.5	28.6	6.8	34.4	5.1	24.2	4.1	23.3	ND	ND
Work-related (on-the-job)	3.1	30.2	3.3	34.4	3.0	24.0	1.9	12.5	ND	ND

Source: DVRPC, 2007

Appendix D: Roadside interview response tabulations (continued)

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q11: Gender										
Not recorded	7	2%	4	4%	0	0%	1	1%	2	5%
Female	81	22%	26	24%	23	22%	23	20%	9	21%
Male	284	76%	79	72%	80	78%	93	79%	32	74%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%
Q12: Riding wrong way										
Not recorded	44	12%	26	24%	2	2%	15	13%	1	2%
No	279	75%	71	65%	79	77%	89	76%	40	93%
Yes	49	13%	12	11%	22	21%	13	11%	2	5%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%
Q13: Riding on sidewalk										
Not recorded	85	23%	40	37%	12	12%	22	19%	11	26%
No	178	48%	29	27%	49	48%	68	58%	32	74%
Yes	109	29%	40	37%	42	41%	27	23%	0	0%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%
Q15: Wearing helmet										
Yes	159	43%	42	39%	42	41%	51	44%	24	56%
No	213	57%	67	61%	61	59%	66	56%	19	44%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%
Q17: Type of bike										
Not recorded	6	2%	1	1%	1	1%	3	3%	1	2%
BMX/Freestyle	13	3%	3	3%	7	7%	3	3%	0	0%
Comfort/city/hybrid	120	32%	36	33%	36	35%	38	32%	10	23%
Folder	3	1%	0	0%	1	1%	2	2%	0	0%
Mountain	106	28%	28	26%	20	19%	42	36%	16	37%
Other (specify)	1	0%	0	0%	0	0%	1	1%	0	0%
Recumbent	2	1%	1	1%	1	1%	0	0%	0	0%
Tandem	1	0%	0	0%	0	0%	1	1%	0	0%
Touring/road	101	27%	30	28%	31	30%	24	21%	16	37%
Track	19	5%	10	9%	6	6%	3	3%	0	0%
TOTAL	372	100%	109	100%	103	100%	117	100%	43	100%

Source: DVRPC, 2007

Appendix E

Mail-back questionnaire response tabulations

Appendix E: Mail-back questionnaire response tabulations

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q1: Where did you start the trip you were making when you received this questionnaire? Check one.										
Factory/warehouse	7	1%	1	0%	1	0%	5	1%	0	0%
Grocery/drugstore/convenience store	11	1%	3	1%	8	3%	0	0%	0	0%
Home	756	62%	324	65%	152	61%	225	63%	55	46%
Mall/strip mall/shopping center	19	2%	5	1%	1	0%	13	4%	0	0%
No response	10	1%	3	1%	3	1%	3	1%	1	1%
Office building	97	8%	60	12%	21	8%	16	4%	0	0%
Other	77	6%	20	4%	13	5%	21	6%	23	19%
Park/playground/ballfield	95	8%	5	1%	19	8%	40	11%	31	26%
Restaurant	16	1%	6	1%	7	3%	3	1%	0	0%
School/campus	85	7%	50	10%	9	4%	19	5%	7	6%
Someone else's home	21	2%	9	2%	6	2%	3	1%	3	3%
Train/subway/bus station	33	3%	12	2%	10	4%	11	3%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q2: Where did you end this trip? Check one.										
Factory/warehouse	11	1%	4	1%	4	2%	3	1%	0	0%
Grocery/drugstore/convenience store	23	2%	8	2%	10	4%	4	1%	1	1%
Home	433	35%	146	29%	104	42%	131	36%	52	43%
Mall/strip mall/shopping center	23	2%	7	1%	5	2%	10	3%	1	1%
No response	11	1%	3	1%	3	1%	3	1%	2	2%
Office building	239	19%	147	30%	27	11%	64	18%	1	1%
Other	118	10%	45	9%	18	7%	36	10%	19	16%
Park/playground/ballfield	110	9%	15	3%	24	10%	39	11%	32	27%
Restaurant	32	3%	16	3%	10	4%	6	2%	0	0%
School/campus	132	11%	73	15%	24	10%	26	7%	9	8%
Someone else's home	34	3%	12	2%	8	3%	11	3%	3	3%
Train/subway/bus station	61	5%	22	4%	13	5%	26	7%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q3: In the past month, about how often did you ride in the location where you received this questionnaire?										
Daily or almost daily	441	36%	235	47%	94	38%	107	30%	5	4%
11-20 times	197	16%	76	15%	38	15%	72	20%	11	9%
6-10 times	168	14%	63	13%	33	13%	53	15%	19	16%
2-5 times	242	20%	69	14%	54	22%	72	20%	47	39%
First time	154	13%	49	10%	24	10%	49	14%	32	27%
No response	25	2%	6	1%	7	3%	6	2%	6	5%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q4: Why did you choose the route you did as opposed to riding somewhere else? Check all that apply.										
Most direct	643	52%	347	70%	132	53%	151	42%	13	11%
Scenic/pleasant	448	37%	70	14%	76	30%	228	64%	74	62%
Less fear of collision	331	27%	116	23%	57	23%	134	37%	24	20%
Fewer hillls	64	5%	11	2%	16	6%	32	9%	5	4%
No alternative	49	4%	24	5%	8	3%	11	3%	6	5%
Off-road	149	12%	5	1%	30	12%	104	29%	10	8%
Less traffic	307	25%	83	17%	66	26%	112	31%	46	38%
Less fear of crime	59	5%	17	3%	17	7%	22	6%	3	3%
Bike lanes	315	26%	139	28%	64	26%	99	28%	13	11%
Other	137	11%	44	9%	27	11%	39	11%	27	23%
No response	8	1%	3	1%	1	0%	3	1%	1	1%
Q5: How many bicycles do you and other members of your household own?										
0	5	0%	2	0%	1	0%	0	0%	2	2%
1	208	17%	101	20%	53	21%	45	13%	9	8%
2	314	26%	160	32%	56	22%	73	20%	25	21%
3 or more	690	56%	231	46%	139	56%	238	66%	82	68%
No response	10	1%	4	1%	1	0%	3	1%	2	2%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q6: How many bicycles do you and other members of your household age 16 years and older own?										
0	30	2%	15	3%	6	2%	5	1%	4	3%
1	205	17%	96	19%	51	20%	48	13%	10	8%
2	356	29%	165	33%	66	26%	95	26%	30	25%
3 or more	604	49%	214	43%	114	46%	202	56%	74	62%
No response	32	3%	8	2%	13	5%	9	3%	2	2%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q7: Why do you ride your bicycle, instead of taking some other form of transportation? Check all that apply.										
Avoid traffic congestion	529	43%	267	54%	110	44%	135	38%	17	14%
Fitness/health	1073	87%	410	82%	213	85%	336	94%	114	95%
Enjoyment or recreation	905	74%	333	67%	185	74%	290	81%	97	81%
No public transportation	94	8%	58	12%	17	7%	15	4%	4	3%
Don't have a car	306	25%	183	37%	63	25%	59	16%	1	1%
Environmental concerns	584	48%	282	57%	125	50%	152	42%	25	21%
Saves time	597	49%	364	73%	120	48%	108	30%	5	4%
Saves money	711	58%	389	78%	142	57%	163	45%	17	14%
Other (specify)	145	12%	81	16%	25	10%	32	9%	7	6%

Source: DVRPC, 2007

Q8: During the past month, how often did you use your bicycle for each of the following purposes?

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Commuting to work										
Daily or almost daily	444	36%	258	52%	89	36%	95	26%	2	2%
10-20 times	138	11%	75	15%	23	9%	36	10%	4	3%
1-9 times	145	12%	63	13%	28	11%	43	12%	11	9%
Never	347	28%	58	12%	77	31%	134	37%	78	65%
No response	153	12%	44	9%	33	13%	51	14%	25	21%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Commuting to school										
Daily or almost daily	145	12%	98	20%	23	9%	22	6%	2	2%
10-20 times	28	2%	17	3%	4	2%	7	2%	0	0%
1-9 times	50	4%	25	5%	16	6%	9	3%	0	0%
Never	579	47%	184	37%	115	46%	196	55%	84	70%
No response	425	35%	174	35%	92	37%	125	35%	34	28%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Connecting with transit										
Daily or almost daily	52	4%	26	5%	5	2%	20	6%	1	1%
10-20 times	34	3%	15	3%	7	3%	11	3%	1	1%
1-9 times	173	14%	95	19%	29	12%	44	12%	5	4%
Never	576	47%	200	40%	118	47%	177	49%	81	68%
No response	392	32%	162	33%	91	36%	107	30%	32	27%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Work-related (on-the-job)										
Daily or almost daily	77	6%	54	11%	11	4%	12	3%	0	0%
10-20 times	33	3%	24	5%	5	2%	4	1%	0	0%
1-9 times	114	9%	72	14%	19	8%	21	6%	2	2%
Never	589	48%	189	38%	118	47%	196	55%	86	72%
No response	414	34%	159	32%	97	39%	126	35%	32	27%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Social visits										
Daily or almost daily	153	12%	101	20%	30	12%	20	6%	2	2%
10-20 times	144	12%	92	18%	34	14%	16	4%	2	2%
1-9 times	378	31%	153	31%	69	28%	120	33%	36	30%
Never	253	21%	55	11%	53	21%	97	27%	48	40%
No response	299	24%	97	19%	64	26%	106	30%	32	27%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Q8: During the past month, how often did you use your bicycle for each of the following purposes? (continued)

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Exercise or recreation										
Daily or almost daily	201	16%	82	16%	43	17%	61	17%	15	13%
10-20 times	273	22%	74	15%	58	23%	89	25%	52	43%
1-9 times	561	46%	235	47%	102	41%	174	48%	50	42%
Never	78	6%	53	11%	16	6%	7	2%	2	2%
No response	114	9%	54	11%	31	12%	28	8%	1	1%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Shopping, appointments, religious, errands										
Daily or almost daily	181	15%	106	21%	47	19%	28	8%	0	0%
10-20 times	176	14%	111	22%	34	14%	27	8%	4	3%
1-9 times	406	33%	178	36%	75	30%	121	34%	32	27%
Never	249	20%	45	9%	52	21%	100	28%	52	43%
No response	215	18%	58	12%	42	17%	83	23%	32	27%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Q8b: How long is your typical one-way bicycle trip?

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Commuting to work										
Time, minutes	24.83	636	19.63	341	24.56	126	34.31	157	51.42	12
Distance, miles	5.19	555	3.54	283	5.09	112	7.90	148	11.77	12
Commuting to school										
Time, minutes	17.64	182	16.66	113	16.49	35	22.70	33	20.00	1
Distance, miles	3.00	147	2.73	91	2.52	28	4.40	27	2.50	1
Connecting with transit										
Time, minutes	16.05	184	14.41	93	19.39	28	17.11	57	15.83	6
Distance, miles	2.76	167	2.45	83	2.77	25	3.26	54	2.54	5
Work-related (on-the-job)										
Time, minutes	25.13	136	22.85	87	24.67	21	29.33	27	120.00	1
Distance, miles	3.95	116	3.44	71	4.51	19	4.13	25	25.00	1
Social visits										
Time, minutes	31.04	446	22.28	221	22.91	91	40.76	106	89.79	28
Distance, miles	4.97	382	3.23	182	3.57	81	7.03	96	15.09	23

Source: DVRPC, 2007

Q8b: How long is your typical one-way bicycle trip?

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Exercise or recreation										
Time, minutes	77.59	576	73.72	246	84.31	112	74.14	175	96.28	43
Distance, miles	11.49	493	10.24	195	11.42	101	12.52	159	13.75	38
Shopping, appointments, religious, errands										
Time, minutes	26.28	509	24.20	260	27.86	105	27.11	124	39.80	20
Distance, miles	3.62	443	3.22	213	3.30	93	4.25	115	5.47	22

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q9: How many miles do you typically ride in a month, May through October? Check one.										
200 miles or more	404	33%	104	21%	79	32%	156	43%	65	54%
100 - 199 miles	289	24%	135	27%	54	22%	75	21%	25	21%
50 - 99 miles	261	21%	119	24%	61	24%	66	18%	15	13%
10 - 49 miles	216	18%	114	23%	39	16%	50	14%	13	11%
Less than 10 miles	33	3%	16	3%	7	3%	8	2%	2	2%
No response	24	2%	10	2%	10	4%	4	1%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q10: How many miles do you typically ride in a month, November through April? Check one.										
200 miles or more	174	14%	57	11%	31	12%	66	18%	20	17%
100 - 199 miles	213	17%	76	15%	42	17%	69	19%	26	22%
50 - 99 miles	279	23%	127	26%	59	24%	69	19%	24	20%
10 - 49 miles	342	28%	153	31%	75	30%	87	24%	27	23%
Less than 10 miles	176	14%	64	13%	33	13%	59	16%	20	17%
No response	43	4%	21	4%	10	4%	9	3%	3	3%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Q11: How often have you taken your bicycle aboard a train during the past month? Check one box for each train line listed below.

	SEPTA Regional Rail		Market-Frankford El or Broad Street Subway		Route 100 Norristown High Speed Line		NJ Transit River Line		NJ Transit Atlantic City or Northeast Corridor Line		PATCO High Speed Line	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
10-20 times	8	1%	7	1%	0	0%	5	0%	5	0%	6	0%
1-9 times	143	12%	93	8%	14	1%	41	3%	41	3%	80	7%
Daily or almost daily	6	0%	4	0%	0	0%	4	0%	1	0%	4	0%
Never	1034	84%	1080	88%	1154	94%	1131	92%	1127	92%	1097	89%
No response	36	3%	43	4%	73	6%	46	4%	53	4%	40	3%
TOTAL	1227	100%	1227	100%	1227	100%	1227	100%	1227	100%	1227	100%

Q12: During the past month, how many times have you taken your bicycle with you on a SEPTA, NJ Transit, or other bus, using the bike rack on the front of the bus, or the luggage compartment?

	SEPTA		NJ Transit		Other	
	Count	Percent	Count	Percent	Count	Percent
10-20 times	6	0%	6	0%	20	2%
1-9 times	85	7%	28	2%	12	1%
Daily or almost daily	4	0%	7	1%	1	0%
Never	1112	91%	1151	94%	989	81%
No response	20	2%	35	3%	205	17%
TOTAL	1227	100%	1227	100%	1227	100%

Source: DVRPC, 2007

AREA TYPE										
Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent

Q13: During the past year, have you been in a collision or fall while riding your bicycle? Check all that apply.

Yes, with a motor vehicle	172	14%	99	20%	37	15%	31	9%	5	4%
Yes, with a pedestrian	54	4%	33	7%	8	3%	13	4%	0	0%
Yes, with another bicyclist	71	6%	27	5%	14	5%	22	6%	8	7%
Yes, with an object/animal	187	15%	78	16%	39	16%	50	14%	20	17%
No	805	66%	305	61%	169	68%	246	69%	85	71%
No response	21	2%	6	1%	5	2%	8	2%	2	2%
Yes (any response)	401	33%	187	38%	76	30%	105	29%	33	28%
TOTAL	1227	100%	498	100%	249	100%	359	100%	120	100%

If you checked yes, how many accidents did you have?

1	237	59%	103	55%	40	53%	73	70%	21	64%
2	90	22%	41	22%	22	29%	21	20%	6	18%
3 or more	58	14%	34	18%	12	16%	6	6%	6	18%
No response	16	4%	9	5%	2	3%	5	5%	0	0%
TOTAL	401	100%	187	100%	76	100%	105	100%	33	100%

Did you go to a hospital emergency room for treatment of your injuries?

No	315	79%	153	82%	61	80%	75	71%	26	79%
Yes, once	59	15%	25	13%	10	13%	18	17%	6	18%
Yes, more than once	9	2%	0	0%	2	3%	6	6%	1	3%
No response	18	4%	9	5%	3	4%	6	6%	0	0%
TOTAL	401	100%	187	100%	76	100%	105	100%	33	100%

Q14: How often do you wear a helmet while riding your bicycle?

Always	676	55%	200	40%	131	52%	242	67%	103	86%
Sometimes	199	16%	113	23%	39	16%	43	12%	4	3%
Never	340	28%	181	36%	78	31%	69	19%	12	10%
No response	12	1%	4	1%	2	1%	5	1%	1	1%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Q15: How often do you ride at night, without a headlight?

Often	323	26%	213	43%	64	26%	41	11%	5	4%
Occasionally	306	25%	147	30%	65	26%	83	23%	11	9%
Never	588	48%	132	27%	118	47%	234	65%	104	87%
No response	10	1%	6	1%	3	1%	1	0%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Q16: Have you ever had formal instruction in school, or have taken a class, on bicycle safety, during which you rode on the street as part of the class experience?

Yes	105	9%	32	6%	19	8%	37	10%	17	14%
No	1122	91%	466	94%	231	92%	322	90%	103	86%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q17: What discourages you from riding your bicycle more often? Check all that apply.										
Unsafe road conditions	518	42%	197	40%	100	40%	166	46%	55	46%
Speed/volume of traffic	461	38%	164	33%	91	36%	157	44%	49	41%
Lack of bicycle lanes and trails	560	46%	220	44%	120	48%	167	47%	53	44%
No place to park bike securely	306	25%	133	27%	53	21%	91	25%	29	24%
Health problems	26	2%	14	3%	6	2%	5	1%	1	1%
Fear of crime	136	11%	76	15%	23	9%	32	9%	5	4%
Destinations are too far away	300	24%	142	29%	61	24%	75	21%	22	18%
Not enough time	271	22%	62	12%	59	24%	109	30%	41	34%
Weather conditions	737	60%	330	66%	146	58%	195	54%	66	55%
Lack of transit connections	57	5%	29	6%	7	3%	18	5%	3	3%
Too hilly	61	5%	27	5%	12	5%	19	5%	3	3%
Other	184	15%	88	18%	32	13%	49	14%	15	13%
No response	32	3%	16	3%	4	2%	11	3%	1	1%

Q18: Please indicate how risky you would feel bicycling in each condition described below. Check one box for each condition listed.

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Rainy weather										
No response	8	1%	3	1%	3	1%	2	1%	0	0%
Not risky	119	10%	50	10%	29	12%	36	10%	4	3%
Somewhat risky	623	51%	274	55%	121	48%	168	47%	60	50%
Risky	361	29%	134	27%	73	29%	113	31%	41	34%
Very risky	116	9%	37	7%	24	10%	40	11%	15	13%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Snow or ice on road										
No response	2	0%	1	0%	1	0%	0	0%	0	0%
Not risky	9	1%	2	0%	2	1%	3	1%	2	2%
Somewhat risky	102	8%	44	9%	23	9%	27	8%	8	7%
Risky	293	24%	157	32%	55	22%	65	18%	16	13%
Very risky	821	67%	294	59%	169	68%	264	74%	94	78%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Q18: Please indicate how risky you would feel bicycling in each condition described below. Check one box for each condition listed. (continued)

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Heavy traffic volume										
No response	12	1%	6	1%	2	1%	3	1%	1	1%
Not risky	87	7%	54	11%	22	9%	10	3%	1	1%
Somewhat risky	395	32%	190	38%	85	34%	97	27%	23	19%
Risky	442	36%	174	35%	76	30%	137	38%	55	46%
Very risky	291	24%	74	15%	65	26%	112	31%	40	33%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Riding on a road with high posted speed limits										
No response	11	1%	5	1%	3	1%	1	0%	1	1%
Not risky	58	5%	26	5%	13	5%	18	5%	1	1%
Somewhat risky	284	23%	132	27%	61	24%	67	19%	24	20%
Risky	422	34%	179	36%	73	29%	120	33%	51	43%
Very risky	452	37%	156	31%	100	40%	153	43%	43	36%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Riding on a road with no shoulders										
No response	10	1%	4	1%	2	1%	3	1%	1	1%
Not risky	47	4%	25	5%	11	4%	10	3%	1	1%
Somewhat risky	271	22%	133	27%	45	18%	69	19%	24	20%
Risky	412	34%	161	32%	85	34%	123	34%	43	36%
Very risky	487	40%	175	35%	107	43%	154	43%	51	43%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Riding on the left side of the road facing traffic										
No response	11	1%	5	1%	2	1%	3	1%	1	1%
Not risky	58	5%	23	5%	13	5%	19	5%	3	3%
Somewhat risky	218	18%	105	21%	39	16%	59	16%	15	13%
Risky	370	30%	164	33%	76	30%	106	30%	24	20%
Very risky	570	46%	201	40%	120	48%	172	48%	77	64%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Riding in a bicycle lane										
No response	7	1%	3	1%	0	0%	4	1%	0	0%
Not risky	701	57%	285	57%	152	61%	197	55%	67	56%
Somewhat risky	457	37%	185	37%	87	35%	137	38%	48	40%
Risky	47	4%	21	4%	10	4%	15	4%	1	1%
Very risky	15	1%	4	1%	1	0%	6	2%	4	3%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Q18: Please indicate how risky you would feel bicycling in each condition described below. Check one box for each condition listed. (continued)

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/ Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Riding on the sidewalk										
No response	13	1%	2	0%	3	1%	6	2%	2	2%
Not risky	413	34%	168	34%	85	34%	131	36%	29	24%
Somewhat risky	557	45%	237	48%	104	42%	162	45%	54	45%
Risky	177	14%	66	13%	44	18%	45	13%	22	18%
Very risky	67	5%	25	5%	14	6%	15	4%	13	11%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Riding on a bicycle path										
No response	10	1%	2	0%	2	1%	6	2%	0	0%
Not risky	1034	84%	423	85%	214	86%	304	85%	93	78%
Somewhat risky	159	13%	69	14%	28	11%	42	12%	20	17%
Risky	14	1%	2	0%	5	2%	5	1%	2	2%
Very risky	10	1%	2	0%	1	0%	2	1%	5	4%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Riding at night with a headlight										
No response	12	1%	4	1%	4	2%	3	1%	1	1%
Not risky	387	32%	207	42%	75	30%	90	25%	15	13%
Somewhat risky	624	51%	250	50%	122	49%	190	53%	62	52%
Risky	160	13%	32	6%	38	15%	62	17%	28	23%
Very risky	44	4%	5	1%	11	4%	14	4%	14	12%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Riding at night without a headlight										
No response	6	0%	2	0%	1	0%	2	1%	1	1%
Not risky	67	5%	45	9%	13	5%	8	2%	1	1%
Somewhat risky	275	22%	166	33%	49	20%	52	14%	8	7%
Risky	345	28%	173	35%	68	27%	88	25%	16	13%
Very risky	534	44%	112	22%	119	48%	209	58%	94	78%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Not stopping at a stop sign										
No response	7	1%	4	1%	0	0%	3	1%	0	0%
Not risky	53	4%	27	5%	12	5%	11	3%	3	3%
Somewhat risky	486	40%	230	46%	87	35%	145	40%	24	20%
Risky	349	28%	136	27%	79	32%	102	28%	32	27%
Very risky	332	27%	101	20%	72	29%	98	27%	61	51%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Q18: Please indicate how risky you would feel bicycling in each condition described below. Check one box for each condition listed. (continued)

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Not stopping for a traffic light										
No response	4	0%	2	0%	0	0%	1	0%	1	1%
Not risky	35	3%	22	4%	7	3%	3	1%	3	3%
Somewhat risky	294	24%	160	32%	49	20%	73	20%	12	10%
Risky	382	31%	156	31%	90	36%	107	30%	29	24%
Very risky	512	42%	158	32%	104	42%	175	49%	75	63%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Potholes or debris in road										
No response	4	0%	2	0%	0	0%	2	1%	0	0%
Not risky	29	2%	12	2%	7	3%	8	2%	2	2%
Somewhat risky	282	23%	102	20%	58	23%	93	26%	29	24%
Risky	475	39%	197	40%	97	39%	137	38%	44	37%
Very risky	437	36%	185	37%	88	35%	119	33%	45	38%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Q19: When riding your bicycle, how often do you obey the traffic laws listed below? Check one box for each situation.

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Stop at stop signs										
Always	248	20%	87	17%	43	17%	71	20%	47	39%
Usually	486	40%	162	33%	108	43%	162	45%	54	45%
Sometimes	432	35%	209	42%	88	35%	116	32%	19	16%
Never	59	5%	39	8%	10	4%	10	3%	0	0%
No response	2	0%	1	0%	1	0%	0	0%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Wait for red lights to turn green										
Always	305	25%	63	13%	68	27%	112	31%	62	52%
Usually	479	39%	175	35%	103	41%	151	42%	50	42%
Sometimes	356	29%	192	39%	67	27%	89	25%	8	7%
Never	84	7%	67	13%	11	4%	6	2%	0	0%
No response	3	0%	1	0%	1	0%	1	0%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Q19: When riding your bicycle, how often do you obey the traffic laws listed below? Check one box for each situation. (continued)

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Stop for pedestrians in crosswalks										
Always	678	55%	258	52%	128	51%	219	61%	73	61%
Usually	383	31%	156	31%	79	32%	108	30%	40	33%
Sometimes	133	11%	72	14%	31	12%	23	6%	7	6%
Never	22	2%	7	1%	8	3%	7	2%	0	0%
No response	11	1%	5	1%	4	2%	2	1%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Observe bicycle warning signs										
Always	518	42%	164	33%	111	44%	170	47%	73	61%
Usually	428	35%	168	34%	86	34%	134	37%	40	33%
Sometimes	151	12%	90	18%	25	10%	32	9%	4	3%
Never	60	5%	37	7%	13	5%	8	2%	2	2%
No response	70	6%	39	8%	15	6%	15	4%	1	1%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Yield at yield signs										
Always	541	44%	189	38%	93	37%	184	51%	75	63%
Usually	415	34%	158	32%	104	42%	118	33%	35	29%
Sometimes	218	18%	118	24%	39	16%	51	14%	10	8%
Never	42	3%	26	5%	11	4%	5	1%	0	0%
No response	11	1%	7	1%	3	1%	1	0%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Ride on the right side of the street										
Always	739	60%	248	50%	152	61%	241	67%	98	82%
Usually	394	32%	198	40%	78	31%	99	28%	19	16%
Sometimes	76	6%	45	9%	15	6%	14	4%	2	2%
Never	13	1%	6	1%	4	2%	2	1%	1	1%
No response	5	0%	1	0%	1	0%	3	1%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Q20: Please indicate the importance of each of the following conditions in encouraging you to bicycle more than you do today. Check one box for each condition.

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Wide travel lanes on roads										
Very important	433	35%	139	28%	87	35%	142	40%	65	54%
Important	448	37%	200	40%	94	38%	121	34%	33	28%
Somewhat important	226	18%	109	22%	41	16%	58	16%	18	15%
Not important	76	6%	31	6%	18	7%	24	7%	3	3%
No response	44	4%	19	4%	10	4%	14	4%	1	1%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Wide shoulders on roads										
Very important	497	41%	154	31%	94	38%	170	47%	79	66%
Important	481	39%	206	41%	109	44%	130	36%	36	30%
Somewhat important	165	13%	98	20%	23	9%	40	11%	4	3%
Not important	53	4%	27	5%	15	6%	10	3%	1	1%
No response	31	3%	13	3%	9	4%	9	3%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Bicycle lanes on roads										
Very important	729	59%	314	63%	137	55%	207	58%	71	59%
Important	288	23%	111	22%	66	26%	79	22%	32	27%
Somewhat important	132	11%	43	9%	27	11%	49	14%	13	11%
Not important	50	4%	16	3%	15	6%	16	4%	3	3%
No response	28	2%	14	3%	5	2%	8	2%	1	1%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Signed bicycle routes on roads										
Very important	398	32%	156	31%	85	34%	117	33%	40	33%
Important	306	25%	121	24%	57	23%	93	26%	35	29%
Somewhat important	307	25%	131	26%	62	25%	86	24%	28	23%
Not important	180	15%	74	15%	39	16%	52	14%	15	13%
No response	36	3%	16	3%	7	3%	11	3%	2	2%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Paved paths along roads physically separated from motor traffic										
Very important	545	44%	206	41%	113	45%	176	49%	50	42%
Important	240	20%	93	19%	50	20%	73	20%	24	20%
Somewhat important	256	21%	115	23%	48	19%	65	18%	28	23%
Not important	153	12%	69	14%	32	13%	36	10%	16	13%
No response	33	3%	15	3%	7	3%	9	3%	2	2%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Q20: Please indicate the importance of each of the following conditions in encouraging you to bicycle more than you do today. Check one box for each condition. (continued)

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Paved trails along rivers and scenic areas										
Very important	565	46%	200	40%	124	50%	179	50%	62	52%
Important	306	25%	133	27%	61	24%	84	23%	28	23%
Somewhat important	217	18%	92	18%	34	14%	67	19%	24	20%
Not important	99	8%	53	11%	23	9%	19	5%	4	3%
No response	40	3%	20	4%	8	3%	10	3%	2	2%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
"Share the Road" warning signs										
Very important	332	27%	151	30%	69	28%	81	23%	31	26%
Important	309	25%	121	24%	59	24%	86	24%	43	36%
Somewhat important	364	30%	135	27%	71	28%	128	36%	30	25%
Not important	190	15%	77	15%	44	18%	53	15%	16	13%
No response	32	3%	14	3%	7	3%	11	3%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Increased enforcement of traffic laws										
Very important	430	35%	180	36%	88	35%	114	32%	48	40%
Important	329	27%	126	25%	68	27%	109	30%	26	22%
Somewhat important	289	24%	109	22%	57	23%	88	25%	35	29%
Not important	147	12%	69	14%	29	12%	38	11%	11	9%
No response	32	3%	14	3%	8	3%	10	3%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Education for bicyclists on how to deal with motor traffic										
Very important	235	19%	80	16%	51	20%	67	19%	37	31%
Important	354	29%	138	28%	71	28%	110	31%	35	29%
Somewhat important	398	32%	171	34%	72	29%	120	33%	35	29%
Not important	206	17%	93	19%	47	19%	54	15%	12	10%
No response	34	3%	16	3%	9	4%	8	2%	1	1%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Education for motorists on how to deal with bicyclists in traffic										
Very important	612	50%	251	50%	127	51%	173	48%	61	51%
Important	314	26%	122	24%	64	26%	95	26%	33	28%
Somewhat important	178	15%	76	15%	31	12%	53	15%	18	15%
Not important	92	7%	31	6%	22	9%	31	9%	8	7%
No response	31	3%	18	4%	6	2%	7	2%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Q20: Please indicate the importance of each of the following conditions in encouraging you to bicycle more than you do today. Check one box for each condition. (continued)

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Secure bicycle parking at destination										
Very important	451	37%	214	43%	85	34%	116	32%	36	30%
Important	430	35%	169	34%	88	35%	129	36%	44	37%
Somewhat important	235	19%	80	16%	49	20%	79	22%	27	23%
Not important	85	7%	23	5%	23	9%	28	8%	11	9%
No response	26	2%	12	2%	5	2%	7	2%	2	2%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
More trail amenities (bike racks, benches, restrooms, etc.)										
Very important	270	22%	107	21%	57	23%	78	22%	28	23%
Important	356	29%	134	27%	70	28%	101	28%	51	43%
Somewhat important	379	31%	160	32%	75	30%	112	31%	32	27%
Not important	188	15%	83	17%	41	16%	55	15%	9	8%
No response	34	3%	14	3%	7	3%	13	4%	0	0%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Indoor bicycle storage, showers & locker room at work										
Very important	305	25%	130	26%	54	22%	93	26%	27	23%
Important	286	23%	103	21%	61	24%	89	25%	33	28%
Somewhat important	284	23%	124	25%	60	24%	77	21%	23	19%
Not important	309	25%	124	25%	62	25%	88	25%	35	29%
No response	43	4%	17	3%	12	5%	12	3%	2	2%
TOTAL	1227	100%	498	100%	249	100%	359	100%	120	100%
Less criminal activity on the streets										
Very important	293	24%	118	24%	61	24%	84	23%	30	25%
Important	273	22%	115	23%	52	21%	79	22%	27	23%
Somewhat important	360	29%	142	29%	75	30%	106	30%	37	31%
Not important	271	22%	109	22%	55	22%	82	23%	25	21%
No response	30	2%	14	3%	7	3%	8	2%	1	1%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Significant increase in the cost of driving										
Very important	222	18%	97	19%	40	16%	65	18%	20	17%
Important	275	22%	102	20%	61	24%	84	23%	28	23%
Somewhat important	312	25%	112	22%	69	28%	96	27%	35	29%
Not important	377	31%	170	34%	71	28%	102	28%	34	28%
No response	41	3%	17	3%	9	4%	12	3%	3	3%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Q20: Please indicate the importance of each of the following conditions in encouraging you to bicycle more than you do today. Check one box for each condition. (continued)

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Significant increase in transit fares										
Very important	181	15%	87	17%	31	12%	46	13%	17	14%
Important	208	17%	97	19%	45	18%	48	13%	18	15%
Somewhat important	303	25%	125	25%	63	25%	85	24%	30	25%
Not important	492	40%	172	35%	100	40%	169	47%	51	43%
No response	43	4%	17	3%	11	4%	11	3%	4	3%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Other (specify)										
Very important	92	7%	46	9%	16	6%	21	6%	9	8%
Important	13	1%	4	1%	4	2%	4	1%	1	1%
Somewhat important	2	0%	1	0%	0	0%	0	0%	1	1%
Not important	16	1%	4	1%	3	1%	7	2%	2	2%
No response	1104	90%	443	89%	227	91%	327	91%	107	89%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q21: Your gender:										
No response	20	2%	9	2%	4	2%	6	2%	1	1%
Female	422	34%	201	40%	83	33%	99	28%	39	33%
Male	785	64%	288	58%	163	65%	254	71%	80	67%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q22: What is your race or origin? Check all that apply.										
White/Caucasian	1059	86%	415	83%	212	85%	323	90%	109	91%
African American	43	4%	24	5%	7	3%	10	3%	2	2%
Asian	43	4%	22	4%	7	3%	12	3%	2	2%
Hispanic/Latino	37	3%	25	5%	7	3%	2	1%	3	3%
Other	58	5%	31	6%	13	5%	11	3%	3	3%
No response	14	1%	5	1%	6	2%	2	1%	1	1%

Source: DVRPC, 2007

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q23: What is your age group?										
16-24 years	156	13%	92	18%	31	12%	30	8%	3	3%
25-34 years	356	29%	220	44%	62	25%	67	19%	7	6%
35-44 years	241	20%	91	18%	58	23%	69	19%	23	19%
45-54 years	268	22%	51	10%	54	22%	117	33%	46	38%
55-64 years	127	10%	28	6%	24	10%	50	14%	25	21%
65 years or older	59	5%	8	2%	17	7%	20	6%	14	12%
No response	20	2%	8	2%	4	2%	6	2%	2	2%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q24: How many people live in your household, including yourself?										
1	230	19%	95	19%	47	19%	61	17%	27	23%
2	482	39%	214	43%	87	35%	132	37%	49	41%
3	219	18%	80	16%	46	18%	67	19%	26	22%
4	174	14%	62	12%	41	16%	63	18%	8	7%
5 or more	88	7%	35	7%	21	8%	27	8%	5	4%
No response	34	3%	12	2%	8	3%	9	3%	5	4%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q25: Does anyone else in your household age 16 years or older ride a bicycle?										
Yes	772	63%	329	66%	150	60%	224	62%	69	58%
If yes, how many persons in addition to yourself?										
1	382	31%	153	31%	78	31%	123	34%	28	23%
2	119	10%	50	10%	22	9%	35	10%	12	10%
3	44	4%	21	4%	8	3%	11	3%	4	3%
4	14	1%	9	2%	4	2%	1	0%	0	0%
5	2	0%	0	0%	2	1%	0	0%	0	0%
6	3	0%	1	0%	1	0%	1	0%	0	0%
7	1	0%	0	0%	1	0%	0	0%	0	0%
8	1	0%	0	0%	1	0%	0	0%	0	0%
9	1	0%	0	0%	0	0%	1	0%	0	0%
48	1	0%	1	0%	0	0%	0	0%	0	0%
No response	204	17%	94	19%	33	13%	52	14%	25	21%
TOTAL	568		235		117		172		44	

Source: DVRPC, 2007

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q26: Does anyone in your household under 16 years of age ride a bicycle?										
Yes	191	16%	42	8%	49	20%	83	23%	17	14%
If yes, how many persons?										
1	84	7%	19	4%	22	9%	34	9%	9	8%
2	71	6%	15	3%	22	9%	27	8%	7	6%
3	16	1%	2	0%	3	1%	10	3%	1	1%
4	2	0%	1	0%	1	0%	0	0%	0	0%
6	1	0%	0	0%	0	0%	1	0%	0	0%
9	1	0%	0	0%	1	0%	0	0%	0	0%
no response	16	1%	5	1%	0	0%	11	3%	0	0%
TOTAL	175		37		49		72		17	
Q27: How many passenger vehicles (cars, trucks, SUVs, minivans) do you have in your household?										
0	245	20%	151	30%	55	22%	37	10%	2	2%
1	435	35%	215	43%	77	31%	114	32%	29	24%
2	376	31%	105	21%	73	29%	142	40%	56	47%
3 or more	152	12%	23	5%	39	16%	60	17%	30	25%
No response	19	2%	4	1%	6	2%	6	2%	3	3%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q28: What is your employment status?										
Full time	832	68%	339	68%	152	61%	259	72%	82	68%
No response	18	1%	7	1%	3	1%	7	2%	1	1%
Not employed	39	3%	13	3%	14	6%	10	3%	2	2%
Part time	139	11%	66	13%	30	12%	37	10%	6	5%
Retired	79	6%	10	2%	21	8%	23	6%	25	21%
Student	120	10%	63	13%	30	12%	23	6%	4	3%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q29: What kind of home do you live in? Check one.										
Apartment building/condominium	312	25%	185	37%	49	20%	67	19%	12	10%
Dormitory, group quarters/ barracks	19	2%	7	1%	7	3%	4	1%	1	1%
Mobile home/trailer	3	0%	2	0%	0	0%	0	0%	1	1%
No response	16	1%	6	1%	4	2%	4	1%	1	1%
Single-family house - detached	391	32%	52	10%	87	35%	163	45%	89	74%
Single-family twin, townhome/row home	486	40%	246	49%	103	41%	121	34%	16	13%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

	AREA TYPE									
	Region		CBD/Fringe		Urban		Suburban		Rural/Open Rural	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Q30: What is the highest level of formal education you have completed?										
High school	214	17%	78	16%	42	17%	76	21%	18	15%
Associate degree	89	7%	37	7%	19	8%	17	5%	16	13%
Bachelor's degree	338	28%	150	30%	74	30%	84	23%	30	25%
Some graduate/ professional school	181	15%	85	17%	36	14%	43	12%	17	14%
Graduate/professional degree	381	31%	139	28%	74	30%	131	36%	37	31%
No response	24	2%	9	2%	5	2%	8	2%	2	2%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%
Q31: What is your household's annual income? Check one.										
Less than $20,000	133	11%	74	15%	35	14%	22	6%	2	2%
$20,000 to $29,999	82	7%	47	9%	19	8%	15	4%	1	1%
$30,000 to $39,999	103	8%	55	11%	19	8%	20	6%	9	8%
$40,000 to $49,999	98	8%	54	11%	14	6%	22	6%	8	7%
$50,000 to $59,999	89	7%	36	7%	18	7%	23	6%	12	10%
$60,000 to $69,999	83	7%	41	8%	14	6%	24	7%	4	3%
$70,000 to $79,999	104	8%	39	8%	25	10%	22	6%	18	15%
$80,000 to $99,999	132	11%	43	9%	30	12%	41	11%	18	15%
$100,000 and above	326	27%	86	17%	58	23%	144	40%	38	32%
No response	77	6%	23	5%	18	7%	26	7%	10	8%
TOTAL	1227	100%	498	100%	250	100%	359	100%	120	100%

Source: DVRPC, 2007

Appendix F

Literature review synthesis

Appendix F: Literature review synthesis

TEA-21 mandates an integrated transportation planning procedure for all modes of transportation and conformity between mobility and environmental goals. Bicycles are an important mode of transportation because they require no fossil fuels, produce no emissions and because they account for a significant share of trips in low income, college and university communities throughout the region. Data on bicycle usage is needed to help guide public policy and investment in bicycle facilities and to evaluate the effect of bicycle facility improvements on bicycle usage.

The purpose of this review of the recent literature on bicycle transportation surveys is to give the project technical committee and DVRPC staff a basis for discussing the goals, objectives and strategies of the survey. The literature review, essentially a summary of experience from similar surveys conducted elsewhere, included national surveys, regional (metropolitan) surveys, local surveys and other special surveys. The surveys reviewed may include others than those specific to bicycling if they are relevant in some way (i.e. how to reach "hard-to-reach" populations). Special note was taken of survey purpose, stakeholder involvement, sample size (and how determined), methodology (selection of individuals, interview technique, methods to increase response rate), response rate, major findings, products and eventual uses of the data. This synthesis presents and summarizes the range of purposes and designs of the surveys reviewed and their applicability to the current project.

Published research and guidance

The United States and Australia share similar characteristics in urban form, metropolitan development and travel behavior. The year 2000 saw the publication of reports by federal transportation authorities in both countries examining bicycling data availability and needs.[17,18] Both reports, each produced under a national policy mandate, thoroughly catalog existing data and recommend actions and standards to fill in identified gaps at each level of planning including metropolitan regions.

The reports classify the various types of data slightly differently:

United States

- Usage, trip and user characteristics
- Preferences, needs and attitudes
- Facility characteristics
- Crash and safety data
- Expenditures on and capital stocks of vehicles and facilities

Australia

- Ownership
- Infrastructure
- Usage
- Cyclists
- Safety

Clearly, the U.S. model groups data types that the Australian model keeps separate (e.g. usage and cyclists [users]) and includes categories the Australian model leaves out altogether (expenditures on facilities; preferences, needs and attitudes). This review of the literature will focus solely on the collection of trip and user (cyclist) characteristics data at the metropolitan level. Such data include distributions of trips by distance, purpose and time of day; distribution of travelers and trips according to demographic and socioeconomic characteristics; and various cross-classifications of these variables.[19] Aggregate usage data has already been collected in the DVRPC region through the 2000 Household Travel Survey.

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[17] US Department of Transportation, Bureau of Transportation Statistics (BTS), *Bicycle and Pedestrian Data: Sources, Needs & Gaps.* BTS00-02. Washington, DC: BTS, 2000.

[18] (Australian) Commonwealth Department of Health and Aged Care and Australian Bicycle Council, *Cycling Data and Indicator Guidelines.* November 2000.

[19] BTS, 65.

The U.S. report, published by the USDOT Bureau of Transportation Statistics (BTS), recommends the development and dissemination of model surveys and sampling methodologies for collecting pedestrian- and bicycle-related data. The Australian report delivers such information, including definitions of indicators and key terms, survey questions, sample sizes and sampling methods.

All national surveys are of random samples of the general population, and record preferences and attitudes as well as self-reported travel behavior. The principal data sets available through BTS are the Omnibus Survey, the 2002 National Bicycle and Pedestrian Survey (with NHTSA), and the 2001 National Household Travel Survey (with FHWA)

Purpose of surveys

According to the BTS report, bicycle and pedestrian data are commonly applied to at least three general uses:

- Research studies and recommended practices;
- Planning and design of facilities, project selection decisions, policies and programs; and
- Analysis of conditions and trends to inform policymaking.

Aggregate or "profile" data for a large geographic area have limited usefulness for the purposes of planning or programming projects; this type of data is more useful for forecasting aggregate demand, designing education and outreach programs and informing policy.

Measurement of progress toward the national goal of increasing bicycling is the purpose behind the Australian guidelines.[20] The guidelines therefore focused on indicators based on outputs and outcomes (e.g. bicycle mode split, number of miles traveled, injuries and fatalities, etc.) rather than inputs (e.g. expenditures on bikeways, number of jurisdictions having bicycle plans, etc.) and on national uniform data standards.

Bicycle travel surveys have been conducted to quantify the economic return, particularly from tourism, on investment in bikeways. These surveys typically ask respondents to report on the reasons for their travel and on money spent during the trip.[21] [22] [23]

Of the three surveys of this type reviewed, two were conducted by universities on behalf of state DOTs; the third was conducted on behalf of a national government.

The metropolitan surveys reviewed were conducted for more planning-oriented reasons:

- To provide "an accurate statistical foundation on which to build our bicycle networks for the future, at both a local level and throughout the metropolitan region";[24]
- For "analyzing potential bicycle programs and projects";[25]
- "To get a better understanding of the effectiveness of the bicycle network and the needs of cyclists";[26]

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[20] Ibid, 3.

[21] Gonzalez, Liliana, R. Choudary Hanumara, Carol Overdeep and Steven Church (Rhode Island Department of Transportation), *2002 Bicycle Transportation Survey; Developing Intermodal Connections for the 21st Century*, Report No. URITC FY02-536182. Kingston, RI: University of Rhode Island Transportation Center, February 2004.

[22] Richardson, Anthony, "A Survey Method for Cycle Networks – A Swiss Example." *Papers of the Australasian Transport Research Forum* I, 23 (Perth, September 1999), 441-457.

[23] Lawrie, Judson, John Guenther, Thomas Cook, Mary Paul Meletiou (Institute for Transportation Research and Education, North Carolina State Univ.), *The Economic Impact of Investments in Bicycle Facilities: A Case Study of the Northern Outer Banks, Summary Report*. North Carolina Department of Transportation, Division of Bicycle and Pedestrian Transportation, April 2004, 3.

[24] VicRoads Bicycle Programs, Traffic and Road Use Management, *Cycling in Melbourne: Ownership, Use and Demographics.* Melbourne, Australia: VicRoads, January 1999. http://www.vicroads.vic.gov.au.

[25] Bairstow, Anne-Marie, "Council of Governments Releases Bicycling Studies," *Chesapeake ACTivities,* Summer 1996, 21.

- For better profiles of bicycle trips and travelers; and
- To support demand modeling.[27]

These purposes generally lack specificity in how the resulting data will be practically applied. The most extensive set of purposes is found in a Las Vegas metropolitan survey:[28]

- Provide information for the development of the regional Bicycle Master Plan;
- Identify individual characteristics of bicyclists so they can ultimately be incorporated in regional travel models;
- Determine the distribution of trip purposes by trip length, time of day, day of week;
- Determine the most common trip purposes for bicycle-transit linked trips;
- Determine how far people ride their bicycle to reach the bus and how far people ride from the bus to their final destination; and
- Identify specific roadways and corridors where citizens would like to see better bicycle facilities.

Most specific in its purpose was a survey conducted by the Texas Transportation Institute for the Texas DOT. Data was gathered with the intent of developing bicycle trip generation rates by land use and area type for use in the development and testing of new travel demand models. [29] [30]

Survey design

While metropolitan household travel surveys can and should gather information on bicycling and walking, they are limited in the level of detail they can yield regarding the nature of travel by these modes. The number of bicyclists reached in a survey of 3,000 households, for example, will yield too small a sample of bicyclists to derive any statistically significant information for any subset of the sample. One way of correcting this problem is to oversample areas known to have higher numbers of bicycle trips. It has been acknowledged that further research and implementation experience is needed in effective means of obtaining larger, representative samples of bicyclists and pedestrians.[31]

Australia offers a complete recommended practice.[32] First, given that the rate of bicycling is relatively low, the level of geography should not be more specific than the Australian equivalent of the Metropolitan Statistical Area. The desired confidence limits, levels of confidence and inherent variability of the things being measured should determine sample size. Continuous variables, such as miles traveled, require a larger sample size to yield reliable results than discrete variables, for example gender (male or female). The Australian guide goes as far as to specify sample sizes for each question of a user survey so that a uniform national database may be developed as follows:

- *Cyclist age and gender:* To estimate the proportion of residents within each age-sex group that have cycled at least once on the Survey Day, at the 95% confidence level, 4,800 respondents from a randomly drawn stratified sample of individuals is recommended (600 in

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[26] *Regional Bicycle Suitability Study*. Roanoke, VA: Roanoke Valley Area Metropolitan Planning Organization, July 2003, 12.

[27] USDOT, 65.

[28] Sprinkle Consulting, Inc., *Las Vegas Bicycle Travel Origin and Destination Survey*. Regional Transportation Commission of Southern Nevada, March 2002.

[29] Hottenstein, Aaron, Shawn Turner, Gordon Shunk, *Bicycle and Pedestrian Travel Demand Forecasting: Summary of Data Collection Activities*, Report No. FHWA/TX-98/1723-2. College Station, TX: Texas Transportation Institute, September 1997.

[30] Turner, Shawn, Gordon Shunk, Aaron Hottenstein, *Development of a Methodology to Estimate Bicycle and Pedestrian Travel Demand,* Report No. FHWA/TX-98/1723-S. College Station, TX: Texas Transportation Institute, September 1998.

[31] USDOT, 22-23.

[32] Commonwealth Department of Health and Aged Care & Australia Bicycle Council.

each strata), assuming a proportion of cycling within each strata of 0.04 and a confidence limit of 0.008;

- *Trip length* (distance bicycled per trip stage): 140 bicycle trips from a random sample of all trips; given a 2 percent mode split and an average number of daily person bike trips is 4, this equates to a random sample of about 1,750 people;
- *Cycling distance by age and gender:* 1,540 respondents from a random sample of each age/sex population desired;
- *Number of people who have bicycled at least once in the past week:* Random sample of entire population, 7,300 respondents; and
- *Bicyclist personal income:* Random sample of 1,540 bicyclists.

Note that for only the measure of bicyclist personal income is the population sampled that of bicyclists alone; samples along all other measures are to be taken from the general population.

The Australian guide outlines four methods of obtaining information on bicyclists:

1. Document and database searches of existing sources;
2. Counts;
3. Intercept surveys; and
4. Home interviews;

and enumerates key considerations and requirements for each type.

Key requirements for intercept surveys include:

- Random selection of locations on the bicycle network;
- Random selection of bicyclists from the passing flow (stopping and interviewing every n^{th} bicyclist; the value of n determined by the volume of bicycle traffic and the speed by which the survey crew can complete interviews);
- Completion of roadside interviews; and
- Careful consideration of and compensation for time, day and season of the survey.[33]

Acknowledging the difficulty inherent in identifying and reaching narrow populations, Babbie (1992) warns that "relying on available subjects, that is, stopping people at a street corner or some other location, is almost never an adequate sampling method, although it is used all too frequently. It is justified only if the researcher wants to study the characteristics of people passing the sampling point at specified times."[34]

Richardson (1999), maintaining that intercept surveys can be more efficient than surveys of the general population in reaching "rare" populations such as bicyclists, offers greater detail in the methodological requirements of intercept surveys, holding up a three-component survey method to estimate system-wide usage of the Swiss national bicycle network as a model.[35]

That survey included full counts of both bicyclists and pedestrians passing randomly selected points on the network during randomly selected survey time blocks. The counts included recording by surveyors of the gender and age cohort of each path user.

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[33] See Niemeier, Debbie A., "Longitudinal Analysis of Bicycle Count Variability: Results and Modeling Implications," *Journal of Transportation Engineering* 122, 3 (May/June 1996), 200-206, for a model of count variability which takes into account seasonal and weather factors. According to Niemeier, a single count volume may be biased as by as much as +/-15 percent depending on the time of year in which the count was taken.

[34] Babbie, Earl, *The Practice of Social Research*, Sixth Edition. Belmont, CA: Wadsworth Publishing Co., 1992, 232.

[35] Richardson, Anthony, "A Survey Method For Cycle Networks – A Swiss Example." *Papers of the Australasian Transport Research Forum* 23, Part 1 (Perth: September 1999), 441-457.

Secondly, users were stopped and interviewed according to a pre-determined sampling rate (every fourth rider, for example) determined so as not to overload the survey crew. The interview was a brief three questions, including place of residence, knowledge of the rider regarding the route currently traveled and whether the trip included an overnight stay. A more extensive mail-back survey was then handed to each interviewee. Each survey was numbered so that acceptance, response and completion rates for population sub-groups could be tabulated and weighting factors generated to ensure the calculation of representative population estimates. Trip length estimates were generated using GIS.

Richardson (1999) identifies the over-representation of longer trips as a problem inherent with the intercept method. Put simply, longer trips have a higher probability of passing a survey site and are therefore likely to be over-represented in the results. To compensate for this as well as for the non-random placement of survey sites, a model of network usage should be developed.[36] Such a model, a variant of the gravity model, is described.[37]

A combination of intercept surveys, self-administered questionnaires of general visitors and counts was conducted to determine the economic impact of bicycle facilities in North Carolina's Outer Banks (a full description of the survey had not been obtained at the time of this writing).[38] Following more closely Richardson's three-component method, minus the counts, was the survey of Rhode Island trail users conducted for that state's department of transportation.[39]

The Texas Transportation Institute conducted its survey at eight sites in three cities in order to help develop and test bicycle and pedestrian travel demand forecasting techniques for the Texas DOT. Survey locations were chosen which have "adequate provision of bicycle and pedestrian facilities; relatively high levels of use; geometric and traffic characteristics typical of state roadways; trip purposes predominantly transportation-related; and ability to position video data collection equipment."[40] These criteria were later modified to reach greater numbers of bicyclists, and to eliminate what they found to be conflicting criteria, i.e. provision of bicycle facilities and state roadways having typical geometric characteristics.

Counts were recorded on videotape and survey workers simultaneously distributed color-coded mail-back questionnaire cards to passing bicyclists and pedestrians. The survey team found that usage levels varied considerably among survey periods at some sites during the course of data collection, even controlling for the time of day, day of week and weather; and that some sites had very low response rates.

A wide variation in methodological rigor was found in the metropolitan bicycle travel surveys reviewed. Detailed data on bicycling in the Melbourne, Australia, metropolitan region was collected as part of an extensive and expensive household travel survey, the first in several decades. Data was collected and presented for Melbourne's four "metropolitan regions" -- central, inner, middle and outer – and by weekday versus weekend. Measures included household bicycle ownership, daily trip rates, length, and purpose, cyclist age, gender, student status, employment status and possession of a driver's license.

On the low end of the rigor scale was a survey for the Roanoke, Virginia area. A mail back questionnaire on attitudes, perceptions, preferences and habits was mailed to "selected focus groups that have the most and best information about bicycling conditions and needs…When possible, surveys were handed out to individual cyclists in the area…[and] also distributed to all area bicycle shops and local planning, recreation, and traffic engineering departments," and advertised through bike club newsletters and a bicyclist listserve.[41]

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[36] Richardson, 456.

[37] Ibid., 450.

[38] Lawrie et. al., 6.

[39] Gonzalez, et. al., 4.

[40] Ibid., 3.

[41] Roanoke Valley Area Metropolitan Planning Organization, *Regional Bicycle Suitability Study Phase 1.* Roanoke, VA: Roanoke Valley Alleghany Regional Commission, July 2003, 38-54.

The Metropolitan Washington Council of Governments did its own variation on the three-component method: counts of bicyclists crossing two screen lines, a survey of bicycle commuters and counts on a major trail before and after the opening of two bridges on the trail. The counts and the survey were not coordinated. Survey crews handed out mail-back questionnaires regarding the current trip, cycling habits and preferences and demographic information, to bicyclists at six locations (each on a bicycle trail or at a Metro station) during the morning peak. The referenced article did not mention the duration of the survey, or the number of questionnaires returned, but claimed a response rate of nearly 75 percent.[42]

A survey conducted of the Las Vegas, Nevada, metropolitan region also included multiple components.[43] Separate questionnaires were developed for each of three target groups: park (trail) users, bike-on-bus users, and employees whose companies participate in the regional travel demand program (as well as college students and other residents who chose to pick up a survey available at bike shops). Only park users were intercepted and interviewed about their current trip and this was conducted during only a single weekend. All three surveys were pilot tested. Prizes were offered as response incentives. Survey forms were prepared in both English and Spanish and a survey hotline was set up to answer respondents' questions. The effort yielded 330 valid responses; the author claims that this response yields results that are significant at the 95 percent confidence level with an error of 5.4 (+/-) percent.

Surveys conducted within the DVRPC region

In 1992, a graduate student at the University of Pennsylvania, Robert Nolan, conducted a survey of Philadelphia region bicycle commuters for his doctoral dissertation.[44] The survey consisted of a rather lengthy mail-back questionnaire on habits, preferences and attitudes sent to members of the Bicycle Coalition of the Delaware Valley and area bicycle clubs (1,000) and the general public (500). Two follow-up mailings were sent, along with a one-dollar incentive, to produce an overall response rate of 68 percent. Results were tabulated for each of the three target groups for comparison. Nolan concluded that the perception of risk was a significant factor in the choice to commute by bicycle; and that bike lanes and shoulders on roadways, along with education of bicyclists and motorists, would increase bicycle commuting.

In 1994 the Cross County Connection Transportation Management Association performed and processed Employee Commute Option surveys for 87 worksites primarily in Camden and Burlington counties, New Jersey.[45] The surveys asked respondents to record their commute mode for each day of the survey week (which varied among worksites), as well as their attitudes and preferences regarding alternative commute modes.

An analysis of the data compiled from the 22,760 returned surveys revealed that 85 respondents, or 0.37 percent, reported bicycling at least one day during the survey week. The average and median distances for the bicycle commuters were six and four miles respectively. The bicycle commuters reported bicycling to work an average of 2.6 days during the survey week or 52 percent of the time.

A total of 2,929 respondents or approximately 13 percent of all commuters surveyed indicated that they were "very likely" or "somewhat likely" to use "convenient bike or walk access to the work location" as "an alternative instead of driving alone to work each day." Respondents who, in addition to responding affirmatively to the bicycling/walking option, also indicated that they would consider using a commute alternative one or more days per week, numbered 1,577 or approximately 7 percent of all commuters surveyed. Among this group, the average and median distances from home to work are 10 and seven miles respectively – so it may be safely assumed that the respondents in large part would choose bicycling over walking. Financial incentives, followed by guaranteed ride home and

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[42] Bairstow.

[43] Sprinkle Consulting, Inc.

[44] Nolan, Robert B., *The Role of Risk in Policies to Promote Bicycle Transportation*. Doctoral dissertation, University of Pennsylvania, 1992. Ann Arbor, MI: University Microfilms International, 1993.

[45] Cross County Connection Transportation Management Association, Inc., *Accommodating the Commuting Bicyclist: Planning for Bicycle Compatible Roadways and Bikeways.* Marlton, NJ: Cross County Connection TMA, December 1996, 99-106.

showers/lockers at the workplace were the three top incentives cited by this group as possible inducements to bicycle commuting.

DVRPC conducted a mail-back survey of Bicycle Coalition and Clean Air Council members in 1998 to identify state highways to target for bicycle service level improvements.[46] The number of surveys distributed is unknown. A total of 259 usable surveys were returned. A plurality of respondents lived in Montgomery County (92) and in Lower Merion (17). Approximately 11 percent of respondents worked in the City of Philadelphia. Most bicyclists agreed that they would ride more often if roads had bike lanes (135 responses) or wider shoulders (172 responses).

Respondents were given a limited set of roadways and asked to indicate which they currently use or would if improved. These roads included PA routes 3, 320, and 252, US 30 and 202, and Paoli Pike. The most frequent response was US 30 (115 responses) and the most frequently requested improvement to that road was to add bike lanes (38 responses). Additionally respondents were offered the opportunity to name a road not listed. In response to this open-ended question, Montgomery Avenue and state highways 1, 23, 29, 73, 100 and 926 were each cited 10 or more times.

More than one-third of respondents commute by bike, and nearly one half ride to shop, run errands, go to parks or purely for exercise or recreation.

[46] DVRPC, *Opportunities for On-Road Bicycle Facilities*, a set of three technical memoranda, June 2000.

Appendix G

Intercept interview form

Appendix G: Intercept interview form

Delaware Valley Regional Planning Commission
REGIONAL BICYCLE TRAVEL SURVEY INTERVIEW FORM

Survey №

Excuse me, may I ask you a few questions? I'm with the Delaware Valley Regional Planning Commission and we are out here as part of a national effort to learn why people bicycle where they do. This will take less than one minute of your time and your answers will be completely confidential.

1. **Location number:** ☐☐ 2. **Day:** ☐Wkdy ☐Sat 3. **Time:**_____:_____☐ AM ☐ PM

4. **What is the main purpose of this trip? Check one.**

☐ Work commute ☐ Work-related (on-the-job) ☐ Social visit ☐ Shopping, appointments, errands
☐ School commute ☐ Exercise or recreation ☐ Vacation travel ☐ Other (specify):_____

5. **Where did you start this trip? Check one.**

☐ Home ☐ Someone else's home ☐ Office building ☐ Mall/strip mall/shopping center
☐ School/campus ☐ Park/field ☐ Train/subway/bus station ☐ Grocery/drug/convenience store
☐ Factory/warehouse ☐ Restaurant ☐ Other

6. **What is your destination? Check one.**

☐ Home ☐ Someone else's home ☐ Office building ☐ Mall/strip mall/shopping center
☐ School/campus ☐ Park/field ☐ Train/subway/bus station ☐ Grocery/drug/convenience store
☐ Factory/warehouse ☐ Restaurant ☐ Other

7. **In the past month, about how often did you ride here?**

☐ First time ☐ 6—10 times ☐ Daily or almost daily
☐ 1—5 times ☐ 10—20 times

8. **Did or will you take your bicycle <u>on board</u> a bus or train during part of your trip?**

☐**Yes:** ☐NJT ☐SEPTA ☐Other **Route:**_____ ☐PATCO ☐ **No**

9. **Did you first carry your bike via private motor vehicle to the location where you began your bike trip, for example to a trailhead parking area?** ☐ Yes ☐ No

10. **How long does this <u>one-way</u> bicycle trip typically take?** TIME _____ . _____ (<u>hours</u> . <u>minutes</u>) DISTANCE _____ . _____ (<u>miles</u> . <u>tenths</u>)

11. **Gender** ☐ Male ☐ Female

12. **Wrong way?** ☐ Yes ☐ No 13: **Sidewalk?** ☐ Yes ☐ No

14. **Passengers?** ☐ In child carrier seat ☐ In trailer ☐ On tandem ☐ On trailer bike ☐ Other

15. **Helmet?** ☐ Yes ☐ No 16: **Passenger(s) helmeted?** ☐ Yes ☐ No

17. **Type of bike:**

☐ Touring/ road ☐ Comfort/ city/ hybrid ☐ BMX/ Freestyle ☐ Tandem ☐ Child's
☐ Track ☐ Mountain ☐ Recumbent ☐ Folder ☐ Other (specify):_____

THANK YOU FOR YOUR TIME! PLEASE FILL OUT AND MAIL BACK THE QUESTIONNAIRE.

Appendix H

Mail-back questionnaire

Appendix H: Mail-back questionnaire

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO 29894 PHILADELPHIA PA

POSTAGE WILL BE PAID BY ADDRESSEE

REGIONAL BICYCLE TRAVEL SURVEY
Delaware Valley Regional Planning Commission
190 N. Independence Mall West, 8th Floor
Philadelphia, PA 19106-9833

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

COUNT!

BICYCLISTS

2005 SURVEY

LOCATION / SURVEY NO.

REGIONAL BICYCLE TRAVEL SURVEY

THANK YOU for participating in the Delaware Valley Regional Bicycle Travel Survey. By taking the time to complete and return this questionnaire, you'll be eligible to WIN A $100 GIFT CERTIFICATE, good at a local bike shop. And, you'll be helping transportation and city planners gather the data we need to improve conditions for bicyclists.

Delaware Valley Regional Planning Commission

Please answer all questions - then tape the booklet closed and drop in any mailbox. No postage required. You may feel that some of the questions are personal in nature, but rest assured that no personal record of your answers will be created, and that no one will be able to identify you or your answers. The Delaware Valley Regional Planning Commission (DVRPC) will combine your answers with those of other bicyclists to determine the transportation needs of people like you. If you have any questions about the survey, please call DVRPC at 215.238.2854.

1. Where did you start the trip you were making when you received this questionnaire? Check one.

- ☐ home
- ☐ someone else's home
- ☐ office building
- ☐ mall / strip mall / shopping center
- ☐ school / campus
- ☐ park / playground / ballfield
- ☐ train / subway / bus station
- ☐ grocery / drugstore / convenience store
- ☐ factory / warehouse
- ☐ restaurant
- ☐ other

2. Where did you end this trip? Check one.

- ☐ home
- ☐ someone else's home
- ☐ office building
- ☐ mall / strip mall / shopping center
- ☐ school / campus
- ☐ park / playground / ballfield
- ☐ train / subway / bus station
- ☐ grocery / drugstore / convenience store
- ☐ factory / warehouse
- ☐ restaurant
- ☐ other

3. In the past month, about how often did you ride in the location where you received this questionnaire?

- ☐ first time
- ☐ 2-5 times
- ☐ 6-10 times
- ☐ 11-20 times
- ☐ daily or almost daily

4. Why did you choose the route you did as opposed to riding somewhere else? Check all that apply.

- ☐ most direct
- ☐ scenic / pleasant
- ☐ less fear of collision
- ☐ fewer hills
- ☐ no alternative
- ☐ off-road
- ☐ less traffic
- ☐ less fear of crime
- ☐ bike lanes
- ☐ other: _____

5. How many bicycles do you and other members of your household own?

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3 or more

6. How many bicycles do you and other members of your household **age 16 years and older** own?

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3 or more

7. Why do you ride your bicycle, instead of taking some other form of transportation? Check all that apply.

- ☐ avoid traffic congestion
- ☐ fitness / health
- ☐ enjoyment or recreation
- ☐ no public transportation
- ☐ don't have a car
- ☐ environmental concerns
- ☐ saves time
- ☐ saves money
- ☐ other (specify): _____

25. Does anyone else in your household age 16 years or older ride a bicycle?

- ☐ yes
- ☐ no
- ☐ If yes, how many persons, in addition to yourself? _____

26. Does anyone in your household **under 16 years of age** ride a bicycle?

☐ yes ☐ no

If yes, how many persons? _____

27. How many passenger vehicles (cars, trucks, SUVs, minivans) do you have in your household?

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3 or more

28. What is your employment status?

- ☐ full time
- ☐ not employed
- ☐ part time
- ☐ retired
- ☐ student

29. What kind of home do you live in? Check one.

- ☐ single-family house - detached
- ☐ single-family twin, townhome / row home
- ☐ mobile home / trailer
- ☐ dormitory, group quarters / barracks
- ☐ apartment building / condominium

30. What is the highest level of formal education you have completed? Check one.

- ☐ high school
- ☐ associate degree
- ☐ bachelor's degree
- ☐ some graduate / professional school
- ☐ graduate / professional degree

31. What is your household's annual income? Check one.

- ☐ less than $20,000
- ☐ $20,000 to $29,999
- ☐ $30,000 to $39,999
- ☐ $40,000 to $49,999
- ☐ $50,000 to $59,999
- ☐ $60,000 to $69,999
- ☐ $70,000 to $79,999
- ☐ $80,000 to $99,999
- ☐ $100,000 and above

32. (Optional) To be eligible for the prize drawing, you must complete the survey and enter your home address below.

Address _____
City _____ State ____
Zip Code _____
Email Address _____

33. Comments / Suggestions

_____
_____
_____
_____
_____
_____

Now just tape closed and drop it in the mail. No postage needed.

Thank you for completing this survey!

Appendix H: Mail-back questionnaire (continued)

12. During the past month, how many times have you taken your bicycle with you on a SEPTA, NJ Transit, or other bus, using the bike rack on the front of the bus, or the luggage compartment?

BUS LINE	HOW OFTEN DURING THE PAST MONTH? daily or almost daily	10-20 times	1-9 times	never
SEPTA	☐	☐	☐	☐
NJ Transit	☐	☐	☐	☐
other: _____	☐	☐	☐	☐

13. During the past year, have you been in a collision or fall while riding your bicycle? Check all that apply.

- ☐ yes, with a motor vehicle
- ☐ yes, with a pedestrian
- ☐ yes, with another bicyclist
- ☐ yes, with an object / animal
- ☐ no

If you checked yes, how many accidents did you have?

- ☐ 1
- ☐ 2
- ☐ 3 or more

Did you go to a hospital emergency room for treatment of your injuries?

- ☐ yes, once
- ☐ yes, more than once
- ☐ no

14. How often do you wear a helmet while riding your bicycle?

- ☐ always
- ☐ sometimes
- ☐ never

15. How often do you ride at night, without a headlight?

- ☐ often
- ☐ occasionally
- ☐ never

16. Have you ever had formal instruction in school, or have taken a class, on bicycle safety, during which you rode on the street as part of the class experience?

☐ yes ☐ no

17. What discourages you from riding your bicycle more often? Check all that apply.

- ☐ unsafe road conditions
- ☐ speed / volume of traffic
- ☐ lack of bicycle lanes and trails
- ☐ no place to park bicycle securely
- ☐ health problems
- ☐ fear of crime
- ☐ destinations are too far away
- ☐ not enough time
- ☐ weather conditions
- ☐ lack of transit connections
- ☐ too hilly
- ☐ other (specify): _____

18. Please indicate how risky you would feel bicycling in each condition described below. Check one box for each condition listed.

CONDITION	very risky	risky	somewhat risky	not risky
rainy weather	☐	☐	☐	☐
snow or ice on road	☐	☐	☐	☐
heavy traffic volume	☐	☐	☐	☐
riding on a road with high posted speed limits	☐	☐	☐	☐
riding on a road with no shoulders	☐	☐	☐	☐
riding on the left side of the road facing traffic	☐	☐	☐	☐
riding in a bicycle lane	☐	☐	☐	☐
riding on the sidewalk	☐	☐	☐	☐
riding on a bicycle path	☐	☐	☐	☐
riding at night with a headlight	☐	☐	☐	☐
riding at night without a headlight	☐	☐	☐	☐
not stopping at a stop sign	☐	☐	☐	☐
not stopping for a red traffic light	☐	☐	☐	☐
potholes or debris in road	☐	☐	☐	☐

19. When riding your bicycle, how often do you obey the traffic laws listed below? Check one box for each situation.

SITUATION	always	usually	sometimes	never
stop at stop signs	☐	☐	☐	☐
wait for red lights to turn green	☐	☐	☐	☐
stop for pedestrians in crosswalks	☐	☐	☐	☐
observe bicycle warning signs	☐	☐	☐	☐
yield at yield signs	☐	☐	☐	☐
ride on the right side of the street	☐	☐	☐	☐

20. Please indicate the importance of each of the following conditions in encouraging you to bicycle more than you do today. Check one box for each condition.

CONDITION	very important	important	somewhat important	not important
wide travel lanes on roads	☐	☐	☐	☐
wide shoulders on roads	☐	☐	☐	☐
bicycle lanes on roads	☐	☐	☐	☐
signed bicycle routes on roads	☐	☐	☐	☐
paved paths along roads physically separated from motor traffic	☐	☐	☐	☐
paved trails along rivers and scenic areas	☐	☐	☐	☐
"Share the Road" warning signs	☐	☐	☐	☐
increased enforcement of traffic laws	☐	☐	☐	☐
education for bicyclists on how to deal with motor traffic	☐	☐	☐	☐
education for motorists on how to deal with bicyclists in traffic	☐	☐	☐	☐
secure bicycle parking at destination	☐	☐	☐	☐
more trail amenities (bike racks, benches, restrooms, etc.)	☐	☐	☐	☐
indoor bicycle storage, showers & locker room at work	☐	☐	☐	☐
less criminal activity on the streets	☐	☐	☐	☐
significant increase in the cost of driving	☐	☐	☐	☐
significant increase in transit fares	☐	☐	☐	☐
other (specify):_____	☐	☐	☐	☐

21. Your gender: ☐ male ☐ female

22. What is your race or origin? Check all that apply.

- ☐ White / Caucasian
- ☐ African American
- ☐ Asian
- ☐ Hispanic / Latino
- ☐ Other

23. What is your age group?

- ☐ 16-24 years
- ☐ 25-34 years
- ☐ 35-44 years
- ☐ 45-54 years
- ☐ 55-64 years
- ☐ 65 years or older

24. How many people live in your household, including yourself?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 or more

8. During the past month, how often did you use your bicycle for each of the following purposes?

TRIP PURPOSE	HOW OFTEN DURING THE PAST MONTH? daily or almost daily	10-20 times	1-9 times	never	HOW LONG IS YOUR TYPICAL ONE-WAY BICYCLE TRIP? time: (hours . minutes)	distance: (miles . tenths))
commuting to work	☐	☐	☐	☐	____ . ____	____ . ____
commuting to school	☐	☐	☐	☐	____ . ____	____ . ____
connecting with transit	☐	☐	☐	☐	____ . ____	____ . ____
work-related (on-the-job)	☐	☐	☐	☐	____ . ____	____ . ____
social visits	☐	☐	☐	☐	____ . ____	____ . ____
exercise or recreation	☐	☐	☐	☐	____ . ____	____ . ____
shopping, appointments, religious, errands	☐	☐	☐	☐	____ . ____	____ . ____

9. How many miles do you typically ride in a month, **May through October**? Check one.

- ☐ less than 10 miles
- ☐ 10 - 49 miles
- ☐ 50 - 99 miles
- ☐ 100 - 199 miles
- ☐ 200 miles or more

10. How many miles do you typically ride in a month, **November through April**? Check one.

- ☐ less than 10 miles
- ☐ 10 - 49 miles
- ☐ 50 - 99 miles
- ☐ 100 - 199 miles
- ☐ 200 miles or more

11. How often have you taken your bicycle aboard a train during the past month? Check one box for each train line listed below.

TRAIN LINE	HOW OFTEN DURING THE PAST MONTH? daily or almost daily	10-20 times	1-9 times	never
SEPTA Regional Rail	☐	☐	☐	☐
Market-Frankford El or Broad Street Subway	☐	☐	☐	☐
Route 100 Norristown High Speed Line	☐	☐	☐	☐
NJ Transit River Line	☐	☐	☐	☐
NJ Transit Atlantic City or Northeast Corridor lines	☐	☐	☐	☐
PATCO High Speed Line	☐	☐	☐	☐

Appendix I

Field operations manual

Appendix I: Field operations manual

Delaware Valley Regional Planning Commission

2005 Regional Bicycle Travel Survey

FIELD MANUAL

(Revised 9/26/05)

Survey purpose

The purpose of the Regional Bicycle Travel Survey is to collect data on bicyclists age 16 years and older, and bicycle trips taken by bicyclists age 16 years and older, throughout the region. This is the largest such survey ever conducted in North America. The data will be used for planning programs and facilities to encourage greater use of the bicycle for adult transportation, and to serve as a benchmark against which to measure change over time in bicycle transportation in the region.

Scope of work

The survey consists of two parts:

1. Distribution of a mail-back questionnaire to passing bicyclists; and
2. A short (less than one minute) interview conducted by survey staff with willing bicyclists, using an interview form.

Locations

The survey locations are shown in the attached maps and tables. Survey locations include street and highway intersections, multi-use trails, intersections of trails with streets and highways, rail stations and transit centers.

The survey station must be open on the day specified between 7 a.m. and 7 p.m. The minimum required number of surveys to be distributed are also indicated in the tables.

Equipment

Every survey station will be equipped by DVRPC with the following materials:

- ✓ Orange safety vests (one per survey worker)
- ✓ Name tags with holders, with DVRPC logo (one per survey worker)
- ✓ Business card for John Madera, DVRPC project manager (inserted in the name tag holder, behind the name tag)
- ✓ Clipboard (one per survey worker)
- ✓ A diagram of the survey location
- ✓ Pens
- ✓ Plastic warning signs reading "BIKE SURVEY AHEAD" (as many as needed)
- ✓ Twine and plastic zip-ties

- ✓ Scissors
- ✓ Plastic trash bags
- ✓ Mail-back questionnaires – English
- ✓ Mail-back questionnaires – other languages (at selected sites)
- ✓ Interview forms (to be filled out and retained by survey workers)
- ✓ Gift bags, to be distributed with the mail-back questionnaires and to interviewees.
- ✓ $10 cash for each survey worker, for meals
- ✓ First-aid kit (one per survey station)
- ✓ Traffic cones (two per survey worker)
- ✓ 11" x 17" placard announcing the survey in Spanish, Chinese, Vietnamese, and Cambodian (at selected sites)
- ✓ Large envelopes: one each for completed forms and for leftover forms

Everyone should bring a watch, for recording time on the interview forms. For your own comfort, you should also bring the following:

- ❑ Cell phone
- ❑ Water
- ❑ Snacks
- ❑ Folding chair
- ❑ Sunglasses
- ❑ Sunscreen
- ❑ Umbrella or raincoat
- ❑ Identification

Site set-up

Survey team members must report to the survey site not later than 6:45 a.m. for the morning shift, and 12:45 p.m. for the afternoon shift.

Signs -- With the exception of rail station platforms, every survey location shall be announced with orange diamond warning signs reading "BIKE SURVEY AHEAD" and containing the "BICYCLISTS COUNT" logo. One sign should be placed on each approach leg of the survey intersection. These signs are designed so that they can be easily tied to tree trunks, telephone poles, and metal signposts. Simply thread pieces of twine (provided) through the holes at the top and bottom of the sign, and tie around the tree trunk, pole, or other fixed object. These signs should be placed a minimum of 30 paces "upstream" of the location where you will be standing. Make sure that the sign is clearly visible to approaching traffic on the roadway or trail. At train stations and transit centers, you may tie a sign to any fixed object in the vicinity where you will be working.

While at the survey location, you will wear an orange safety vest and a nametag with the DVRPC logo. At trail, street and highway locations, you will stand on the curb or shoulder of the trail or road at the point closest to the stop bar at the intersection. Place boxes containing survey materials and gift bags on the sidewalk or shoulder in such a way as to avoid obstructing pedestrian traffic.

Survey procedures

Please arrive at the survey site 15 minutes before your shift is scheduled to begin. Volunteers will be paired with DVRPC employees, who will conduct a brief on-site training.

As a member of the survey crew, your job is to

1. hand out the mail-back questionnaires and gift bags to as many bicyclists age 16 years and older passing by your survey location as possible during the survey period; and
2. interview a small number of passing bicyclists age 16 years and older, recording responses and observations on a one-page interview form. You will also give interviewees a gift bag.

Only bicyclists 16 years and older may be surveyed. Bicyclists may be surveyed regardless of whether they're riding on the road, sidewalk, or trail, walking their bike, or parking their bike at their destination.

Distributing mail-back questionnaires – Survey crews will receive a pre-determined number of pre-paid, mail-back questionnaires for distribution during the course of the survey day. Approximately half of these questionnaires should be distributed between 7 a.m. and 1 p.m., and the other half during the rest of the day. Give only one questionnaire and one gift bag per bicyclist. Do not distribute gift bags without questionnaires.

Also, you may be given a small number of questionnaires printed in the following languages: Spanish, Chinese, Vietnamese, and Cambodian, depending upon the location you'll be working.

As a moving bicyclist approaches, hold up a gift bag and state in a loud and friendly voice ***"Bicycle Survey! Please stop."*** The best time to approach bicyclists, however, is when they are slowing for a stop sign, or when they are waiting at a red light. As you approach the bicyclist you should state the following in a clear and friendly manner:

"Excuse me. I am with the Planning Commission, conducting a survey of bicyclists. Please take this questionnaire, fill it out later, and drop it in the mail, to be eligible to win a $100 gift certificate. And please accept these gifts, our compliments. Thank you."

Should the bicyclist refuse or hesitate, don't be pushy; wish him/her a good day and move on to the next person.

Without endangering yourself, move about the intersection when it is safe to do so in order to reach more bicyclists. If one corner or leg of the intersection seems to have more bicycle traffic than where you're at, move to the busy spot. But be careful: do not dart out into traffic just to try and get an interview you've been waiting a long while for. Your safety is worth more than the interview.

At the end of the day any unused questionnaires and gift bags are to be returned to the survey manager.

Conducting intercept interviews – In many locations it would be fair to say that your day will go much like a day spent fishing: most of the time you'll spend waiting for a catch. It may be that you'll go 30 minutes or more without activity. At such locations you should attempt an interview with every passing bicyclist. Center City Philadelphia and certain trail locations most likely will be very busy at certain times of the day – so busy that it will be impossible to interview every passing bicyclist. In these situations it may be best that survey team members alternate tasks, with one hand out mail-back questionnaires and the other conducting interviews. Just make sure that interviews are conducted on each leg of the intersection, rather than all on just one or the other street.

As a moving bicyclist approaches, hold up a gift bag and state in a loud and friendly voice ***"Bicycle Survey! Please stop."*** The best time to approach bicyclists, however, is when they are slowing for a stop sign, or when they are waiting at a red light. As you approach the bicyclist you should state the following in a clear and friendly manner:

"Excuse me, may I ask you a few questions? I am with the Planning Commission, conducting a survey of bicyclists. This will take less than a minute and will be completely confidential."

Should the bicyclist refuse or hesitate, don't be pushy; ask if they would please take a mail-back questionnaire and complimentary gift bag. If no, wish him/her a good day and move on to the next person. If the bicyclist agrees, lead him/her off of the roadway or trail and conduct the interview. **For the safety of everyone, it is very important that neither you nor the bicyclist are standing in the roadway or trail during the interview.**

Filling out the interview form – Please look over the interview form, a copy of which is attached. Items #1 and 2, location number and day, should be already filled in before you approach the bicyclist. At the start of the interview fill in the current time of day.

Items 4 through 10 are for you to ask the respondent about the bicyclist's current trip. For the purposes of this survey, the trip origin is the place where the bicyclist first started pedaling, regardless of whether any part of the trip involved transit. If the bicyclist carried his/her bike on a car's rooftop or other carrier to a location before starting to ride, the trip begins at the place where the bicyclist began to ride. The trip ends at the bicyclist's one-way destination; not at the end of a home-to-home round-trip, unless the trip is for purely recreational or exercise purposes.

When asking each question, you will not have time to read every answer option. It is up to you to categorize the answer given, and check the appropriate box. You may read two or three options to the respondent as examples of how the question should be answered. You may ask for clarification of the response, i.e. "is that an office building?" For question 10, time and distance should include any legs of the trip involving mass transportation.

Items 11 through 17 are found in a box at the bottom of the form. Complete each item based on what you observe. Did you observe the bicyclist riding against traffic (#12: Wrong way?) and/or on the sidewalk (#13: Sidewalk?). Is the bicyclist carrying passenger(s) (#14)? If not, do not check any boxes.

Is the bicyclist wearing a helmet (#15)? Are any and all passengers wearing a helmet (#6)? Check both items either yes or no.

For item #17, please identify the type of bike to the best of your ability, and check the appropriate box. Study the attached "field guide" to the various types of bicycles.

At the end of the interview, thank the respondents for their time, hand them a gift bag and mail-back questionnaire, and ask them to please fill it out and drop it in the mail, so that they may be eligible for a prize drawing.

Respondents who do not speak English – You may encounter bicyclists who stop for the survey but who do not speak English. In case you cannot communicate with the respondent, hold up the foreign language placard and get the respondent to point to his or her language. Then give the respondent a mail-back questionnaire in that language, along with a gift bag, and say "thank you."

Other considerations

Breaks – You may take bathroom breaks as needed, and a lunch break if working a 12 hour shift. Please make sure that at least one survey team member remains on-site to safeguard materials and equipment.

Police officers – Municipal police have been notified that the survey is taking place. They will have the final word on the operation and safety of the survey. Please be courteous to police officers, and do not dispute their orders. If a police officer questions your purpose for being there, tell the officer that you are conducting a bicyclist survey on behalf of the Delaware Valley Regional Planning Commission, give the name of the local official listed on the site diagram who granted permission to conduct survey activities, and give him or her the survey manager's (John Madera's) business card.

In case of problems or questions about survey procedures – call John Madera at (856) 906-0610.

In case of emergency – If someone is seriously injured –another member of the survey crew, or a bicyclist, or even you – call 911 and ask for an ambulance. Then report the incident to John Madera at (856) 906-0610.

Weather – Persistent rain or the forecast of persistent rain will postpone survey activities until another day. John Madera will notify survey workers by telephone by 9 p.m. the evening before the scheduled survey in case of postponement because of weather. An intermittent shower or storm on the survey day will not cancel activities. Should it begin to rain, enclose the survey supplies in a plastic trash bags (provided) and take shelter until the rain stops.

Personal vehicles – If you arrive at the survey site in your own vehicle, you must park the vehicle in a designated parking space; or, if at a rural location, entirely off the traveled roadway and away from the interviewing area.

Smiles – Please remember that you are a representative of the Delaware Valley Regional Planning Commission. Please be courteous at all times to travelers and answer all reasonable questions as to the nature and purpose of the work briefly and concisely. Every member of the survey crew should make every effort to establish and maintain a friendly, cooperative attitude toward bicyclists (and motorists, too!) in order to gain cooperation in gathering the survey data.

At the end of the day – When leaving the survey station at the end of the day, the crew must remove the signs, cones, materials and all other equipment temporarily placed in the survey area. The station site must be left in a cleared and clean condition. The crew leader must return all completed questionnaires and interview forms, as well as unused forms and gift bags, to the office.

HAVE FUN – and remember: BE CAREFUL OUT THERE!

THANK YOU FOR YOUR HARD WORK TOWARD A SUCCESSFUL SURVEY!

Bicycling in the Delaware Valley in 2005: Use, Safety, and Demographics
Publication No. 07050

Date Published: November 2007

Geographic Area Covered: DVRPC 9-county region

Key words: bicycle, bicyclists, travel survey, trip characteristics, user characteristics, safety

Abstract: Because data on bicycling is needed to help guide transportation policy and capital investment, and to evaluate their effects on bicycle usage, the Delaware Valley Regional Planning Commission conducted its first-ever metropolitan bicycle travel survey, the most comprehensive look at bicycling ever conducted in the region and possibly the largest of its kind ever conducted in North America. The goals of the survey were to generate data on the characteristics of adult bicyclists and bicycle trips, and to ascertain bicyclists' travel behavior, attitudes and desires.

This report describes the survey design and procedures; and presents the principal findings of an analysis of the data collected during the survey. Conducted in the autumn of 2005, the survey collected trip data through roadside interviews of bicyclists intercepted at pre-selected sites; and user data through the distribution of mail-back questionnaires to intercepted bicyclists, attachment to parked bicycles, and through leaders of club rides. Trip characteristics recorded included length; duration and purpose; use of multiple modes; helmet use and riding behavior; and gender of rider. User characteristics included age, race gender, and socioeconomic status; bicycle ownership; estimated monthly usage by purpose and in combination with transit; safety habits and attitudes; and facility and policy preferences. Unique to this survey, data was collected on bicyclist crash experience during the previous 12 months. Responses are tabulated for the entire sample and by travel analysis "area type" in which the bicyclists were intercepted.

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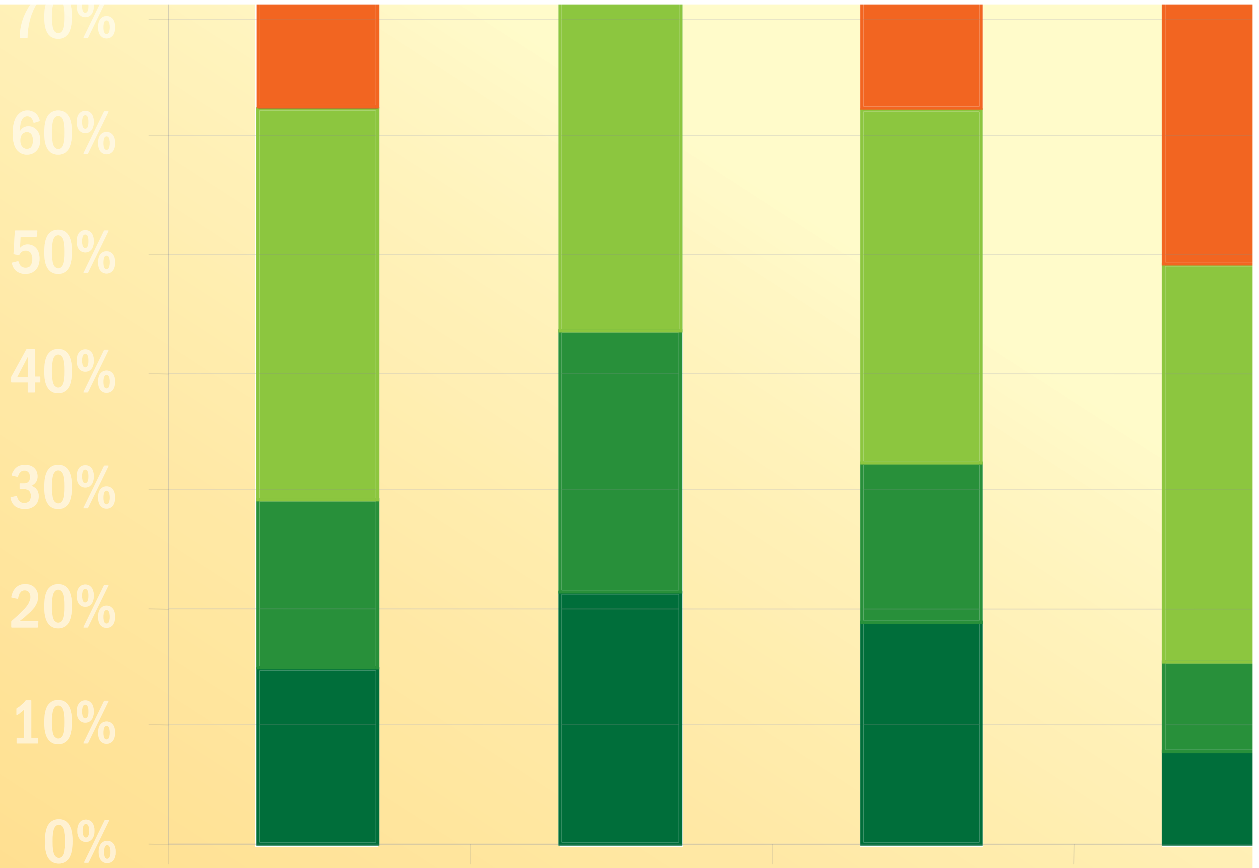

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