Fredericksburg Region Commuter

Workforce Skills Study

Prepared for the Fredericksburg Regional Alliance and the Fredericksburg Regional Chamber of Commerce

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Summary of Key Findings

- The estimated number of commuters is 61,639.
- The majority commute to Prince William County, Fairfax County, and Washington, D.C.
- More than half of all commuters estimate that it takes at least one hour to get to work each day.
- Commuters tend to have higher levels of education than non-commuters.
- More than half of all commuters work in the six Priority Industry Clusters identified in the Fredericksburg Region Industry Cluster Study.
- Commuters have higher average income than non-commuters at every level of education.
- Commuters are much more likely to have military experience (active duty or National Guard) than non-commuters (28% versus 12%), and commuters with military experience earn more than commuters without military experience.

Introduction

It is widely known that a large number of people leave the Fredericksburg Region each day to work in Northern Virginia and Washington, D.C. These commuters are a valuable resource that new businesses or businesses considering relocating to the region should be aware of. Unfortunately, the characteristics of these commuters are not well known. Consequently, the Fredericksburg Regional Alliance and the Fredericksburg Regional Chamber of Commerce requested that the University of Mary Washington conduct a study of the commuter workforce. The objective of this study is to develop a more accurate picture of the characteristics of the commuter workforce.

Two previous commuter studies have been prepared for the Fredericksburg Regional Alliance by the Center for Regional Analysis, School of Public Policy, George Mason University.[1] Those studies, however, relied upon surveys of a small subset of commuters: train riders and car poolers at commuter lots. Consequently, it is not possible to make inferences about the commuter population as a whole based upon evidence the survey results.

This study uses data collected by the United States Census Bureau through the American Community Survey (ACS). The ACS surveys one percent of the population each year. The surveys ask numerous questions relevant to an analysis of the commuter workforce: residence, place of work, commuting time, level of schooling, wages and salary, occupation, and industry. This study uses the most recent available three-year (2011-2013) sample of individual level data for the people living in the area of the

[1] *2003 Commuter Labor Study Fredericksburg Region* and *2006 Commuter Labor Study Fredericksburg Region* prepared for the Fredericksburg Regional Alliance by the Center for Regional Analysis, School of Public Policy, George Mason University.

Fredericksburg Region to construct estimates of the number of commuters as well as the characteristics of those commuters.

Microdata from the American Community Survey is available at both the level of the household and the individual. Households and individuals are identified only by serial numbers in the microdata set. In order to further protect the anonymity of survey participants, the Census Bureau does not release microdata for geographic regions with population of less than 100,000. To facilitate the use of the data, the Census Bureau created Public Use Microdata Areas (PUMAs). Two of these PUMAs (George Washington Region North and George Washington Region South) correspond to the Fredericksburg Region: Stafford, Fredericksburg, Spotsylvania, King George, and Caroline.[2]

Because the purpose of the study is to identify the characteristics of commuters for potential employers in the Fredericksburg Region, the study does not include active duty military personnel in estimates of the characteristics of commuters. Excluding active duty military also means that the results of the study should not be used directly for analysis of commuting for transportation purposes.

[2] Data collected in 2011 include Culpeper instead of Caroline, but both represent a small portion of the area's population.

Basic Characteristics of Commuters

This section examines the basic characteristics of the commuter workforce: the number of commuters, method of travel, time of commute, and destination.

Table 1 provides basic demographic information. Commuters are defined as people in the civilian labor force who live in the Fredericksburg Region but work outside of it. We estimate that 61,639 people are commuters.

Table 1. Basic Demographic Information

Population	Estimated Number of People
Virginia	8,184,299
Fredericksburg Region	346,048
Live and Work in the Region*	99,431
Commuters*	61,639
Active Duty Military	6,820

*Includes only civilian workers, not active duty military.

The total number of people who live in the region and are employed (commuters plus non-commuters) was 161,070.[3] These estimates for commuters differ from those reported by the Virginia Employment Commission, which reports that 60,311 people work in the area and 74,773 people commute to jobs outside of the area. The Virginia Employment commission numbers are based upon the Longitudinal Employment and Housing Dynamics (LEHD) Origin destination Employment Statistics. LEHD estimates are inferred from information government sources listing the address of the employee

[3] The Bureau of Labor Statistics estimate for the number of people who lived in the region and were employed in 2013 was 160,849. See http://www.bls.gov/lau/laucnty13.txt.

and the employer. If the location of the employer is outside of the region, the person is counted as a commuter regardless of whether they actually travel to that location to perform their work. Previous studies have suggested that caution should be used in interpreting LEHD commuting estimates.[4] In contrast, the ACS estimates are based upon survey participants' answers to questions about where they live and where they work. Consequently, we believe they are more likely to reflect the actual number of commuters.

Table 2 shows the number of commuters by method of travel. The primary means of transportation for commuters is automobiles, with the vast majority driving by themselves.

Table 2. Method of Travel

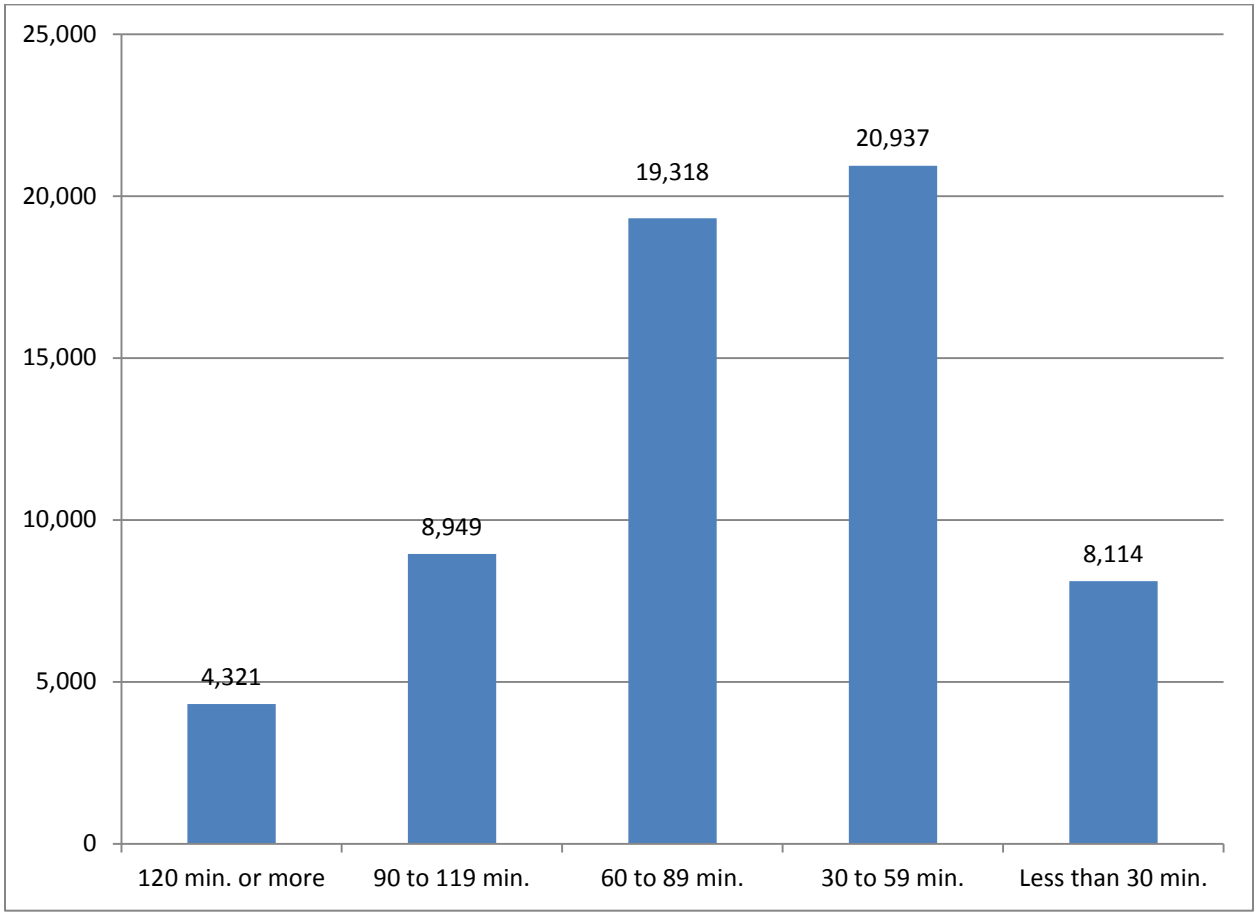
Method of Travel	Estimate
1 passenger	53,355
2 or more passengers	3,134
Bus	828
Train	2,925

Note: The numbers sum to 60,242 rather than 61,639 because several small categories (e.g., motorcycle and bicycle) are omitted.

[4] http://www.fhwa.dot.gov/planning/census_issues/lehd/lehdonthemap.cfm

The commute times are substantial. Figure 1 shows commute times in terms of how many minutes on average the person estimates that it takes them to get to work each day. In other words, the minutes indicate about half of the average daily commute time. **More than half estimated that it takes them at least an hour to get to work.**

Figure 1. Number of Commuters Grouped by Commuting Time



The vast majority of commuters from the Fredericksburg Region work north of the region. The most important destinations are Prince William County (including the independent cities of Manassas and Manassas Park), Fairfax County, and Washington, D.C.

Table 3. Place of Work

Location	Estimated Number of Commuters
Manassas, Manassas Park, and Prince William	17,216
Fairfax, Falls Church	14,760
Washington, D.C.	10,532
Alexandria	1,954
Maryland	3,317
Richmond City	1,038
Henrico	1,031

Note: The numbers in Table 3 do not sum to 61,639 because destinations with fewer than 1,000 commuters are not reported.

Education and Military Service

This section examines two characteristics that reflect the skills and experience of members of the commuter workforce: education and military experience. Table 4 shows the number of commuters by the highest level of education they have attained and provides a comparison with non-commuting workforce. Among commuters, 37% had attained a bachelor's degree or higher. Statewide about 32% of the adult population have attained at least a bachelor's degree.[5]

[5] Virginia Employment Commission, *Virginia Community Profile, George Washington RC*, Last updated 5/6/2015.

Table 4. Level of Education

Highest Level of Educational Attainment	**Commuters**		**Non-Commuters**	
	Estimate	**Percent**	**Estimate**	**Percent**
Advanced Degree	8,727	14%	10,611	11%
Bachelor's Degree	13,969	27 %	17,428	18 %
Sum of Bachelor's Degree and Advanced	**22,696**	**37%**	**28,039**	**29%**
Associate Degree	4,388	7%	7,588	8%
Sum of People with a College Degree	**27,065**	**44%**	**35,626**	**36%**
Some college but no degree	17,083	28 %	23,050	23%
High School diploma or GED (no college)	15,205	25%	31,708	32%

Commuters who have attained at least a bachelor's degree majored in a wide array of fields of study. The American Community Survey provides codes for more than 100 separate fields. In order to make the report manageable, the fields are grouped into categories of major fields of study. The number of commuters and non-commuters with degrees in each of these major fields of study are shown in Table 5. Not surprisingly, given its popularity as a college major, business is the largest single category.

Table 5. Fields of Study

Field of Study	**Commuters**	**Non-Commuters**
Business	6,327	5,680
Engineering	2,390	2,704
Social Science	2,023	2,574
Education	1,926	4,200
Physical Sciences	1,142	1,011
Computer science	1,063	1,358
Health	983	1,302
Life Sciences	835	1,141
Math	559	753

One of the most noteworthy characteristics of commuters from the Fredericksburg Region is their high rate of military service. Twenty-eight percent of commuters either served time as active duty military or members of the National Guard. In contrast, only 12% of the people who live and work in the region have military experience. The percentage of non-commuters who have military experience is comparable to the overall workforce in Virginia. Commuters, however, are much more likely to have had military experience than non–commuters. The likelihood of military experience also increases with level of education. Among commuters with at least a bachelor's degree, one-third had some military experience.

Table 6. Military Service

Category	Percent With Military Experience
Virginia	11%
Live and Work in Fredericksburg Region	12%
Fredericksburg Region Commuters	28%
Commuters with High School or GED	25%
Commuters with Associate Degree	24%
Commuters with Bachelor's Degree	34%

Employment

This section examines the characteristics of commuters in terms of the type of work they do. It provides estimates of the numbers of commuters by class of worker, industry, and occupation. It also relates the employment of commuters to the Priority Industry Clusters identified in the *Fredericksburg Region Industry Cluster Study*.

The American Community Survey defines class of worker in terms of the basic nature of the person's employer: private for-profit, private not-for-profit, federal government, state government, local government, and self -employed. Table 7 shows the number of commuters that fall into each category. More than half of all commuters are employed by private for-profit companies. The second largest category of employer is the federal government, which accounts for nearly one-third of commuters.

Table 7. Class of Worker

Type of Employer	Estimated Number of Workers
Private for-profit	33,191
Federal government	18,390
Local government	4,648
Private not-for-profit	2,473
Self-employed	1,483
State government	1,453

As with field of study, the American Community Survey provides more than 100 separate codes for industries, but it also groups these industries into broad categories. Table 8 shows the estimated number of commuters in each of these broad categories.

Table 8. Estimated Number of Commuters by Industry Categories

Industry	Estimate
Administration	18,327
Professional Services	10,134
Construction	5,379
Retailing	3,912
Education	3,906
Medical Care	3,196
Manufacturing	3,087
Transportation	2,617
Service	2,352
Entertainment	1,959
Finance	1,876
Infrastructure	1,625
Wholesaling	1,274
Utilities	1,127
Social Services	606

The largest single industrial category is Administration. **Within the category of Administration, more than half (9,963) are employed in the subcategory of National Security and International Affairs**

Administration. This subcategory also illustrates the important role played by military experience: 58% of commuters working in National Security and International Affairs Administration have military experience.

As with education and industries, the American Community Survey provides a large number of codes for separate occupations, but also provides broader groupings of occupations. Table 9 shows the number of people in each of these occupational categories.

Table 9. Occupational Categories

Occupational Category	Estimate
Office managers and administrative assistants	9,941
Manager	8,862
Computer and Information Systems	5,392
Police, Firefighter, Security	4,504
Construction	4,212
Business	3,139
Sales	2,997
Education	2,956
Transportation	2,843
Repair	2,786
Medical	2,374
Engineering	1,935
Finance	1,657
Production	1,434
Cleaning	1,397
Entertainment	1,230
Health Services	769
Legal	747
Scientists	566

Finally, Table 10 shows commuter employment in the six priority industry clusters identified in the *Fredericksburg Region Industry Cluster Study* prepared for the Fredericksburg Regional Alliance by Chmura Economics and Analytics. The estimates are based upon the NAICS codes identified for each cluster in the Industry Cluster Study. Clearly, commuters provide a large pool of experienced labor in several of the targeted industries. In all, more than half of all commuters (36,593) are employed in the six priority industry clusters.

Table 10. Commuter Employment in Priority Industry Clusters

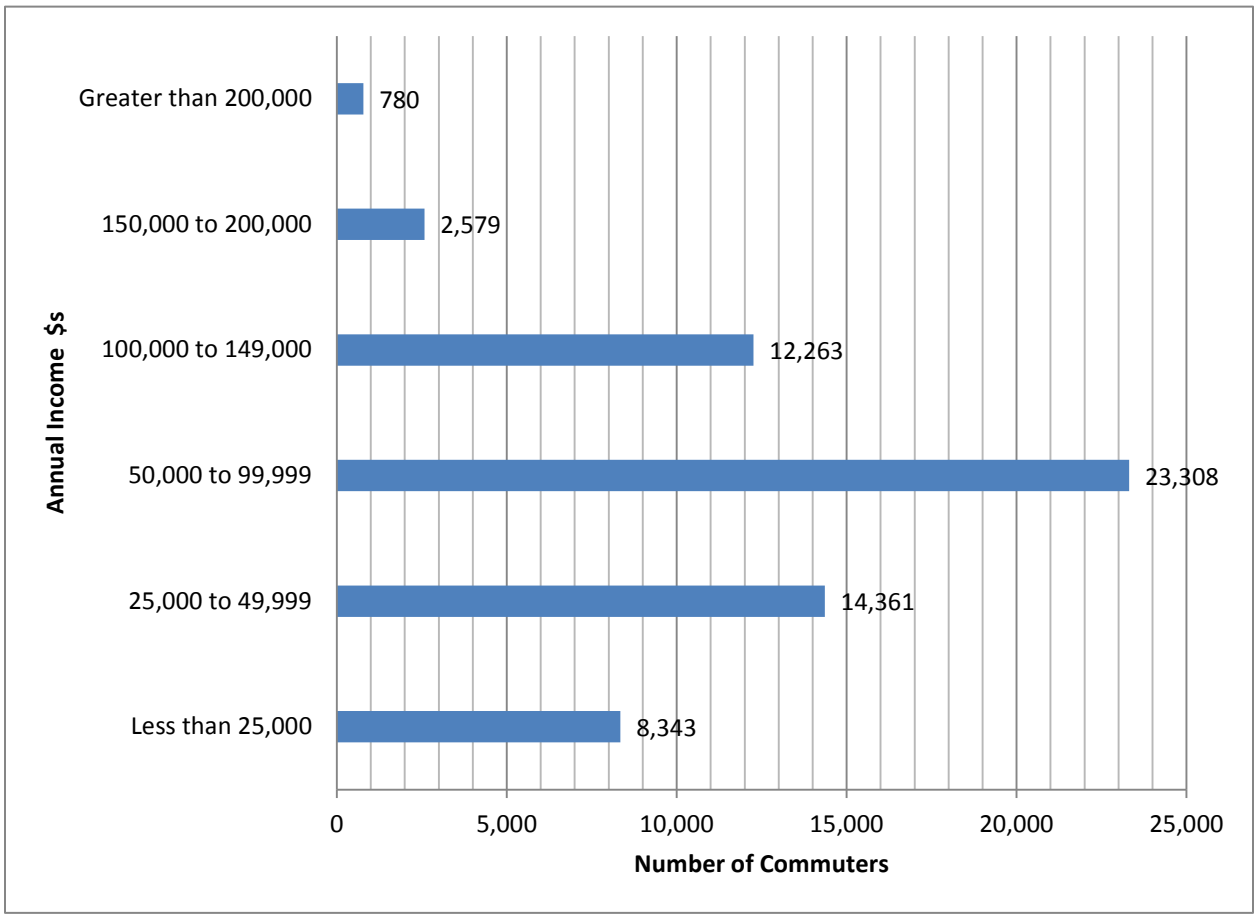
Industry Cluster	Estimate
Business Services	8,934
Finance, Insurance, and Real Estate	1,081
Health and Life Sciences	1,390
Information and Communication	3,801
Manufacturing	4,028
Public Administration	17,359

Income

Previous commuter studies surveyed commuters on the extent to which they would be willing to accept a lower income in exchange for a reduction in commuting time.[6] This question is not directly addressed in the American Community Survey. This study can, however, provide some context for considering this tradeoff by examining the differences in incomes between commuters and non-commuters, the extent to which these differences can be attributed to differences in observable characteristics like education, and the extent to which the differences appear to compensate people for the time and money spent on commuting.

[6] *2006 Commuter Labor Study Fredericksburg Region* prepared for the Fredericksburg Regional Alliance by the Center for Regional Analysis, School of Public Policy, George Mason University.

Figure 2. Distribution of Income for Commuters



How do salaries of commuters compare with salaries of non-commuters? As we noted earlier, commuters are more likely to have higher levels of education and more likely to have served in the military. However, as Table 11 shows, commuters tend to have higher average incomes at every level of education.

Table 11. Average Income by Level of Education

	Commuters	**Non-Commuters**
High School or GED	$59,230	$32,093
Associate Degree	$73,985	$44,922
Bachelor's Degree	$93,329	$68,803

Even among those with college degrees, incomes tend to vary a great deal based upon field of study. Table 12 shows that there is considerable variation in the average income of commuters based upon the field of study. The highest-paying fields of study are Computer Science and Engineering, and both of these fields also show significant differences in average income for commuters and non-commuters. For most fields, commuters have higher average incomes than non-commuters. The exceptions to the rule are Life Sciences and Health related fields. These results are consistent with the prominent role of health care providers in the economy of the region.

Table 12. Average Income by Field of Study

Field	Commuter	Non Commuter
Computer Science	$ 112,578	$ 80,897
Engineering	$ 126,091	$ 98,073
Life Sciences	$ 93,134	$ 96,374
Physical Sciences	$ 112,477	$ 97,185
Health	$ 56,262	$ 78,196
Business	$ 95,200	$ 71,314
Education	$ 73,195	$ 50,406
Social Sciences	$ 95,053	$ 65,228

The differences do not appear to be attributable to differences in level of education or age. Consider the case of computer science. Only a slightly higher percentage of commuters with computer science degrees have advanced degrees (27% of commuters versus 25% of non-commuters), and the average age is essentially the same (43 years for commuters and 42 for non-commuters).

The most noteworthy observable difference between commuters and non-commuters is military service. Commuters have rates of military service that are more than double those for non-commuters at every level of education. The positive effect of military service can be seen by comparing commuters with and without military service. Table 13 shows this comparison for two different levels of education. The average incomes of commuters with military service are noticeably higher than those of commuters without military service. But even those without military service have average incomes that are higher than those of non-commuters.

Table 13. Average Income of Commuters by Military Experience

	Military Experience	No Military Experience
High School or GED	$73,990*	$54,338
Bachelor's Degree	$110,902*	$84,172

*Includes income from wages, salaries, and self-employment, but not retirement income.

It is possible that some of the differences in average income that persist even after taking into consideration differences in education and military experience are attributable to characteristics that do not appear in the American Community Survey. For instance, it is possible that some of the differences are due to high-wage employers outside of the region selecting the most productive employees. However, it also seems reasonable to attribute much of the disparity in salaries to compensation for commuting.

From the standpoint of commuters, salaries need to reflect the compensation they expect to receive for their skills and experience and the compensation they expect to receive for the time and money they spend on commuting. Consider, again, the case of computer science. Seventy nine percent of commuters with degrees in computer science report that it takes at least one hour to get to work. Assuming a five-day work week for 50 weeks a year, these commuters spend the equivalent of at least 12.5 work weeks commuting. Compensation for time spent commuting is particularly relevant for the highest-income occupations because of the high value of their time.

In conclusion, commuters earn higher average incomes than non-commuters. These higher incomes appear to be attributable to higher levels of education, higher rates of military service, and compensation for time spent commuting. The fundamental implication of these high wages, however, is that they indicate high levels of productivity on the part of the commuter workforce. The high incomes of the commuter workforce are indicative of the value that employers place upon the skills and

experience they possess. Employers could not consistently pay high salaries unless these employed consistently make significant contributions to the revenue of the firms at which they work.

Conclusion

This study has examined the characteristics of the Fredericksburg Region commuter workforce. The key findings are:

- A large fraction (approximately 37%) of the area's workforce commutes to work outside the region.
- More than half of commuters spend an hour or more commuting in each direction.
- Commuters are more likely to have higher levels of education and military experience than non-commuters.
- Commuters have higher average incomes than non-commuters at every level of education.
- Commuters present a large potential pool of labor for businesses in the priority industry clusters identified in the Fredericksburg Region Cluster Study. More than half are currently employed in the targeted industry clusters.

Appendix: Description of the data and methodology.

The analysis in this report began by sorting out individuals who lived in the PUMAs that correspond to the Fredericksburg Region. From that group, the individuals in the civilian labor force were sorted out. Finally, commuters were identified as members of the civilian workforce who live in the region but work outside of it.

The Census Bureau provides weights for each of the individual observations. These weights can be used to estimate the number of individuals in the population that have any characteristic that was recorded in the survey. So, for example, summing the weights for all the individuals in the sample that live in Virginia produces an estimate of the population for Virginia. Summing the weights of all the individuals in the sample that live in the PUMAs designated 51115 and 51120 provides an estimate of the population in the Fredericksburg Region.

The ACS microdata provide a great deal of flexibility to the researcher. Individuals can be identified based upon any of the characteristics reported in the survey. However, the more finely the survey is sliced, the smaller the number of observations that an estimate will be based upon. The precision of the estimates will tend to decrease as the number of observations decreases. For, example, Table 14 shows the standard errors (calculated using the replicate weights method recommended by the Census Bureau) for the estimated number of commuters by level of education. Larger estimates are based upon larger numbers of observations and are, in general, more precise than smaller estimates.

Table 14. Standard Errors for Estimated Number of Commuters by Level of Education

	Estimate	Standard Error
Commuters	61,639	1,624
College Degree	27,065	1,156
Associate	4,369	486
Bachelor	13,969	868
More than Bachelor's	8,727	602