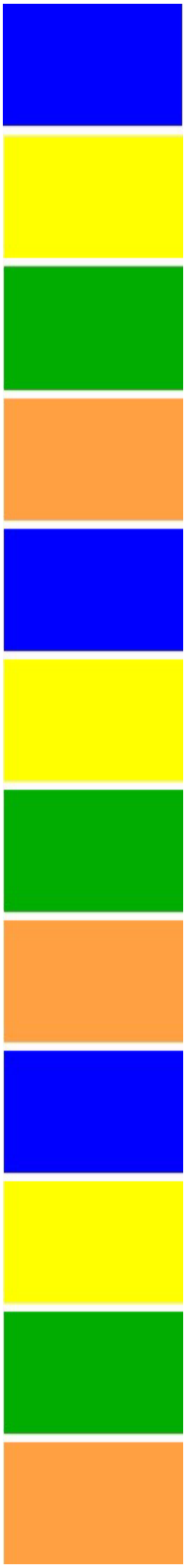
The Washington & Old Dominion Trail: An Assessment of User Demographics, Preferences, and Economics



The Washington & Old Dominion Trail: An Assessment of User Demographics, Preferences, and Economics

Final Report
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Introduction

This report is one in a three part series looking at linear recreation corridors, or trails, in Virginia. The intent of the series is to quantify a number of issues related to recreational trail use across different types of trails in the State. These issues broadly include: (1) trail use, (2) user demographics and preferences, (3) economic benefits to users, and (4) economic impacts to the local communities. Because of limited resources, gathering information from an extensive cross-section of trails in the state was not feasible. Therefore, as a starting point, three trails with different attributes and locations were chosen. The trails selected for this study include the Washington and Old Dominion Trail, the Virginia Creeper Trail, and the New River.

This report focuses on the Washington and Old Dominion Trail (W&OD), a 45-mile long transportation and recreation corridor running from Arlington, VA west to Purcellville, VA. The report is organized as follows. First, a brief description of the W&OD is provided. Next, the specific objectives of the W&OD study are presented. This is followed by a description of the research design employed at the site. A series of results sections follows. The first part includes statistical information about user demographics, trip profiles, attitudes and management preferences. The next part of the results section explores the economic benefits accruing to trail users and the economic impacts on the region stimulated by trail use. The report concludes with a summary and interpretation of key findings.

The Northern Virginia Regional Park Authority (NVRPA) was the primary on-site coordinator of the W&OD study, with support from the Project Planning Team. NVRPA provided a part-time volunteer coordinator, meeting space, supplies, materials and logistical support. The Northern Virginia Regional Commission (NVRC) provided technical expertise and assisted USDA Forest Service and University of Georgia staff with database development.

The Washington and Old Dominion Trail

The W&OD Trail is a 100-foot wide, hard-surfaced transportation and multi-use recreation corridor, located in northern Virginia. It is owned and operated by the NVRPA. The trail extends from the Washington DC urban metropolitan area, characterized by communities such as Arlington, and Falls Church, Virginia, through various suburban neighborhoods and rural towns to Purcellville, Virginia located in the Virginia piedmont, roughly 45 miles west of Washington DC. A parallel gravel trail is located for approximately 32 miles of the route, providing an opportunity for equestrians, mountain bikers, and joggers who typically prefer a softer surface. A more complete description of the W&OD, including access points, user information, historical notes, and detailed maps can be found at the website maintained by the Friends of the Washington & Old Dominion Trail www.wodfriends.org.

Map of the Washington and Old Dominion Trail in red. Courtesy of James Menzies.

Objectives

Consistent with the broader overall objectives of examining the economic benefits and impacts of recreation trails throughout the state of Virginia, the specific objectives for the Washington and Old Dominion Trail study were to:

1. Describe trail users and their current trip;
2. Examine user attitudes / preferences per
   a. trail attributes
   b. management / policy
   c. benefits
3. Estimate local economic impacts from nonlocal visitor spending;
4. Estimate net economic benefits for all trail users.

Research Design

The W&OD Trail study was conducted in 2003-2004, with data collection occurring between May 2003 and April 2004. The study took place on the trail, through a self-administered 2-page survey, made available to trail users by volunteers and NVRPA personnel.

Although various sampling methodologies were considered, a non-probability quota sampling approach was selected (Cochran, 1977). Quota sampling is similar to stratified sampling in that the researcher first identifies the strata and their proportions as they are represented in the user population. Then convenience or judgment sampling is used to select the required number of subjects from each stratum (http://www.statpac.com/surveys/sampling.htm). This differs from probability based stratified sampling, where each stratum is filled by random sampling. Overall a goal of 1500 completed respondent questionnaires was set. The quota sampling approach was

necessitated primarily by three factors: (1) the physical layout of the trail (45 miles with hundreds of access points), (2) financial limitations, and (3) volunteer labor constraints.

During the initial phases of project scoping, it was determined that the majority of data collection would need to rely on volunteers. To supplement labor, the Northern Virginia Regional Park Authority worked in collaboration with the Friends of the W&OD to recruit and train a 20-member volunteer data collection crew. It was estimated that a maximum of 200 volunteer hours could be provided in support of data collection. It was determined that NVRPA staff could cover weekday data collection, so that volunteer hours could be focused on Saturday survey sessions. At this rate, the planning team was confident that the goal of completing1500 surveys could be achieved using the 200 hours supplied by volunteers, plus the additional hours supplied by NVRPA staff.

In an effort to ensure that the data collected was representative of typical users of the W&OD Trail, the Project Planning Team established the following criteria to guide sampling:

1. Sample sites must be representative of the 45-mile trail corridor.
2. Sampling time allocated should be proportional to expected trail use, 25 percent weekdays, 75 percent weekends.
3. Sampling should be account for seasons, Spring (May), Summer (July), Fall (September/October), Winter (March).
4. Weekday data will be collected in 2 shifts: 10:00am-1:00pm to capture lunch time usage; and 3:00-6:00pm to capture commuter usage.
5. Weekend data will be collected throughout the day on Saturday during the following shifts: 9:00am-12:00pm, 12:00pm-3:00pm, and 3:00pm-6:00pm.

Twelve representative sites were identified by a team of managers and trail users throughout the trail corridor corresponding to the various landscape settings through which the trail traversed (Table RD-1).

Table RD-1. Data Collection Sites on the W&OD Trail.

Mile Marker	Town	Location
3.6	Arlington	Bluemont Park
7	Falls Church	Rt. 7
12	Vienna	Train Station
18	Reston	Duck Pond
24	Sterling	Rt. 28 Trailhead
26	Ashburn	Smith Switch Station rest stop
34.5	Leesburg	Raflo Park, Harrison Street
45	Purcellville	Hatcher Ave., Trailhead

Table RD-2. W&OD Trail Study, Sample Dates, Times, Locations

Season	Month	Days	Hours	Sites
Spring	May	Mon. 5/19/03	10-1, 3-6	Reston
		Sat. 5/3/03	9-12,	Arlington
		Sat. 5/24/03	12-3, 3-6	Arlington
		Sat. 5/3/03	9-12, 12-3	Sterling/Rt 28
		Sat. 5/24/03	3-6	Sterling/Rt 28
Summer	July	Tue. 7/22/03	10-1, 3-6	Arlington
		Sat. 7/19/03	9-12, 12-3, 3-6	Vienna
		Sat. 7/19/03	9-12, 12-3, 3-6	Leesburg
Fall	September/	Wed. 10/22/03	10-1, 3-6	Sterling/Rt28
	October	Sat. 10/11/03	9-12, 12-3, 3-6	Reston
		Sat. 10/11/03	9-12, 12-3, 3-6	Purcellville
Winter	March	Thur. 3/25/03	10-1, 3-6	Ashburn/Smith Switch
		Sat. 3/20/03	9-12, 12-3, 3-6	Falls Church

Given the guidelines and constraints outlined above, the following sampling plan was developed (Table RD-2). Specific Saturday dates were selected based on availability of volunteers and best professional judgment that the dates identified were representative of typical trail use.

The sampling framework led to 1426 completed survey responses following distribution across sites as listed in Table RD-3.

Survey Instrument

Two different questionnaires, one for locals and another for nonlocals (Appendix A), were developed to obtain information from trail users corresponding to the project objectives listed above. Common to both survey versions were sections about the current W&OD trip, annual use, personal benefits from trail use, as well as attitude and preference questions about trail issues, and demographics. The local questionnaire also included a section

Table RD-3.

Survey site	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Vienna	341	23.96	341	23.96
Bluemont	252	17.71	593	41.67
Rt. 28	214	15.04	807	56.71
Reston	260	18.27	1067	74.98
Raflo	199	13.98	1266	88.96
Purceville	65	4.57	1331	93.53
Arlington	31	2.18	1362	95.71
Falls Church	20	1.41	1382	97.12
S. Switch	16	1.12	1398	98.24
Sunset Hills	16	1.12	1414	99.36
Ashburn	7	0.49	1421	99.85
Duck Pond	2	0.14	1423	100.00

about management concerns and annual trail-related spending. In order to estimate the economic impact of visitor spending on the northern Virginia economy, the nonlocal questionnaire included a detailed section on current trip expenditures.

A two-step intercept procedure was used at the various sample points. First, trail users were approached and asked whether they would agree to partake in the study. If they agreed, they were asked whether they were from the Northern Virginia region that was identified as those jurisdictions located within the Northern Virginia Regional Park Authority district including the counties of Arlington, Fairfax, and Loudoun; and the cities of Alexandria, Falls Church, and Fairfax. All towns located within this 3-county area were also considered local (i.e., the towns of Vienna, Reston, Herndon, Ashburn, Leesburg, and Purcellville). Based upon their response, they were given a local or nonlocal questionnaire.

The survey instrument and procedure were pre-tested on Saturday, March 22, 2003 to identify any problems with the survey questions or format, as well as to determine the average number of surveys per hour that could be expected given typical usage rates, and skills of volunteer surveyors. During the pre-test, each volunteer surveyor averaged completing 6 to 7 surveys per hour.

Trail Use Estimation

While not an explicit objective of this study, an estimate of annual use on the W&OD is necessary to address the economic objectives discussed later in this report. Without the financial resources necessary to undertake a probabilistic sampling procedure leading to a statistically valid count of trail users, an ad hoc procedure was employed.

This procedure involved the combination of two pieces of information. First, during the summer of 2003, a student intern employed by NVRPA spent 32 hours collecting data on trail usage, working under the direction of the W&OD park manger. The purpose of the study was to count the relative numbers and types of trail users observed during typical hours of trail operation at randomly selected locations. To accomplish this task, the 45-mile long trail was divided into 8 regions that would serve as a cross section of trail use. Each of the 8 regions was surveyed 4 times- one weekday morning, one weekday evening, one weekend morning, one weekend evening. The survey consisted of a count of all trail users for a period of one hour. Trail users that passed the surveyor and then turned and passed again were not counted twice. Trail users on both the asphalt and the gravel trail were counted during the survey, however, children in strollers, bicycle trailers, and infant bicycle seats were not counted in this study. Cyclists on tandem bicycles were counted as two separate cyclists. If two or more people were walking together with a pet, they were all considered pet walkers. Over the course of 32 hours at 8 locations a total of 2,540 adult users were counted, implying an average of 79.375 users per hour at each location, or approximately 635 people per hour along the trail. Weekday counts averaged 62 users per hour, while weekend counts averaged 96.75.

The second piece of information leading to an annual visitation estimate was drawn from the local subgroup of the on-site survey described above. Included in the local questionnaire was a

question asking respondents to allocate seasonal shares to their annual use of the trail. On average, respondents claimed that 39 percent of their annual use took place in summer, followed by 28 percent spring, 27 percent in fall, and 12 percent in winter. These seasonal shares, while adding to 106 percent, were normalized to 100 percent and used to create seasonal factors that can be combined with average hours of trail use per day by season, summer counts, and days per season to arrive at an estimate of annual W&OD use by adults.

Based on the method described above, annual adult visitation for the W&OD is estimated to be 1,707,353 with summer having about double the use of fall and spring and about seven times as much use as the winter (Table RD-4).

Trail Users

This section of the report details three aspects of W&OD users. The first part describes visitor demographics including age, race, gender, residence, and other socioeconomic factors. The second part reports on the user trip profiles and annual use of the W&OD. Included are travel distances to, and on the W&OD, primary activities, number of annual trips, and group size. The final part of this section details user attitudes and preferences pertaining to a number of trail amenities (e.g., restrooms, water fountains, shade, and parking) and trail related issues (e.g., benefits, safety,

Table RD-4. W&OD Visitation Estimates

	Locations	Season Factor	Hours per Day	Season Days	Count Rate	Season Totals
Summer						
WE/HOL	8	1.000000000	14	28	96.750	303,408
WKD	8	1.000000000	14	52	62.000	361,088
FRI	8	1.000000000	14	12	79.375	106,680
Spring						
WE/HOL	8	0.615384615	12	26	96.750	148,608
WKD	8	0.615384615	12	52	62.000	190,464
FRI	8	0.615384615	12	14	79.375	65,649
Fall						
WE/HOL	8	0.593406593	12	31	96.750	170,858
WKD	8	0.593406593	12	47	62.000	166,002
FRI	8	0.593406593	12	13	79.375	58,783
Winter						
WE/HOL	8	0.219780220	11	35	96.750	65,492
WKD	8	0.219780220	11	42	62.000	50,363
FRI	8	0.219780220	11	13	79.375	19,957
Annual Total				**365**		**1,707,353**

above. It should be noted that locals, defined as people living in Northern Virginia, were the overwhelming majority of W&OD users. There were 1426 surveys completed during the sampling season along the W&OD. Locals comprised 95 percent of the completed surveys (1351 surveys), while nonlocals completed 75 surveys.

Visitor Demographics

Users of the W&OD are predominately white. Of the 1426 individuals filling out a survey, 85 percent were white (figure 1). The remaining ethnic groups responding to survey questionnaires were black (2%), Hispanic (4%), Asian (6%), and Native American (1%). The remaining 2 percent did not respond to the race/ethnicity question. The gender of W&OD users was split fairly evenly, with a slight edge going to females. Fifty-three percent of users sampled were female and 47 percent were male (figure 2).

Acknowledging that only those 16 years old and older were interviewed, the average age of respondents was 41 years old. Over 56 percent of the respondents were between the ages of 36 and 55. Trail users between the ages of 16 and 35 accounted for 25 percent of the sample. Respondents between the ages of 56 and 65 accounted for 14 percent of users, while visitors over the age of 65 accounted for 5 percent of the users surveyed (figure 3). These findings suggest that the W&OD is an outdoor recreation resource attracting primarily middle-aged users.

The average income for the entire sample is $98,590 (figure 4). The average income for the local user population was $98,549, while the average income for the nonlocal user population was $99,322. These means were calculated by multiplying the midpoints of each income category on

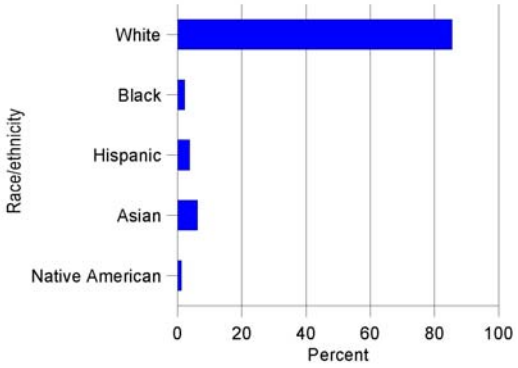

Figure 1. Percentage of respondents by race/ethnicity (n=1426).

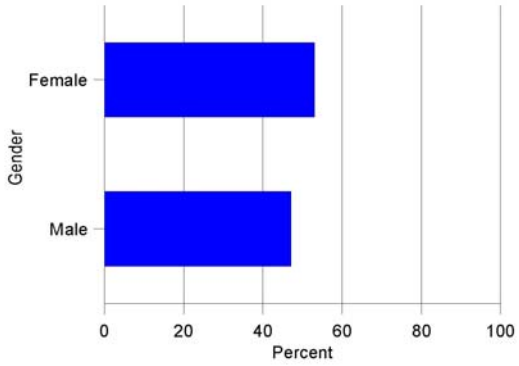

Figure 2. Percentage of respondents by gender (n=1342).

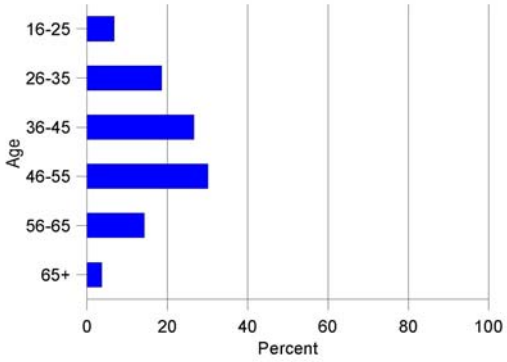

Figure 3. Percentage of respondents by age (n=1352).

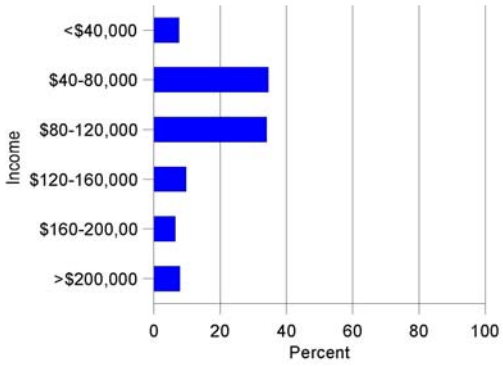

Figure 4. Percentage of respondents by household income (n=1107).

the respective questionnaires by the frequency for each income category. For the entire survey, 68 percent of respondents indicated a household income between $40,000 and $120,000. Seven and a half percent of respondents reported a household income less than $40,000 and 24.5 percent of respondents reported a household income greater than $120,000. It should be noted that 22 percent of those surveyed chose not to answer the income question.

Overall, just below 84 percent of users reported being currently employed (figure 5). The majority, 48 percent worked in the private sector, the federal government employed 20 percent, while 15 percent were self-employed. Of the 16 percent not currently working, 7 percent were retired and 5 percent were students. For the total sample, 5 percent chose not to respond to the employment question. One point of interest related to employment between the local and nonlocal populations was the difference in the numbers of users who were self-employed. Based on responses by the local population, 12 percent of W&OD users were self-employed, while over 87 percent of nonlocal users reported being self-employed.

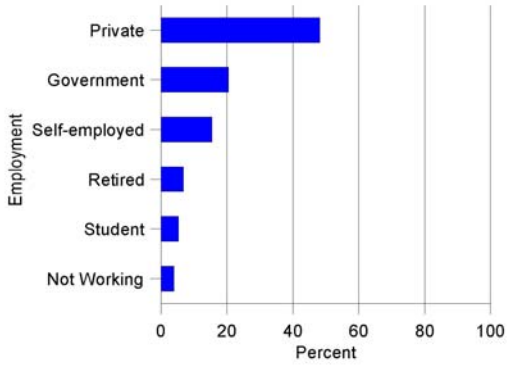

Figure 5. Percentage of respondents by type of employment (n=1355).

The average recreation group size for W&OD is 1.7 people. Single visitors (57%) comprised the largest group, while groups of two made up around 31 percent of those sampled (figure 6). About 2 percent of visitors were in groups of 6 or more, with a maximum reported group size of 50. This suggests that the vast majority of visitors are using the trail for some type of personal use before, during, or after work hours, not as a place to enjoy fellowship in groups.

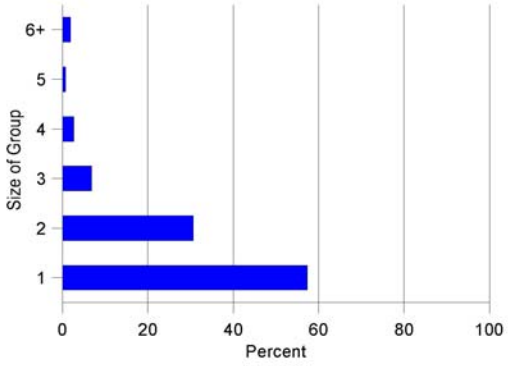

Figure 6. Percentage of respondents by size of group (n=1422).

Trip Profile

For the entire sample, the average distance traveled (one way) to reach the W&OD was 19 miles. The average time spent traveling was 18 minutes. These distance and one-way time numbers suggest a user population comprised primarily of local users. Local users, 95 percent of those sampled, traveled an average of 10 miles from home or work to use the W&OD, with an average reported travel time of 14 minutes. It should be noted that among locals, 26 percent actually lived directly adjacent to the trail and hence reported a travel distance of zero. Nonlocal users (5%), traveled 186 miles on average to use the W&OD, with an average travel time of approximately 3 hours. While in the

local area, 89 percent of nonlocal users did not stay adjacent to the W&OD. Fifty-six percent of nonlocal W&OD users were in the area for the primary purpose of visiting the W&OD. Modes of travel to reach the W&OD were fairly evenly split between auto (44%) and bicycle (38%). Walking to the trail accounted for 15 percent of users, while taking a bus or the metro was the mode chosen by 2 percent of users (figure 7).

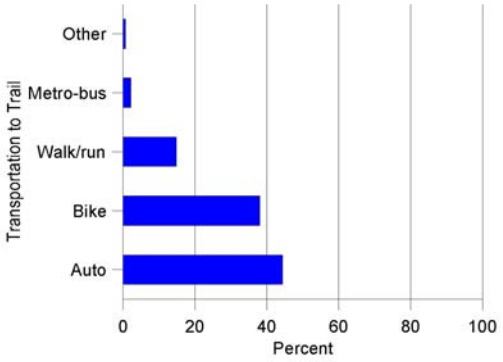

Figure 7. Percentage of respondents by transportation used to reach the trail (n=1411).

The annual number of visits taken to the W&OD by nonlocals is 16.5. Sixty-three percent of nonlocals took fewer than four trips per year. The remaining 37 percent took from 5 to 325 annual trips. It should be noted that because of the small number of nonlocal respondents in the sample, averages can be greatly influenced by a small number of observations. For example, 4 out of 73 nonlocals averaged close to 200 trips per year. Removing these 4 observations (5%) from the sample lowers the average number of trips per year by nonlocals from 16.5 to just over 6. The average number of monthly trips taken by local visitors is just over 10. This equates to about 120 annual trips to the W&OD.

W&OD use among locals was distributed fairly evenly over the various seasons. On average, users claimed that summer accounted for 39 percent of their trail use. Spring (28%) and fall (27%) were next, followed by winter at 12 percent (figure 8).

The average time spent while on the W&OD was 2 hours with an average travel distance of 20.2 miles. Local users dominated the average travel time and distance estimation. Local average time spent on trail was 2 hours, with an average travel distance of 19 miles. Nonlocal average time spent on the W&OD was 3.4 hours with an average travel distance of 32.6 miles.

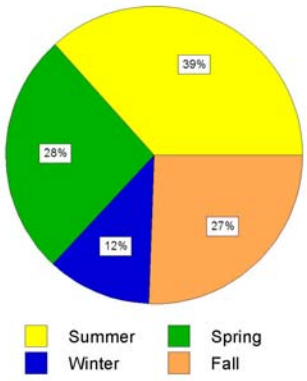

Figure 8. Percentage of respondents by season of use.

The primary reason for users being on the W&OD was recreation and fitness (84%). Training for an upcoming event comprised 7 percent of the reported primary reason for being on the trail, while the commuting accounted for 6 percent. The remaining 3 percent was split among pets, nature, and other (figure 9).

Among the users, biking (66%) was the leading observed activity (figure 10). Walking and jogging each accounted for 16 percent of the users, while skating and pets accounted for 3 percent and 2 percent of users, respectively. One

percent of users were pushing strollers, while 2 of the 1426 respondents were on horseback. It should be noted that the percentages here sum to more than 100 because they are not necessarily mutually exclusive.

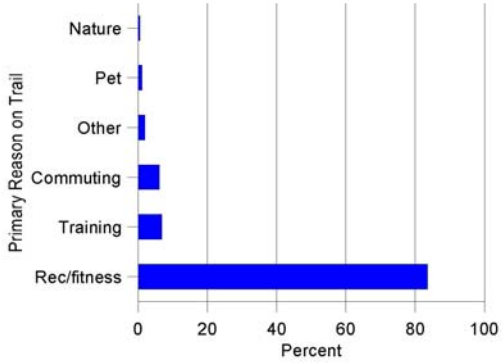

Figure 9. Percentage of respondents by primary reason for being on trail (n=1415).

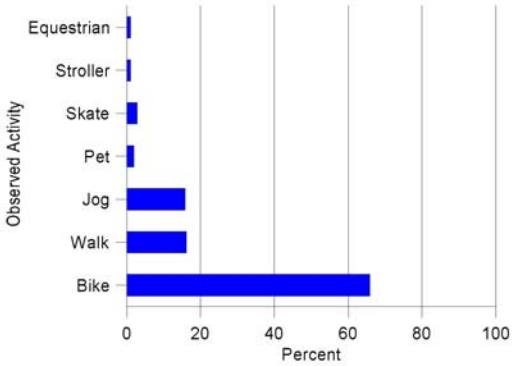

Figure 10. Percentage of respondents by observed activity (n=1426).

Preferences and Satisfaction

This section is divided into three parts. These parts include benefits received from W&OD use, trail issues, and management issues. The benefits section includes health & fitness, viewing nature, safety, commute alternatives, pet use, community feelings, and training. In this question, the respondent was asked to rate the level of different benefits they received from using the W&OD. The rating system is a likert scale with benefits being ranked ordinally ranked as high, medium, low, or none.

Trail issues included questions related to parking, scenery, shade, restrooms, maintenance, water fountains, community, and commerce connections. Each item in the trail issues section consists of two likert scales, one measuring importance to the respondent and the other measuring the current condition of the item. The scale for the condition section contains rankings of excellent, good, fair, and poor. The scale for the importance section is high, medium, low or none.

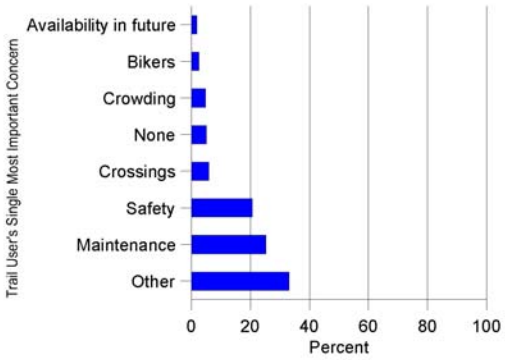

Figure 11. Percentage of respondents by trail users' single most important concern (n=571).

The management issues section asks respondents to indicate whether they strongly agree, agree, disagree, or are uncertain about specific management questions. These questions include how they feel about crowding, safety, construction along the trail, and rules. These questions were designed to determine how these management issues affect the quality of W&OD trips. Also included in this section, were questions that asked respondents to voice other concerns they have while using the

W&OD. In addition, users were asked who they thought owned the W&OD.

Trail Benefits

Table TU-1 displays responses to questions related to various benefits that visitors gain from using the W&OD. These benefits were ranked from high (4), medium (3), low (2) and none (1). Health received the highest ranking of the seven benefits categories. The mean response for health related benefits were 3.91. Over 92 percent of respondents ranked health benefits as high. Health was followed by safety, which had a mean response of 3.71. Seventy-three percent of respondents ranked the benefit from being able to recreate in a safe environment while on the W&OD as high. Benefit from opportunity to view nature (3.55) and community benefits (3.18), followed health and nature. Sixty percent of respondents ranked benefits from the opportunity to view nature as high and only 5 percent ranked it as low or none. Forty-seven percent of respondents indicated a high level of benefit from a sense of community while on the W&OD.

The category referring to benefits for training (3.11) on the W&OD followed benefits from sense of community. Fifty-four percent of respondents indicated that the W&OD ranked high as a place to train for events. The remaining two categories, commute alternatives (2.27) and pet related activities (2.06), received the lowest rankings. For both categories, less than 50 percent of respondents indicated that they received high benefits for these uses. Thirty-nine percent of respondents received high benefit from the W&OD as a commute alternative and 23 percent of respondents indicated they received high benefits from the W&OD for pet activities.

The results for the W&OD benefits questions suggest that health, safety, and a sense of community are the most important benefits visitors get from the W&OD. More than 94 percent of respondents listed benefits for these three categories as being high or medium, with over 60 percent listing high. These results also suggest that users do not receive as high a benefit from the W&OD as a commute alternative or as a place to take pets. Such results are in consistent with the reported percentage of commuters (6%) and people with companion animals (2%). It should be noted that while the question only asked for the level of benefits on the current W&OD visit, people tended to answer more generally. A sense of community is the most important benefits visitors get from the W&OD. More than 94 percent of respondents listed benefits for these three categories as being high or medium, with over 60 percent listing high. These results also suggest that users do not receive as high a benefit from the W&OD as a commute alternative or as a place to take pets. Such results are in consistent with the reported percentage of commuters (6%) and people with companion animals (2%). It should be noted that while the question only asked for the level of benefits on the current W&OD visit, people tended to answer more generally.

Table TU-1. Benefits of the W&OD

Benefits	High (4)	Med (3)	Low (2)	None (1)	Mean	Rank
Health (n=1355)	92.54	7.01	0.30	0.15	3.91	1
Nature (n=1340)	60.22	34.70	4.70	0.30	3.55	3
Safety (n=1339)	73.34	25.09	1.34	0.22	3.71	2
Commute alternative (n=1272)	25.86	14.94	20.20	39.00	2.27	6
Pets (n=1233)	22.71	12.98	12.33	51.99	2.06	7
Community (n=1313)	47.14	32.22	12.49	8.15	3.18	4
Training (n=1288)	54.19	20.42	7.61	17.78	3.05	5

Table TU-2. Please rate these features: first conditions and then importance.

	CONDITIONS					
Area features	Excel (4)	Good (3)	Fair (2)	Low (1)	Mean	Rank
Parking (n=875)	49.03	42.63	7.09	1.26	3.39	3
Scenery (n=1102)	48.91	44.92	5.81	0.36	3.42	1
Amount of shade (n=1070)	32.15	49.35	16.36	2.15	3.11	4
Restrooms (n=965)	22.90	44.35	22.07	10.67	2.79	8
Maintenance (n=1080)	47.87	44.91	6.20	1.02	3.40	2
Water fountains (n=989)	23.15	44.29	24.57	7.99	2.82	7
Community connections (n=976)	29.51	54.41	14.04	2.04	3.11	4
Commercial connections (n=947)	25.34	54.80	18.16	1.48	3.04	6

	IMPORTANCE					
Area features	High (4)	Med (3)	Low (2)	None (1)	Mean	Rank
Parking (n=1275)	32.86	21.18	19.61	26.35	2.60	8
Scenery (n=1321)	64.04	31.49	3.56	0.91	3.58	2
Amount of shade (n=1313)	27.88	49.35	18.43	4.34	3.01	5
Restrooms (n=1317)	32.42	39.41	21.79	6.38	2.97	6
Maintenance (n=1313)	78.60	19.76	1.37	0.38	3.76	1
Water fountains (n=1305)	44.90	38.39	13.56	3.14	3.25	3
Community connections (n=1289)	42.28	35.53	15.59	6.60	3.13	4
Commercial connections (n=1291)	26.34	39.43	26.72	7.51	2.84	7

Trail Issues

The trail issues section of the visitor survey asked respondents to indicate the importance of various trail related issues and the current condition of these issues. Specific issues included parking, natural scenery, amount of shade, restrooms, trail maintenance, water fountains, connecting paths to community parks and services, and connecting paths to commercial establishments. By asking for importance and condition, one is potentially able to identify areas of concern to management. For example, if a particular issue is deemed to be very important, but the current condition is rated as poor, then it would most likely be an area worthy of management's attention. Similarly, if the condition is mediocre or poor, but the importance is very low, then it is likely not worth management time or money to improve the condition.

Frequencies, mean responses, and rankings for the trail related issues are reported in Table TU-2. The four trail issues ranked highest for importance were maintenance (3.76), natural scenery (3.58), water fountains (3.25), and connecting paths to community parks and services (3.13). In fact, of the four highest ranked trail issues, only trail maintenance and scenery had more than 50 percent of respondents indicate highly important. The amount of shade (3.01) was the only other issue scoring between medium and high importance. Among the least important issues, relatively speaking, were the related issues of restrooms (2.97), connecting paths to commercial establishments (2.84), and parking (2.60). Nevertheless, fairly large contingents of users found these items to be of high importance with nearly one-third rating restrooms and parking as highly important, while one-fourth rated commercial connections as highly important. Given that over 20 percent of users live adjacent to the trail, and that biking is the primary mode of transport while on the trail, it isn't surprising that parking scores lowest on average across all users, in spite of its high importance to a large user segment.

Frequencies, means, and rankings for observed conditions related to each of the trail issue categories are also reported in Table TU-2. Scenery (3.42), maintenance (3.40), parking (3.39), connecting paths to community parks and services (3.11), and the amount of shade (3.11) were ranked highest according to observed current conditions. More than 90 percent of users rated the natural scenery, maintenance, and parking as excellent or good. Ranking lowest in observed condition were water fountains (2.82) and restrooms (2.79). Commercial connections had a mean response of 3.04.

In general, these rankings suggest a couple of things. First, the trail appears to be managed in a way where those issues that are most important to users are being provided at good to excellent levels. The lone exception appears to be water fountains, which, while ranking as third most important (3.25), scored second to last (2.82), between fair and good in current condition. While parking ranked last in importance (2.60), it was provided at good to excellent levels and ranked third in current condition (3.39). Only 8 percent of users rated parking along the trail as either fair (7%) or poor (1%). This result would appear to suggest that developing more parking is unwarranted.

Management Issues

In this section, visitor responses to four policy statements pertaining to management issues along the W&OD are presented. These management issues include the potential negative effect of crowding, whether the W&OD is a safe place for families, elderly, and children to recreate, the potential negative effect of trail-side construction, and whether the trail rules & regulations are well enforced. The findings from these questions are reported in Table TU-4.

Table TU-4.

Item	Strongly Agree	Agree	Disagree	Strongly Disagree	Undecided	Mean	Rank
Crowding (n=1327)	17.63	37.75	32.03	8.82	3.77	0.47	3
Safety (n=1337)	36.65	52.95	5.76	1.50	3.14	2.35	1
Construction (n=1323)	10.58	28.87	42.25	11.04	7.26	-0.29	4
Rules (n=1316)	29.51	40.50	16.72	2.28	11.09	1.56	2

The survey asked respondents whether they strongly agree, agree, disagree, strongly disagree, or are uncertain about the management statements. For comparison purposes, these ordinal responses are assigned numerical values as follows: strongly agree (4), agree (2), uncertain (0), disagree (-2), and strongly disagree (-4). Mean values ranging from +4 to -4 can are then computed to give an idea about the overall strength of agreement or disagreement with the statement. Also included in this section are findings from two open-ended questions asked only of local users. One question asks for the respondent's greatest concern regarding management of the W&OD, while the other asks whether the respondent is aware of who owns and operates the trail.

The first statement claimed that crowding often negatively affects the quality of one's W&OD visits. The mean response to the crowding statement is 0.47 indicating mild agreement that crowding often negatively affects one's W&OD visits. Fifty-six percent of respondents either strongly agreed (18%) or agreed (38%) with the statement. About 41 percent of users disagreed (32%) or strongly disagreed (9%) with the statement.

The next statement claimed that the W&OD was a safe place for family groups, elderly, and children to recreate. Nearly 90 percent of users either agreed (53%) or strongly agreed (37%). The mean value for this statement was 2.35, the strongest level of agreement among the four management issue statements. Only 7 percent of respondents disagreed with the statement thus implying the W&OD was not a safe place to recreate for families, elderly, or children.

The third management statement claimed construction projects like fiber optic cable and overhead utilities projects negatively affect one's visits to the W&OD. The mean value for this statement was -0.29 indicating very weak disagreement. Over 53 percent of respondents either disagreed (42%) or strongly disagreed (11%) with the statement. Over 39 percent of respondents strongly agreed (11%) or agreed (29%) that construction projects have a negative affect on W&OD visits.

The final management statement claimed that trail rules and regulations were well enforced on the W&OD. The mean response to this question was 1.56 indicating general agreement. Seventy percent of respondents strongly agreed (29%) or agreed (41%) that rules along the trail were well enforced. Seventeen percent of respondents disagreed with the statement and 2 percent strongly disagreed. Just over 11 percent were undecided.

User responses to the management statements can be summarized as follows. First, users are in strong agreement that the W&OD is a safe place for families, elderly, and children to recreate. Second, most visitors find the rules and regulations to be well enforced, with fewer than 20 percent of users thinking otherwise.

Results for crowding and construction are mixed. While both statements lead to mean values approaching zero (0=uncertain), the number of respondents expressing uncertainty with either statement is less than 10 percent. The fact that large numbers of users agree and similarly large numbers disagree with the statements suggests that the issues of crowding and construction along the trail could well become problems for management.

Also included in the management section were two open-ended questions. These questions were only asked of local respondents. The first asked for the respondent's greatest concern along the W&OD (figure 11). The second asked whether the respondent knew who owned and operated the trail. The three concerns most often expressed by trail users were maintenance, safety, and street crossings. Twenty-five percent of respondents who answered the question explicitly indicated that maintenance was their chief concern. Maintenance was followed by safety (21%) and street crossings (6%). Five percent claimed to have no concerns and another 5 percent listed crowding as their single most important concern. Three percent listed aggressive bikers and 2 percent expressed the most concern about the availability of the W&OD in the future. It should, however, be noted that 58 percent of all local respondents chose not to answer this open-ended question. While not explicit, this result would appear to suggest that at least half of the W&OD users are reasonably content with current conditions and do not have an over-riding concern.

Respondents were also asked who they thought owned the W&OD. Again, there were varied responses to this question. Forty-seven percent of respondents indicated that they did not know who owned the W&OD. Thirty-five percent correctly listed the Northern Virginia Regional Park Authority (NVRPA) as the trail's owner and operator. Eighteen percent of those answering this question selected an alternative agency or institution. If one considers that 656 of 1351 locals chose not to answer the question, it is likely that well over half of those using the W&OD have no idea who owns and operates the trail.

Economics

In this section of the report, two important economic aspects related to the use of the W&OD are discussed, economic impacts and net economic benefits. Economic impacts basically trace and measure the effects of visitor spending on the regional economy. These effects are quantified in dollars of

output and jobs. Net economic benefits or consumer surplus is a measure that indicates the value of a resource. In the case of unpriced access to recreation resources like the W&OD, it represents the dollar amount that individuals are willing-to-pay to use the resource above and beyond what they must pay to use the resource. More complete discussion of these and related concepts, such as price elasticity, along with estimates for the W&OD are provided in the sections below.

Economic Impact Analysis

This section examines visitor expenditures and the impact on the local economy. One of the primary objectives of this project was to estimate the economic impact to northern Virginia counties of nonlocal trips to the W&OD. Nonlocal expenditures related to recreation use impact the local economy in the form of increased output, income, and jobs. These increases are quantified by performing economic impact analysis. Economic impact analysis estimates the changes in regional economic activity that result from some action, measured as changes in visitor spending, regional income, and/or employment (Stynes 2004; Bergstrom et al. 1990). There are three components necessary to perform impact analysis:

1. Obtain an accurate number of users and user types.
2. Estimate average spending per person per trip for each user type.
3. Estimate direct and secondary effects of visitor spending.

Impact analysis can be performed as ex ante or ex post analysis. Ex ante is used when trying to determine impacts from proposed or hypothetical changes and ex post analysis is used for projects that currently exist. In ex post analysis impacts are measured as changes in economic activity resulting from the loss of visitors to the area. This method is frequently used when estimating the impacts of recreation visitors and the impacts they have on the local economy. In ex post impact analysis it is assumed that visits and expenditures related to recreation would be lost to the local economy as a result of site closure. If there are other recreation opportunities within the region that could absorb visitors lost as a result of site closure, this assumption may not hold (Stynes 2004).

Total economic impact is a combination of direct spending (direct effects) and secondary spending (secondary effects). Direct spending is the total amount spent by nonlocal visitors in the local economy. These expenditures represent the direct economic effects of recreation on the local region. The direct effects of visitor expenditure create a "ripple" effect within the local economy. Initial nonlocal expenditures stimulate local industries and businesses that supply the recreation and tourism sectors. This stimulation provides income to employers and employees that can be spent within the region. These effects related to visitor expenditures are termed secondary economic effects. Secondary effects are made up of indirect and induced effects. Indirect effects are changes in sales, income, or jobs to suppliers of the recreation and tourism sectors within the region. Induced effects are increased regional sales that result from income earned in recreation or supply sectors (Stynes 2004).

Estimation of Total Group Trips

As described above, estimation of total economic impacts first requires

estimates of total recreation visitation. Total visitation was estimated based on the trail counts and survey information described in previous sections of this report. This use estimate represents the annual number of visits taken to the W&OD. In order to estimate economic impacts, this estimate was converted to group trips as described below. A group trip is defined as one group taking one recreational trip to the W&OD.

As described above, for estimation of economic impacts we are concerned with trips to the W&OD from nonlocal visitors. Thus, the first step was to estimate total number of visits from nonlocals by multiplying the 1,707,353 estimate of visits from all visitors by the percentage of visits from nonlocals (5.24%) estimated from the survey data; the result was 89,807 nonlocal visits. Next, the 89,807 estimate was divided by the mean number of persons per group (2.69) estimated from the survey data to generate a total group visits estimate of 33,262. Although a group may take multiple visits to the W&OD on the same trip (e.g., multiple visits over a several day trip), we assume for estimation of economic impacts that groups only visit the W&OD once per trip. Hence, the estimate of 33,262 group visits directly converts to an estimate of 33,262 group trips.

Estimation of Group Trip Expenditures

The expenditures of importance in an economic impact analysis are nonlocal expenditures. Nonlocal expenditures represent "new" money being brought into the local economy that increases total wealth in the economy resulting in economic growth.

Nonlocal expenditures by major spending categories were estimated from responses to trip expenditure questions included in the on-site survey conducted of W&OD visitors. The expenditure questions asked for information to determine group expenditures within 25 miles of the W&OD and group expenditures for the whole trip. The expenditure questions also asked the respondent about the size of their spending party. Table EI-1 shows estimated spending per trip per group on major expenditure categories.

Table EI-1. Expenditure profile for nonlocal primary W&OD Visitors

	N=60, spending party = 2.69			
Expenditure type	w/in 25 miles	entire trip	per person w/in 25 miles expenditure	per person per trip expenditure
Lodging	10.50	56.00	3.90	20.81
Restaurants and Bars	17.30	70.20	6.43	26.09
Groceries, Carry out food	2.55	34.43	0.94	12.79
Gas and Oil	9.00	29.63	3.34	11.01
Other Vehicle Expenses	0.16	2.43	0.06	0.90
Use Fees	1.66	1.66	0.61	0.61
Souvenirs, Other expenses	0.33	4.56	0.12	1.69
Total	41.50	198.91	17.16	73.90

Estimation of Total Economic Impacts

The direct, indirect and induced effects of recreation expenditures per 1,000 group trips were estimated by first multiplying average expenditures per group trip for each user category by 1,000. These direct expenditures per 1,000 group trips were then entered into the National Park Service Money Generation Model, Version 2 (MGM2) and the model estimated the total effects (direct, indirect and induced effects) of visitor expenditures. The MGM2 model was developed at Michigan State University in cooperation with the National Park Service by Dr. Daniel Stynes and Dr. Dennis Propst of the Department of Park, Recreation and Tourism Resources. The model was developed specifically for the purpose of estimating total economic impacts of national parks using the type of trip expenditure data collected in the W&OD survey. Additional information about MGM2 is available on-line at www.prr.msu.edu/mgm2/mgm2main.htm.

The estimated total economic impacts on Arlington, Fairfax, and Loudoun counties per 1,000 group trips to the W&OD trail are shown in Table. Total economic impacts of total estimated trips to the W&OD were then estimated by multiplying the estimates of total person visits by user category (in units of 1,000 trips) by the estimated impacts per 1,000 person trips reported in Table EI-2 and then summing up these total impacts by category. The final results are reported in Table EI-3.

Table EI-2. Estimated Economic Impacts of Washington and Old Dominion Rail-Trail Use per 1,000 Group Trips in Arlington, Fairfax, and Loudoun Counties, VA, 2003 dollars.

Economic Impact Indicator	Economic Impact Per 1,000 Group Trips
Output (Sales)	$54,000
Employment	1.03
Total Value Added	$30,199
a. Personal Income	$19,293
Output Multiplier	1.55
Employment Multiplier	1.31
Total Value Added Multiplier	1.65
Personal Income Multiplier	1.56

Table EI-3. Estimated Total Economic Impacts of Washington and Old Dominion Trail Use in Arlington, Fairfax, and Loudoun Counties, VA, 2003 dollars.

Economic Impact Indicator	**Total Economic Impact**
Output	$1,800,000
Employment	34
Total Value Added	$1,005,000
Personal Income	$642,000

Overall, recreation spending by nonlocals visiting the W&OD supported approximately $1.8 million of economic output, about 34 full-time job equivalents, and around $642 thousand of personal income in the northern Virginia economy. These amounts are quite small relative to the overall magnitude of the northern Virginia economy.

Visitor Spending

Measuring the economic impacts of nonlocal visitor spending in the northern Virginia economy is the correct way to assess the contribution of recreation at the W&OD toward the local economy. However, it may also be of interest to note the total amount of spending by both locals and nonlocals related to their use of the W&OD. This is particularly relevant given the large proportion of locals using the trail. For example, locals reported spending about $375 annually directly related to their use of the trail. Most of this spending, just under 88 percent, was spent within the northern Virginia economy. Given an estimated 1.6 million visits per year by locals, and an average of about 100 visits per user per year, annual spending by northern Virginia residents in the local economy directly related to their use of the W&OD totals about $5.3 million.

Nonlocals account for only about 5 percent of the visits, however, this still amounts to about 90 thousand visits annually. Based on an average expenditure of just over $15 per person per visit, nonlocal spending in the northern Virginia economy directly related to using the W&OD totals about $1.4 million annually. Moreover, entire trip spending by nonlocals visiting the area and using the W&OD totals about $6.6 million annually, or about $74 per person per trip.

Combined, local and nonlocal spending in the northern Virginia economy directly related to use of the W&OD leads to a conservative total approaching $7 million annually. Including complementary spending and amounts spent outside the region, use of the W&OD contributes to about $12 million of recreation expenditures annually.

Net Economic Benefits

To make effective planning and policy decisions, land managers often need information that provides quantifiable measures of public preferences and values associated with different recreation resources. For many recreation venues like the W&OD, fees are either not charged or are minimal. Hence, market-clearing prices are unavailable as indicators of value. Consequently, alternative economic valuation methods have been developed for unpriced goods and services, like access to the W&OD. In this study, the travel cost method (TC) is used to develop a model describing visitor behavior that can be ultimately used to estimate individual and aggregate consumer surplus resulting from recreation access to the W&OD. The technique relies on establishing a relationship between the costs incurred by travelers to a site and the number of trips taken. Hof (1993, p.54) demonstrates that this relationship can be exploited to derive consumer surplus for recreation access to a site. As an economic benefit or welfare measure, consumer surplus is the amount by which an individual's willingness to pay for a good exceeds what the individual must pay for the good. While not

directly comparable to market price, consumer surplus is accepted for use in benefit/cost calculations for project related economic efficiency analyses (Pearce and Holmes 1993, USDA Forest Service 1994). TC has been used extensively in outdoor recreation research to value site access as well as changes in site quality (Betz et al. 2003, Bowker and Leeworthy 1998, Siderelis and Moore 1995).

The general travel cost demand model for visitor behavior is typically specified as:

$$TRIPS = f(TC, SC, INC, SE, TP, OTH) + u, \quad (1)$$

where, for the *ith* household, *TRIPS* are the annual number of primary purpose trips to a recreation site; *TC* is the travel cost per trip; *SC* is the cost of visiting a substitute site; *INC* is annual income; *SE* is a vector of socioeconomic variables which could include age, gender, race, and the like; *TP* is a vector of taste and preference variables which could include variables for activity preferences and experience at the site or in a given activity; and *OTH* is a vector which could include other variables such as site quality indicators. In some cases, the opportunity cost of travel time is included as part of the travel cost, alternatively, travel time may be included as a separate variable. The variable *u* is included to account for random error.

Data for the W&OD empirical model were obtained from the on-site questionnaires (Appendix A). Only on-site visitors listing the W&OD as their primary destination are included. Under these conditions, the data are zero-truncated and endogenously stratified. Failure to account for zero-truncation has been shown to have large effects on model estimates (Zawacki et al. 2000). The effects of endogenous stratification, i.e., more frequent users have a higher probability of being in the sample, have been shown in some cases to be relatively minor (Ovaskainen et al. 2001). For the W&OD, two functional forms for zero truncated estimators are used; the truncated negative binomial (TNB) and the truncated stratified Poisson (TSP). The latter includes an adjustment for endogenous stratification. A number of preliminary specifications and assumptions were explored with the final model parameterized as follows:

$$\ln TRIPS = \beta_1 + \beta_2 TC + \beta_3 TIME + \beta_4 INC + \beta_5 DSUB + \beta_6 NUM + u. \quad (2)$$

Variables listed in Equation 2 are defined in Table EB-1. Regression parameters are represented by the vector of β's and are estimated using LIMDEP. Travel distances and times used to compute the travel cost variable, *TC*, were estimated using PCMiler software. The error term, *u*, is assumed to be independently and identically distributed. In the case of the TNB, $\exp(u)$ is assumed to follow a gamma distribution with a mean of 1.0 and constant variance σ.

Regression results and means of the explanatory variables are reported in Table EB-2. The estimated parameter for *TC* in both models is significant and has the expected sign, indicating that trips decrease with increased distance and consequent travel costs. The *NUM* variable in both models significantly helps to explain the number of trips demanded. As group size increases, the number of trips demanded decreases. This result is consistent with previous studies. The income, *INC*, and substitution, *DSUB*, variables are not statistically significant, but are retained for theoretical consistency.

Table EB-1 — Definition of variables included in the W&OD trips model.

Variable Name	Definition
TRIPS	Annual W&OD trips by the traveling unit (mean=99).
TC	Distance round trip ($0.131/mile)
TIME	Travel time round trip
DSUB	Binary variable indicating whether or not the respondent felt there was a viable substitute for the W&OD.
INC	Annual household income
NUM	Number of people living in the household that use the W&OD

Table EB-2. Truncated negative binomial and truncated stratified Poisson regression parameter estimates and standard errors for annual W&OD trips.[1]

Variable	$.131 per mile TNB N= 997	$.131 per mile TSB N= 997	Mean
Constant	4.789***	4.95518***	1
	(.097)[2]	(.120)	
TC	-.0827**	-.0551*	4.14
	(.0327)	(.0342)	
TIME	.0095**	0.0041	40.1
	(.0041)	(.0049)	
INC	.0000	-.0000	96,730
	(.0001)	(.0001)	
DSUB	-.1004	-.0650	.525
	(.0746)	(.0677)	
NUM	-.1593***	-.2276***	1.70
	(.0169)	(.0446)	
Overdispersion σ	1.077***		
	(.0476)		
Consumer Surplus/Trip	$9.08	$13.63	
Price Elasticity	-.343	-.223	

*** Significant at the .01 level. **Significant at the .05 level. *Significant at the .10 level.

[1]Models reflect trip demand for primary purpose recreation visitors not living directly adjacent to W&OD.

[2]Parameter estimate standard error reported in parentheses.

Average per-trip consumer surplus estimates for groups traveling to the W&OD can be estimated using the negative inverse of the travel cost coefficient ($CS = -1/\beta_2$). Assuming no cost for time, a mileage cost rate of $0.131, and using the TNB results, average consumer surplus per group per W&OD trip is $12.08 or $9.08 per person per trip. With the TSB model, the group per trip consumer surplus is $18.13, while on a per person basis, the consumer surplus is $13.63.

An estimate of the total annual recreation use value of the W&OD can be obtained by combining estimated number of primary purpose person trips with estimated per trip consumer surplus. We report a range based on the estimates from each of the models reported above. It should be noted that we account for the fact that 7 percent of the sample were either commuting or not on a primary purpose visit to the trail. Moreover, we chose to exclude those visitors that lived directly on the trail from our travel cost estimation sample. Hence, our estimate of annual net economic value of primary purpose W&OD trips ranges from approximately $14.4 million to $21.6 million. (1,707,353 visits * .93 primary purpose factor * $9.08 to 1,707,353 *.93* $13.63). Because we do not explicitly place a monetary value on the opportunity cost of time, and because we exclude commuters and ancillary visitors, these estimates are likely conservative.

The aggregate values reported above are consistent with previous trail related studies. Siderelis and Moore (1995) reported a range of $1.9 million (Lafayette/Moraga Trail), $4 million (Heritage Trail) and $8.5 million (St. Mark's Trail) in aggregate value. Adjusted to 2003 dollars these values would be $2.3 million, $5 million and $10.6 million respectively. Although considerably shorter (7.6 vs 45 miles), the trail in Siderelis and Moore (1995) with characteristics most similar to the W&OD is the Lafayette/Moraga Trail (LMT) near Oakland, CA. On the LMT, reported average per trip consumer surpluses ranged from $5.82 to $20.22 (in 2003 dollars) depending on the statistical model selected. The model most closely related to the models we report above, yielded a consumer surplus of $11.57 (2003 dollars).

Price Elasticity

The results of the regression analysis above can also be used to calculate the price elasticity of demand, ε_p. The price elasticity of demand is a unit-less measure representing the percentage change in trips in response to a given percentage change in price. For the models estimated above, the price elasticity can be estimated as,

$$\boldsymbol{\varepsilon_p = \beta_2 * TC}$$

where, β_2 and TC are as defined above. For the TNB and TSB models above, the price elasticities calculated at the mean travel costs are -.343 and -.223, respectively. These values are within the ranges reported by Siderelis and Moore (1995) of -.207 to -.430 and Betz et al. (2003) of -.681, respectively.

Price elasticity between 0 and -1 suggests that as price or travel cost increases, visits will decrease. However, price response is considered inelastic, i.e., the percentage decrease in visits will be less than the percentage increase in price. For example, consider $\varepsilon_p = -.343$ and an average per trip travel cost of $4.14 from the TNB model above. While unlikely feasible given the multitude of access points to the trail,

imposing a $1 use fee (per group trip) would increase price by nearly 25 percent. However, group visitation would only be expected to decline by only about 8 percent. This assumes, of course, that visitors respond to a use fee as they would to an increase in gasoline price. In the short run, given emotion and political situations, this assumption is tenuous, especially as a use fee is not already being implemented at the site.

Summary and Conclusions

In this report we examined a number of aspects related to recreation use of the Washington & Old Dominion Trail. Specifically, the objectives of the W&OD study were to: (1) describe trail users and their current trip; (2) examine user attitudes/preferences per trail attributes, management/policy, and benefits; (3) estimate local economic impacts from nonlocal visitor spending; and (4) estimate net economic benefits for all trail users. While not a specific objective of the study, estimating trail use was necessitated by objectives 3 and 4.

A representative sampling procedure described above was used to obtain 1,426 completed questionnaires from trail users between May 2003 and April 2004. Information from completed questionnaires was combined with on-site summer visitor counts at various trail segments to arrive at an annual estimate of adult visits (aged 16 and older) of 1,707,353. Of this number 5.24% or 89,807 of the visits, amounting to 33,262 group trips were from users living outside the northern Virginia area. The remainder if the visits, 1,617,546, were from local residents.

Trail users were primarily white (85%) and evenly split along gender lines. Asians were the leading minority group at 6 percent. The largest two age cohorts were those aged 36-45 and 46-55. Average annual household income for users was just under $100,000. About 84 percent of users reported being employed, 63 percent in the private sector. The average user group size for all visitors was 1.7, but more than 57 percent of visitors were using the trail alone.

Nonlocals traveled from an average distance of just under 200 miles. Nonlocals reported on average 16.5 visits per year. However, removing the 5 percent of nonlocals with very large reported number of visits lowered the average to 6 visits per year. While on the trail, nonlocals spent about 3.4 hours and averaged over 32 miles traveled.

On average, local users not living immediately adjacent to the W&OD traveled 10 miles to reach the portion of the trail they wished to use. Among locals, modes of travel to reach the trail were split primarily between auto (44%) and biking (38%), with walking accounting for 15 percent. The average monthly use by locals was just over 10, which if extrapolated to 12 months, would imply around 120 visits per year. Summer accounted for 40 percent of the share of annual use for locals, with spring and fall at almost 30 percent each and winter use accounting for just over 10 percent.

Most users (85%) claimed that recreation and fitness was the main reason for their use of the trail. Among users, biking (66%), walking (16%), and jogging (16%) were the main observed activities. Among the benefits received by users, health, a safe place to recreate, and nature were the most highly ranked. A place to take pets was the lowest ranked benefit. The most important

concerns listed by users were maintenance, safety, and crossings. However, more than 58 percent of those queried did not list any specific concerns suggesting the W&OD is for the most part meeting their expectations and needs.

Trail features were assessed in terms of their importance to users and in terms of their current observed condition. Among trail features, maintenance, natural scenery, and the presence of water fountains were ranked the most important to users. Parking, trail connections to commercial establishments, and restrooms were ranked the least important. Trail users ranked the current conditions for natural scenery, maintenance, and parking highest. The trail features ranked lowest in terms of current condition were restrooms and water fountains. It should be noted that the condition for these lowest ranked features averaged slightly less than "good" and well above "fair." The remaining features averaged a current condition between "good" and "excellent." These importance and condition rankings appear to indicate that the trail is being successfully managed to meet the needs and expectations of the majority of users. The only feature that ranks high in importance and low in current condition is the presence of water fountains.

Visitors were also given 4 statements pertaining to crowding, safety, construction, and rules enforcement with which they could agree or disagree at various intensities. These results indicated that the majority of users feel very positively about the way the trail is currently managed with respect to safety and rules enforcement. Users were about evenly split as to whether crowding or construction projects negatively impacted their use of the trail. Very few users claimed to be neutral about any of the management statements. This indicates that for crowding and construction, there are basically two large groups of users coming down on either side of these issues.

An estimated 1.7 million adult W&OD users spent in total about $12 million annually related to their use recreational use of the trail. Of this amount, about $7 million was spent directly in the northern Virginia economy by locals and nonlocals using the trail. The estimated 1.6 million local visits accounted for about $5.3 million of spending directly related to the use of the W&OD.

Nonlocal visitors spent about $199 per group trip and $74 per person to visit the W&OD. Of this amount, $41.50 per group and $15 per person was spent in the northern Virginia economy directly related to trail use. Overall, the estimated $1.4 million in nonlocal spending generated about $1.8 million in local economic impacts and supported 34 full time job equivalents and about $642 thousand of personal income.

Finally, while access to the trail is "free," there is nevertheless considerable economic value that accrues to W&OD users. This net economic value or consumer surplus is a dollar measure of the amount of welfare that users would lose if the trail were unavailable. Using conventional economic methods, it was determined that, on average, a trip to the W&OD was worth between $9 and $14 dollars per person more than the average cost to use the trail. Extrapolating this net economic benefit across 1.7 million adult visits, of which 93 percent were for the primary purpose of visiting the W&OD, leads to an annual net economic

benefit of trail access to users of between $14.4- and $21.6 million. Because the W&OD is primarily a local resource (95% of visits are by locals) rather than a destination trail, the vast majority of these net economic benefits accrue to northern Virginia residents.

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Appendix A. W& OD Survey Versions

Washington & Old Dominion On-Site LOCAL Questionnaire 4/29/03

1. Survey # _____ 2. Date_____ 3. Time_____
4. Location_____ 5. Interviewer_____
6. Activity/Modes: Bike Walk Jog Pet Skate Stroller Equestrian Other

Part A. TRIP PROFILE

1. What is your residence Zip Code? _____

2. Did you come directly from your residence today? Y N

3. How did you get to the W&OD today? A. Auto B. Bike C. Walk/Run D. Metro/Bus E. Other

4. How long did it take to get to where you entered the trail? _____ hours _____ minutes

5. Do you live adjacent to the W&OD trail? Y N
   If NO, about how far did you travel to get where you entered the trail today? _____miles

6. Circle the town closest to where you entered the trail today: Arlington Falls Church Vienna Herndon Reston Rt 28/Sterling Ashburn Leesburg Hamilton Purcellville Don't Know

7. Circle the town closest to where you will exit the trail: Arlington Falls Church Vienna Herndon Reston Rt 28/Sterling Ashburn Leesburg Hamilton Purcellville Don't Know

8. About how much time will you spend on the trail during this trip/visit? _____hours _____minutes

9. About how far will you go on the trail today (roundtrip)? _____miles (see mileage chart)

10. How many, including yourself, are in your group? _____people

11. What is your main reason for being on the W&OD today? A. commuting
    B. recreation/fitness C. pet activities D. view nature
    E. train for event F. other _____

Part B. VISITOR PROFILE

1. What percent of your annual use of the W&OD occurs during the following seasons?
   Total should be 100% Spring (M,A,M) _____% Summer(J,J,A)_____%
   Fall (S,O,N)_____% Winter (D,J,F)_____%

2. What percent of your annual visits to the W&OD are on weekends/holidays? _____%.

3. Counting this visit, how many different times have you visited the W&OD in the past 30 days? _____

4. In the past 30 days, how many trips have you made to other trails like the W&OD?
   A. 0 B. 1 C. 2-5 D. 6-10 E. 11-15 F. 16-25
   G. 26-35 H. 36-45 I. More than 45

4a. Is there another trail you would consider as a substitute for the W&OD? Y N
   If YES, Name of trail _____. Distance from your residence _____ miles.

5. How much will you spend on today's visit for food, equipment, and services just for yourself? _____ dollars

6. About how much did you spend in the past year on equipment, maintenance, gear, food, transportation and other items related to your use of the W&OD? **NOTE:** on major items like bikes etc., try to consider what percentage of annual use is on the W&OD. E.g., a bike costing $500 which you use 50% of the time on the W&OD would account for $250. Only count what you purchased within the past year.

   A. <$50 B.$50-100 C. $100-250 D. $250-500 E. $500-1000 F. $1000-2000 G. More than $2000

7. How much spending is in Northern Virginia? A. 100 - 95% B. 95-75% C. 75-50%
   D. 50-25% E. 25 – 0 %

Part C. INFORMATION ABOUT W&OD

How would you rate the W&OD in general for providing **you** the following **benefits**:

1. Health and wellness	High	Medium	Low	None
2. Opportunity to view nature	High	Medium	Low	None
3. Safe place to recreate	High	Medium	Low	None
4. Alternative for commuting	High	Medium	Low	None
5. A place to take my pets/animals	High	Medium	Low	None
6. A place to be with family/friends	High	Medium	Low	None
7. A place to train for events	High	Medium	Low	None

Please rate the following in terms of **importance to you** and then **current conditions** (only if they apply).

	Importance to you				**Condition Today**			
1. Parking	High	Med	Low	None	Excel	Good	Fair	Poor
2. Natural Scenery	High	Med	Low	None	Excel	Good	Fair	Poor
3. Amount of shade	High	Med	Low	None	Excel	Good	Fair	Poor
4. Restrooms	High	Med	Low	None	Excel	Good	Fair	Poor
5. Trail maintenance	High	Med	Low	None	Excel	Good	Fair	Poor
6. Water fountains	High	Med	Low	None	Excel	Good	Fair	Poor
7. Connecting paths to community parks & services	High	Med	Low	None	Excel	Good	Fair	Poor
8. Connecting paths to commercial establishments & services	High	Med	Low	None	Excel	Good	Fair	Poor

Please state whether you **Strongly Agree (SA), Agree (A), Disagree (DA), Strongly Disagree (SD)** or are **Uncertain (U)** about the following statements:

1. **Crowding** often negatively affects the quality of my visits to the W&OD.	SA A D SD U
2. The W&OD is a **safe place** for family groups, elderly, or children to recreate.	SA A D SD U
3. **Construction projects**, like fiber optic and overhead utilities projects, negatively affect my visits to the W&OD.	SA A D SD U
4. Trail **rules & regulations** are well enforced on the W&OD.	SA A D SD U

Part D. Please answer the following:

1. What is your greatest concern regarding management of the W&OD?_____

2. Who owns and operates the W & OD? _____ Don't Know

3. Other Comments:

Part E. DEMOGRAPHIC INFORMATION

1. What is your age? A. 16-25 B. 26-35 C. 36-45 D. 46-55
   E. 56-65 F. 66+

2. What is your ethnicity? Circle ALL that apply. A. White B. Black C. Hispanic
   D. Asian E. Native Am.

3. What is your gender? A. Female B. Male

4. What is your employment status? A. Student B. Self employed C. Retired
   D. Government employee E. Private sector employee F. Not currently working

5. Would you be willing to say which interval represents your personal pre-tax income?
   Y / N/ DK **==> if Y circle below**
   a. Under $40,000 b. $40 - 80,000 c. $80 - 120,000
   d. $120 - $160,000 e. $160 - 200,000 f. Above $200,000

THANK YOU !

Washington & Old Dominion On-Site NONLOCAL Questionnaire 04/30/2003

1. Survey # _____ 2. Date_____ 3. Time_____
4. Location_____ 5. Interviewer_____
6. Activity/Modes: Bike Walk Jog Pet Skate Stroller Equestrian Other

Part A. TRIP PROFILE

1. What is your residence Zip Code? _____

2. Did you come directly from your residence today? Y N

3. How did you get to the W&OD today? A. Auto B. Bike C. Walk/Run D. Metro/Bus E. Other

4. How long did it take to get to where you entered the trail? _____ hours _____ minutes

5. Did you stay last night adjacent to the W&OD trail? Y N
   If NO, about how far did you travel to get where you entered the trail today? _____miles

6. Circle the town closest to where you entered the trail today: Arlington Falls Church Vienna Herndon Reston Rt 28/Sterling Ashburn Leesburg Hamilton Purcellville Don't Know

7. Circle the town closest to where you will exit the trail: Arlington Falls Church Vienna Herndon Reston Rt 28/Sterling Ashburn Leesburg Hamilton Purcellville Don't Know

8. About how much time will you spend on the trail during this trip/visit _____hours _____minutes

9. About how far will you go on the trail today (roundtrip)? _____miles (see mileage chart)

10. How many, including yourself, are in your group? _____people

11. What is your main reason for being on the W&OD today?
    A. commuting B. recreation/fitness C. pet activities D. view nature
    E. train for event F. other _____

Part B. VISITOR PROFILE

1. Counting this visit, how many times have you visited the W&OD in the past year?
   _____

2. In the past year, how many trips have you made to other trails like the W&OD?
   _____

3. If the W & OD were not available, would you have visited another trail instead? Y N
   Trail _____ City & State_____

4. How did you find out about the W&OD? A. Friends/relatives B. Internet C. Magazine
   D. Newspaper E. Other _____

5. What is your greatest concern regarding management of the W&OD?_____

6. Other Comments:

Part C. INFORMATION ABOUT W&OD

How would you rate the W&OD <u>on this visit</u> for providing **you** the following **benefits**:

1. Health and wellness	High	Medium	Low	None
2. Opportunity to view nature	High	Medium	Low	None
3. Safe place to recreate	High	Medium	Low	None
4. Alternative for commuting	High	Medium	Low	None
5. A place to take my pets/animals	High	Medium	Low	None
6. A place to be with family/friends	High	Medium	Low	None
7. A place to train for events	High	Medium	Low	None

Please rate the following in terms of **importance to you** and then **current conditions** (only if they apply).

	<u>Importance to you</u>				**<u>Condition Today</u>**			
1. Parking	High	Med	Low	None	Excel	Good	Fair	Poor
2. Natural Scenery	High	Med	Low	None	Excel	Good	Fair	Poor
3. Amount of shade	High	Med	Low	None	Excel	Good	Fair	Poor
4. Restrooms	High	Med	Low	None	Excel	Good	Fair	Poor
5. Trail maintenance	High	Med	Low	None	Excel	Good	Fair	Poor
6. Water fountains	High	Med	Low	None	Excel	Good	Fair	Poor
7. Connecting paths to community parks & services	High	Med	Low	None	Excel	Good	Fair	Poor
8. Connecting paths to commercial establishments & services	High	Med	Low	None	Excel	Good	Fair	Poor

Please state whether you **Strongly Agree (SA), Agree (A), Disagree (DA), Strongly Disagree (SD)** or are **Uncertain (U)** about the following statements:

1. **<u>Crowding</u>** often negatively affects the quality of my visits to the W&OD.	SA A D SD U
2. The W&OD is a **<u>safe place</u>** for family groups, elderly, or children to recreate.	SA A D SD U
3. **<u>Construction projects</u>**, like fiber optic and overhead utilities projects, negatively affect my visits to the W&OD.	SA A D SD U
4. Trail **<u>rules & regulations</u>** are well enforced on the W&OD.	SA A D SD U

Part D. EXPENDITURES We would like to ask you about your ESTIMATED EXPENSES for this trip to the W&OD. The information will be used to calculate the economic effects of the W&OD on Northern Virginia.

1) How many nights total will you be away from home on this trip? _____ nights
2) Including yourself, how many are in your spending party? _____ people
3) Is the W&OD a main reason for this trip to Northern Virginia. Y N

In **Column A** below, estimate spending by your party **for your whole trip**. In **Column B** below, estimate your spending in Northern Virginia **primarily related to your use of the W&OD Trail**.

Note: If your trip is not yet complete, include what you expect to pay for the whole trip. Remember to report all spending for your party (e.g., family, scout group, friends sharing expenses, or just yourself).

	A. Spending by your party on the whole trip	B. Spending by your party in Northern Virginia directly related to use of the W&OD
Lodging:	_____	_____
Food & Beverage:		
Food and drinks consumed at restaurants or bars	_____	_____
Other food and drinks (carry-out, groceries)	_____	_____
Transportation:		
Gasoline, oil, repairs	_____	_____
Other transportation (tolls, airfare, vehicle rental, parking)	_____	_____
Trail Related:		
Bicycle rentals, shuttle, or service	_____	_____
Any other expenses:		
Other services or equipment	_____	_____

Part E. DEMOGRAPHIC INFORMATION

1. What is your age? A. 16-25 B. 26-35 C. 36-45 D. 46-55 E. 56-65 F. 66+

2. What is your ethnicity? Circle ALL that apply.
   A. White B. Black C. Hispanic D. Asian E. Native Am.

3. What is your gender? A. Female B. Male

4. What is your employment status? A. Student B. Employed C. Retired D. Not currently working

5. Would you be willing to say which interval represents your personal pre-tax income? Y / N/ DK **=> if Y circle below** a. Under $40,000 b. $40 - 80,000 c. $80 - 120,000 d. $120 - $160,000 e. $160 - 200,000 f. Above $200,000

THANK YOU !