The Waterway at New River State Park: An Assessment of User Demographics, Preferences, and Economics

The Waterway at New River State Park: 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 water trail at New River State Park.

This report focuses on a 39-mile segment of the New River running from Pulaski, VA to Galax, VA. This portion of the New River lies within the New River State Park (NRSP). The park corridor runs for 57 miles and includes a bike and hiking trail paralleling the river, camping areas, and a number of other attractions. A more complete description of the New River and the New River State Park, including access points, user information, historical notes, and detailed maps can be found at http://www.dcr.state.va.us/parks/maps/newriver.pdf.

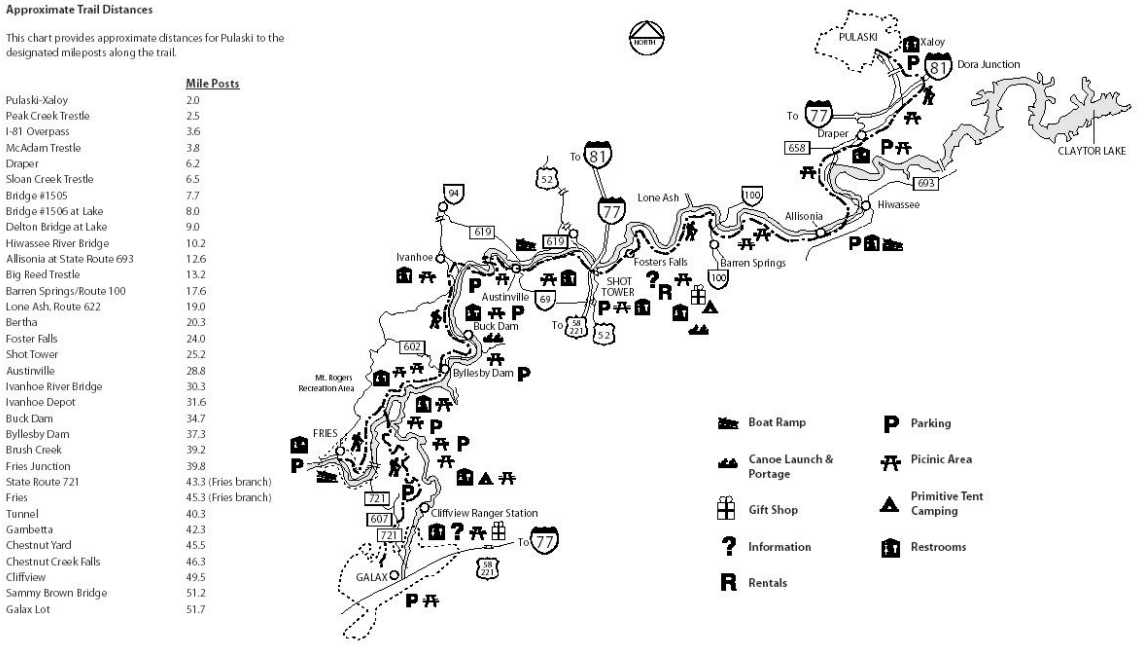

Figure 1. Map of New River Trail

This report is organized as follows. First, the specific objectives of the New River 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 descriptive statistics 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.

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 New River study were to:

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

Research Design

The New River recreation user study was conducted in 2003, with data collection occurring between July 2003 and September 2003. The study took place on the river, through a self-administered 2-page survey, made available to trail users by Virginia Department of Conservation and Recreation (VADCR) personnel.

Although various sampling methodologies were considered, a non-probability convenience sampling approach was selected. This method is often used in preliminary or exploratory research to obtain gross estimates of results, while requiring considerably less time and money than selection of a random or stratified random sample (http://www.statpac.com/surveys/sampling.htm). The convenience sampling approach was necessitated primarily by three factors: (1) the physical layout of the river and multiple access points (39 miles with numerous public and private access points), (2) financial limitations, and (3) volunteer and state personnel labor constraints.

It should be noted however, that while inferential statistics can be used with convenience samples, generalizing the results from such a sample to the population should be done with caution. Here, the sample would, at best, only apply to the population of water venue users of the New River State Park. Moreover, it would best apply only to summer water users. For a good discussion of convenience and random samples, see Huck and Cormier (1996). The convenience sampling framework led to 185 completed survey responses following distribution across river entry and exit sites as listed in Table RD-1.

Survey Instrument

Two different questionnaires, one for locals and another for nonlocals, were developed to obtain information from water trail users corresponding to the project objectives listed above (Appendix A). Common to both survey versions were sections about the current New River trip, annual use, and demographics; as well as attitude and preference questions about water trail issues and area features. The local questionnaire also included a section about annual spending. In order to estimate the economic impact of visitor spending on the local economy which includes Carroll, Grayson, Pulaski, and Wythe counties; the towns of Fries and Pulaski; along with the city of Galax; the

Table RD-1. New River Sample Entry and Exit Site Distribution.

Enter	Frequency	Percent	Cumulative Frequency
F. Falls (u)	64	34.59	64
Other	45	24.32	109
Austinville	30	16.22	139
F. Falls (l)	30	16.22	169
Allisonia	16	8.65	185

Exit	Frequency	Percent	Cumulative Frequency
F. Falls (u)	67	38.51	67
Other	37	21.26	104
F. Falls (l)	34	19.54	138
Allisonia	20	11.49	158
Austinville	16	9.20	174

Frequency Missing = 11

nonlocal questionnaire included a detailed section on current trip expenditures, both within 15 miles of the New River and for the whole trip.

A two-step intercept procedure was used to obtain completed questionnaires 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 also asked whether they were from the any of the counties or towns listed above. Based upon their response, they were given a local or nonlocal questionnaire.

Use Estimation

Because of limited financial and labor resources, estimating total visitation on the New River was not an explicit objective of the current study. However, in order to estimate total economic benefits to visitors and to estimate economic impacts on the local economy, an estimate of annual is necessary. Estimates of total visitation to the New River State Park were provided by VADCR for the period spanning 2001 to 2003. These estimates were based on traffic counters at all major access points or the 57-mile park corridor. The average annual visitation during this period was 1,035,543. However, this visitation includes all NRSP visitors, not just water venue users. Hence, VCDR personnel on-site provided a factor of 15 percent for water users yielding an estimate of recreational water use at the park of approximately 155,331 person-visits annually.

Trail Users

This section of the report details three aspects of water venue users at New River State Park (NRSP). 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 New River at NRSP. Included are travel distances to, and on the New River, 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 area amenities (e.g., camping, dining, guide services, shopping) and trail related issues (e.g., safety, crowding, conflicts, signage, and boat ramps). Information in this portion of the report was obtained via the on-site questionnaire described above (Appendix A).

Visitor Demographics

The majority of New River users had at least a college education. Fifty-nine percent of respondents indicated at least one person in their household had college degree. Twenty-seven percent indicated that high school was the highest level of education in their household, while 14 percent indicated something other than a high school or college degree (figure 1).

The average age of respondents was 41 years old. Approximately 60 percent of the respondents were between the ages of 36 and 55. Respondents between the ages of 56 and 65 accounted for 7 percent of users. Trail users between the ages of 16 and 35 accounted for 30 percent of the sample, while users over the age of 65 account for 4 percent of the users (figure 2).

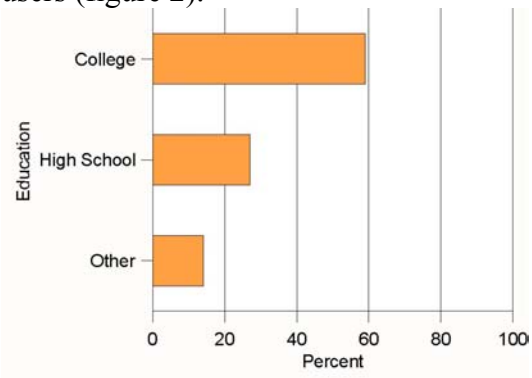

Figure 2. Percentage of respondents by education (n=178).

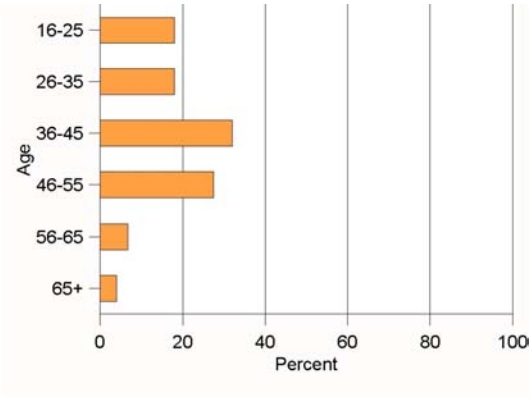

Figure 3. Percentage of respondents by age (n=178).

The average household income for the entire user population is $53,300. The average income for local users was $43,100, while the average income for the nonlocal users was $67,000. These household averages were calculated by multiplying the midpoints of each income category by the frequency for each income category. For the entire survey, 53 percent of respondents indicated a household income between $40,000 and $120,000. Thirty-three percent of respondents reported a household income less than $40,000 and five percent of respondents reported a household income greater than $120,000. Nine percent preferred not to answer this question (figure 3).

Survey responses indicate that the majority of New River users are employed, 75 percent (figure 4). Of the remaining respondents, 11 percent were retired, 4 percent were students, 7 percent were not currently employed, and 3 percent were employed part-time.

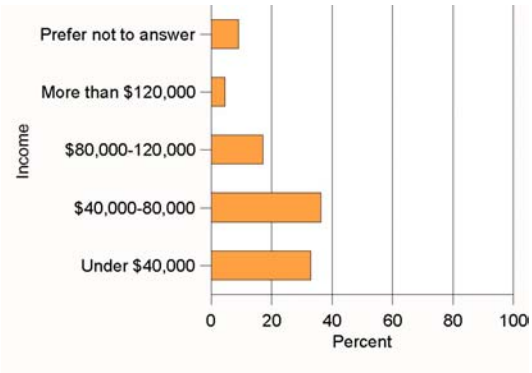

Figure 4. Percentage of respondents by income (n=176).

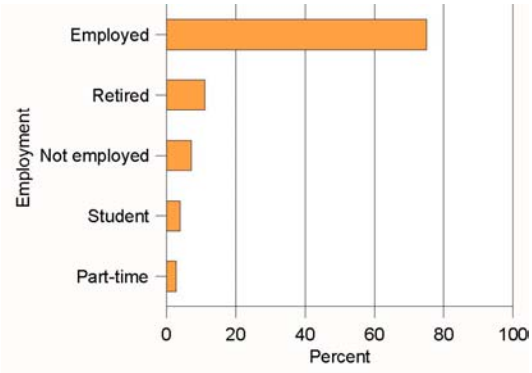

Figure 5. Percentage of respondents by employment (n=180).

There were two questions regarding household size. The first question asked respondents about household size. The second questions asked respondents how many members of the household regularly used the New River. The average household size for New River users is 3.32. Eighty-one percent of the respondents' households contained four or fewer people. The average number of people in a household who use the New River is 2.89. Eighty-seven percent of household members who use the New River at the state park contained fewer than five members.

Trip Profile

For the entire dataset, the average distance traveled to reach the New River was 117 miles. The average time spent traveling was 1.9 hours one-way. For local users (57%), the average travel distance was 44 miles, with an average travel time of 47 minutes. Nonlocal users (43%), on average, traveled 217 miles with an average travel time of 3.5 hours one-way. The annual number of visits taken to the New River by nonlocals is 3.25. Eighty-two percent of nonlocals took fewer than four trips per year. The remaining 18 percent took from 5 to 30 annual trips. The average number of annual trips taken by local visitors is 26.56. Forty-seven percent of local users take fewer than 10 trips per month, while 53 percent take more than 10 trips per year.

The overall average time spent on the New River during a trip was 8.1 hours. Local users spent an average of 4.34 hours on the New River, while nonlocals spent an average of 13.62 hours per trip on the New River. This suggests a large proportion of the nonlocal visits were over night.

Eighty-seven percent of New River users were in the area for the primary purpose of visiting the New River. The average group size on the water trail was 3.85. Eighty percent of respondents traveled the river in groups with less than four individuals. The remaining 20 percent of users traveled the trail in groups containing 5 to 25 individuals.

The primary activity for New River users was fishing (43%). Canoeing comprised 14 percent of the reported activity along the river. Another 18 percent of primary activity included kayaking, boating, and tubing (figure 5). The remaining 25 percent of respondents indicated their primary activity as "other." Of those respondents indicating other as their primary activity, 37 percent indicated said their primary

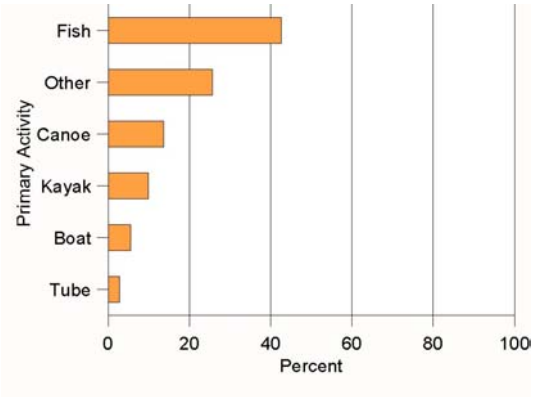

Figure 6. Percentage of respondents by primary activity (n=183).

activity was biking. Another 11 percent indicated that camping was their primary activity.

Preferences and Satisfaction

This section is divided into two parts. These parts include use issues, and area features. Use issues included questions related to safety/security, crowding, parking, restrooms, conflicts, maps/guidebooks, signage, public access, and boat ramps. The area features section include questions related to canoe-in camping, eating places, shopping, historical attractions, outdoor attractions, shuttle/boat rentals, guide services, tackle sales, outdoor equipment, water quality, water level.

Each item in the use issues and area features sections 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.

Trail Issues

The trail issues section of the visitor survey asked respondents to indicate the importance and condition of various trail related issues at the park. Specific issues included, safety/security, crowding, parking, restrooms, conflicts, maps/guidebooks, signage, public access, and boat ramps. 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 the issue should concern management.

Frequencies, average responses, and rankings for all of the trail related issues asked in the visitor survey are reported in Table TU-1. The four trail issues that were ranked the highest for importance were safety (3.65), public access (3.52), avoiding conflicts (3.51), and parking (3.23). For each of these categories, respondents indicated high or medium importance more than 80 percent of the time, with safety, and public access exceeding 90 percent. Among the least important issues, relatively speaking, were restrooms (3.21), boat ramps (3.12), signage (3.07), crowding (3.02), and maps (2.85). Nevertheless, these issues received high or medium importance votes from between 70 and 80 percent of respondents.

Frequencies, averages, and rankings for observed conditions related to each of the trail issue categories are also reported in Table TU-1. Conflicts (3.56), parking (3.54), public access (3.53), and safety (3.45) were ranked highest for their current condition. Ranking lowest in observed condition were crowding (3.44), boat ramps (3.43), signage (3.31), maps (3.16), restrooms (2.96). It should be noted however, that the condition for the lowest ranked use issues, on average, were ranked as being in good condition. With the exception of

Table TU-1. Importance and current condition ratings of water trail issues at NRSP.

Area features	IMPORTANCE High (4)	Med (3)	Low (2)	None (1)	Mean	Rank
Safety (n=180)	73.33	20.00	5.56	1.11	3.65	1
Crowding (n=179)	36.87	35.20	21.79	6.15	3.02	8
Parking (n=180)	43.33	40.56	12.78	3.33	3.23	4
Restrooms (n=177)	48.59	31.64	12.43	7.34	3.21	5
Avoid conflict (n=172)	70.93	15.12	8.72	5.23	3.51	3
Maps (n=175)	32.00	36.57	16.57	14.86	2.85	9
Signs (n=169)	34.32	44.97	14.79	5.92	3.07	7
Public access (n=176)	63.64	28.98	3.98	3.41	3.52	2
Boat ramps (n=172)	50.00	23.26	16.28	10.47	3.12	6
Area features	CURRENT CONDITIONS Excel (4)	Good (3)	Fair (2)	Low (1)	Mean	Rank
Safety (n=172)	53.49	40.12	5.23	1.16	3.45	4
Crowding (n=173)	53.18	39.88	5.20	1.73	3.44	5
Parking (n=168)	63.10	30.36	4.76	1.79	3.54	1
Restrooms (n=163)	40.49	31.29	12.27	15.95	2.96	9
Avoid conflict (n=172)	70.93	15.12	8.72	5.23	3.51	3
Maps (n=156)	42.31	39.10	10.90	7.69	3.16	8
Signs (n=161)	41.61	49.69	6.83	1.86	3.31	7
Public access (n=169)	61.54	31.95	5.33	1.18	3.53	2
Boat ramps (n=165)	53.33	39.39	4.85	2.42	3.43	6

restrooms (71 percent), 80 to 90 percent of respondents indicated the condition of the listed trail issues along the New River were in good or excellent condition.

The results for the use issues section suggest a couple of things. First, safety, public access, conflicts, and parking are of highest importance to the large majority of visitors. Second, restroom conditions were ranked the lowest among use issues. Nevertheless, it should also be noted that all of the listed issues received good or excellent ratings from at least 70 percent of users. Moreover, maps and restrooms were the only category to receive a poor rating by at least 5 percent of users and a combined fair or poor rating from more than 15 percent of respondents. Overall, results in this section suggest that users are pleased with the conditions on the water trail and that management is not overlooking important trail-related issues.

Area Features

In this section, area features complementing visitor use of the New River are examined. As is the previous section, respondents were asked to assess the importance and the observed condition of the following area features: canoe-in camping, eating places, shopping for gifts, historical attractions, outdoor attractions, shuttle/boat rental services, guide services, tackle sales, and outdoor equipment. In addition, water quality, and water level are considered. Because the listed features are general, the intent is to provide very basic information about user preferences for places and services that would complement their use of the New River.

Frequencies, averages, and rankings for area feature importance are presented in Table TU-2. For the most part, the rankings for the importance of area features are lower than those for use issues, with two exceptions. Water quality (3.70) and water level (3.57) are online with the rankings found among the highest-ranking use issues. The various area features not directly related to the New River are ranked lower. For example, the top five area features include water quality (3.70), water quantity (3.57), outdoor attractions (3.22), outdoor equipment (2.92), and canoe-in camping (2.88). For water quality and quantity, over 90 percent of respondents said these features were of high or medium importance. The remaining six area features are historical attractions (2.85), eating places (2.82), shuttle/boat rentals (2.73), tackle sales (2.73), guide services (2.49), and shopping (2.09). While these area features are lower in rank, with the exception of shopping, all of these area features had at least 50 percent of respondents indicating that they are of high or medium importance.

Using similar scales, mean ratings for observed conditions of area features were often lower than the importance ratings. For example, water quality (3.23) and quantity water quantity (3.24) were among the highest rated conditions for area features, but the ratings were somewhat less than those for importance reported above. This suggests that while users generally find water conditions good to excellent, some seem to think a number think there is room for improvement. Canoe-in camping (3.12) and outdoor attractions in the area (3.26) were also rated on average as good to excellent.

Among the lower rated area feature conditions were outdoor equipment (2.76), bait/tackle sales (2.62), shopping (2.60), and eating places (2.49). For the most part, these features scoring fair to good are not highly important on average to users. This is especially true for shopping which scored low in importance indicating that river users are not interested in shopping as part of their trip. A potential area of concern is eating places. While 62 percent of users rated eating places high to medium in importance, about 46 percent said that the current condition for eating places in the area was fair or poor.

Table TU-2. Importance and current condition rankings of area features at NRSP.

Area features	IMPORTANCE High (4)	Med (3)	Low (2)	None (1)	Mean	Rank
Canoe camping (n=169)	37.87	27.81	19.53	14.79	2.88	5
Eating places (n=167)	31.74	29.94	26.95	11.38	2.82	7
Shopping (n=165)	8.48	15.15	53.94	22.42	2.09	11
Historical attractions (n=168)	28.57	39.88	19.64	11.90	2.85	6
Outdoor attractions (n=168)	48.21	32.14	13.10	6.55	3.22	3
Shuttle (n=166)	27.71	33.73	22.89	15.66	2.73	8
Guides (n=163)	20.25	29.45	30.06	20.25	2.49	10
Bait/tackle sales (n=161)	29.19	31.06	23.60	16.15	2.73	8
Outdoor equipment (n=163)	31.90	39.26	17.79	11.04	2.92	4
Water quality (n=172)	73.84	23.84	1.74	0.58	3.70	1
Water quantity (n=169)	63.91	30.77	4.73	0.59	3.57	2

Area features	CURRENT CONDITIONS Excel (4)	Good (3)	Fair (2)	Low (1)	Mean	Rank
Canoe camping (n=133)	33.08	51.13	11.28	4.51	3.12	4
Eating places (n=140)	18.57	35.71	22.14	23.57	2.49	11
Shopping (n=133)	15.04	45.11	24.81	15.04	2.60	10
Historical attractions (n=142)	30.28	43.66	19.01	7.04	2.97	5
Outdoor attractions (n=147)	38.10	40.14	17.01	4.76	3.26	1
Shuttle (n=139)	28.78	45.32	14.39	11.51	2.92	6
Guides (n=127)	25.20	45.67	15.75	13.39	2.83	7
Bait/tackle sales (n=125)	18.40	45.60	16.00	20.00	2.62	9
Outdoor equipment (n=132)	25.00	42.42	16.67	15.91	2.76	8
Water quality (n=152)	38.16	50.00	9.21	2.63	3.23	3
Water quantity (n=150)	40.67	46.67	9.33	3.33	3.24	2

Economics

In this section of the report, two important economic aspects related to the use of the water venue at the New River State Park (NSRP) 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 or lower-than-market priced access to recreation resources like

the New River, net economic benefit or consumer surplus 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 New River 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 on Carroll, Grayson, Pulaski, Wythe counties, VA of nonlocal trips to the New River State Park for water-based activities. Nonlocal expenditures related to recreation use impact the local economy in the form of increased output, income, and jobs (Moore et al. 1994). 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, English and Bowker 1996). 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 sampling process described in previous sections of this report. The use estimate based on the sampling process gave an estimate of the annual number of visits taken to the New River State Park for water-based activities. In order to estimate economic impacts, this estimate was converted to group trips as described below. A group trip is defined as one nonlocal spending group taking one recreational trip to the NSRP.

As described above, for estimation of economic impacts we are concerned with trips to the NSRP from nonlocal visitors. Total visits to the NSRP for water-based activities were estimated at 155,331 visits. This total was multiplied by the percentage of visits from nonlocals (43%) estimated from the survey data; the result was 66,331 nonlocal visits. Next, the visit estimate of 66,331 was divided by the mean number of persons per spending group (3.97), which was estimated from the survey data, to generate a total nonlocal group visits estimate of 16,708. Although a group may take multiple visits to the NSRP for water-based activities 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 NSRP for water-based activities once per trip. Hence, the estimate of 16,708 group visits directly converts to an estimate of 16,708 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 New River State Park visitors. The expenditure questions asked for information to determine group expenditures within 15 miles of the NRSP and for the trip as a whole. 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.

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 was used to estimate the total effects (direct, indirect and induced effects) of visitor expenditures. Dr. Daniel Stynes and Dr. Dennis Propst of the Department of Park, Recreation and Tourism Resources developed MGM2 at Michigan State University in cooperation with the National Park Service. This spreadsheet model is based upon IMPLAN, a popularly used input-output model developed by the USDA Forest Service. The model was developed specifically for the purpose of estimating the total economic impacts of parks using the type of trip expenditure data collected in the New River State

Park survey. Additional information about MGM2 is available on-line at www.prr.msu.edu/mgm2/mgm2main.htm.

The estimated total economic impacts on Carroll, Grayson, Pulaski, and Wythe counties, VA, per 1,000 group trips to the NSRP for water-based activities are reported in Table EI-2. The total economic impacts from the total estimated trips to the New River State Park for water-based activities were then estimated by multiplying the estimates of total group trips (16.708 in units of 1,000 trips) by the estimated impacts per 1,000 group trips reported in Table EI-2, and then summing up these total impacts by category.

The final results are reported in Table EI-3. Nonlocal spending in the counties and towns surrounding the NRSP is responsible for generating about $2.3 million in total economic output. This amount of economic output supports approximately 50 local full-time job equivalents and creates about $750 thousand in personal income.

Table EI-1. Expenditure profile for nonlocal New River State Park water users.

	(N=69, spending party = 3.97)			
Expenditure type	w/in 15 miles	entire trip	per person w/in 15 miles expenditure	per person per trip expenditure
Lodging	43.68	109.10	11.00	27.48
Restaurants and Bars	26.35	59.61	6.63	15.01
Groceries, Carry out food	10.36	22.79	2.60	5.74
Gas and Oil	11.88	47.89	2.99	12.06
Other Vehicle Expenses	0.14	0.47	0.03	0.11
Canoe Rental	12.08	23.95	3.04	6.03
Shuttle Fees	4.41	18.16	1.11	4.57
Use Fees	3.07	7.97	0.77	1.93
Souvenirs, Other expenses	8.97	12.49	2.25	1.69
Total	120.94	302.13	30.46	76.10

Table E-2. Estimated economic impacts of water-based recreation at New River State Park per 1,000 group trips in Carroll, Grayson, Pulaski, Wythe Counties, VA, 2003 dollars.

Economic Impact Indicator	Economic Impact Per 1,000 Group Trips
Output (Sales)	$136,000
Employment	3.00
Total Value Added	$72,000
a. Personal Income	$45,000
Output Multiplier	1.33
Employment Multiplier	1.18
Total Value Added Multiplier	1.41
Personal Income Multiplier	1.34

Table E-3. Estimated total economic impacts of water-based recreation at New River State Park on Carroll, Grayson, Pulaski, Wythe Counties, VA, 2003 dollars.

Economic Impact Indicator	Total Economic Impact
Output	$2,272,000
Employment	50
Total Value Added	$1,203,000
Personal Income	$752,000

Visitor Spending

Measuring the economic impacts of nonlocal visitor spending is the correct way to assess the contribution of water-based recreation at the New River State Park toward the local economy (Carroll, Grayson, Pulaski, Wythe Counties). 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 water trail at NSRP. This is particularly relevant given the large proportion of locals using the trail. For example, locals reported spending about $228 annually per household directly related to their use of the water trail. Most of this spending (62%) was within the local economy. Given an estimated 89,000 visits per year by locals to the water venue, an average of about 26.5 visits per local user per year, and an average of 2.89 users per household, annual spending by area residents directly related only to water use at the NSRP totals nearly $265,000 annually with just under $165,000 spent within the four-county economy.

Based on the ratios obtained in the on-site summer sample, nonlocals account for about 43 percent of all water venue visits, or about 66,331 visits annually. Based on an average expenditure of just over $30.46 per person per visit, nonlocal spending in the four-county economy related to using the NSRP water venue is just over $2 million annually. Moreover, entire trip spending by nonlocals visiting the park

and using the New River totals about $5 million annually, or about $76 per person per trip. Combining local and nonlocal spending in the four-county economy related to use of the New River water venue leads to a total of nearly $2.3 million 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 New River, fees are either not charged, or are considerably below market price. Therefore, 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 water trail at the New River State Park. In this study the travel cost method (TC) is used to develop a model describing visitor behavior. This model can ultimately be used to estimate individual and aggregate consumer surplus resulting from recreation access to the NRSP. The TC 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 1995). 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, Bowker et al. 1996, 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 NRSP water user empirical model were obtained from the local and nonlocal on-site questionnaires (Appendix A). Only on-site visitors listing the New River 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 NSRP water users, a zero truncated negative binomial regression specification is used. A number of preliminary specifications and assumptions were explored with the final model parameterized as follows:

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

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 (Greene 2002). Travel distances and times used to compute the travel cost variable *TC* were estimated using PCMiler software. Two versions of the model are estimated based on alternative assumptions about the travel cost variable. The first version omits the opportunity cost of travel time, while the second version assumes a cost of travel time equaling ¼ the household wage rate. Finally, the for error term, exp(u) is independent and identically distributed and 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. Finally, the binary variable, *DFISH,* indicating whether the respondent is fishing on the trip or not, is also statistically insignificant.

Table EB-1. Definition of variables included in the New River State Park water-based recreation trip models.

Variable Name	Definition
TRIPS	Annual New River trips by the traveling unit (mean=16).
TC	Round trip travel cost ($0.131/mile and $0.131 plus ¼ wage rate)
DFISH	Binary variable indicating whether respondent fished on the trip
DSUB	Binary variable indicating whether or not the respondent felt there was a viable substitute for the New River.
INC	Annual household income
NUM	Number of people in the traveling group

Table EB-2. Truncated negative binomial regression parameter estimates and standard errors for annual water-based New River State Park trips.[1]

Variable	$.131 per mile N= 147	$.131 per mile Plus ¼ wage rate N= 147	Mean
Constant	3.843*** (.417)[2]	3.582*** (.427)	1
TC	-.0376*** (.003)	-.0175*** (.002)	--[3]
DSUB	-.325 (.319)	-.288 (.319)	0.58
INC	-.00001 ** (.000005)	-.000001 (.000001)	50,033
NUM	-.102 ** (.042)	.0650** .0677)	3.95
DFISH	-.282 (.354)	-.282 (.351)	0.42
Overdispersion σ	2.92 *** (.897)	3.10*** (1.01)	
Cons.Surplus Person-trip	$11.73	$25.24	
Price Elasticity	-.62	-.66	

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

[1]Models reflect trip demand for primary purpose water recreation visitors to New River.

[2]Parameter standard error estimates in parentheses.

[3]Average travel costs are respectively, $17.67 and $35.80, for the no wage and ¼ wage rate models.

Average per-trip consumer surplus estimates for groups traveling to the New River State Park for water-based recreation can be estimated using the negative inverse of the travel cost coefficient ($CS = -1/\beta_2$). Assuming no cost for time and a mileage cost rate of $0.131, average consumer surplus per group per New River water recreation trip is $26.60 or $11.73 per person per trip. Alternatively, using the same model but assuming that the opportunity cost of travel time is ¼ the household wage rate yields a group consumer surplus per trip of $57.25, or $25.24 per person per trip. These results are

somewhat lower than the $35 per person trip reported by Moore and Siderelis (2002) for the recreation access on the West Branch of the Farmington River in Connecticut. Part of this difference may be attributed to their use of a higher per mile cost ($0.14 vs. $0.13) and a higher assumed household wage rate ($33.83 per hour vs. $25.15 per hour). Moreover, the West Branch of the Farmington offers trout fishing and is part of the nationally designated Wild and Scenic River system.

An estimate of the total annual recreation use value for water recreation access on the New River 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 13 percent of the sample were not specifically on a primary purpose visit to the New River. Under such an aggregation assumption, our results can be expected to be somewhat conservative. Hence, our estimate of the annual net economic value of all primary purpose New River water venue trips ranges from approximately $1.6 million to $3.4 million. (155,331 water visits * .87 primary purpose factor * $11.73 to 155,331 *.87* $25.24). Certainly, visits by the 13 percent who are not in the area primarily to recreate at the New River can be expected to generate a consumer surplus greater than zero, however, a theoretical limitation of the travel cost method is that trips that are not primary purpose can not be valued. Therefore, it would be reasonable to conclude that the aggregate range reported above is somewhat conservative.

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, $\varepsilon_p=\beta_2 * TC$, where, β_2 and TC are as defined above. For the TNB no wage and TNB wage models above, the price elasticities calculated at the mean travel costs are -.62 and -.66, respectively. These values are similar to results by Siderelis and Moore (2002) for recreation at the Farmington River in Connecticut of -.75.

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 ε_p= -.62 and an average per trip travel cost of $17.60 from the TNB no wage model above. An increase in gasoline costs by $5 (per group trip) would increase price, or travel cost, by over 28 percent. However, group visitation would only be expected to decline by only about 17 percent. A similar analysis could be done with an increase in park entrance fees.

Summary and Conclusions

This primary intent of this report has been to assess the economic impacts and economic benefits of water-based recreation at the New River State Park. Additional and related objectives included estimating annual visitation by local and nonlocal users, describing visitors and visitor behavior, and examining visitor attitudes and

preferences associated with water trail related issues and local amenities.

A convenience sampling procedure was used to obtain counts of visits and to survey users about their demographics, behavior, attitudes, and preferences. On-site sampling took place from July to September 2003. Recreation visits to the water venue at NRSP were estimated at approximately 155,331 for 2003. Nonlocals accounted for 43 percent of use or about 66,331 visits, while locals accounted for the remaining 57 percent of use or about 89,000 visits.

The average age of survey respondents was 41 years and approximately 60 percent of adult users were between the ages of 36 and 55. People over 65 accounted for only about 4 percent of those surveyed. Fifty-nine percent of respondents reported having at least one person with a college degree in their household. The average household income for the entire sample was $53,000. For locals the average household income was $43,100 while for nonlocals average household income was $67,000.

For locals, the average travel distance to the NRSP was about 40 miles, while nonlocals averaged traveling 217 miles and about 3.5 hours to reach the park. The average number of annual visits by locals was about 25, while nonlocals averaged just over 3 trips to the park each year. However, 18 percent of nonlocals took between 5 and 30 trips to the park each year.

During each visit, locals averaged about 4 hours on the New River indicating primarily day use. Nonlocals, on the other hand, averaged close to 14 hours on the water per visit suggesting that many nonlocal visits involved overnight stays. Primary activities for water-based recreation at NRSP were fishing (43%), canoeing (14%) and other floating/boating (18%). Twenty-five percent of those surveyed reported a primary activity that was not water-based, with camping and biking being most popular.

Park visitors were also asked about questions about the importance and condition of a number of issues related to their recreation experience. Among the most important issues to users were safety, public access, conflict avoidance, and parking. Among the least important issues were signage, crowding, and maps. Interestingly, those issues ranked most important were also ranked highest in terms of current conditions. The lowest ranked condition was for restrooms, but the ranking was only slightly less than "good." These results suggest that management is doing an excellent job meeting the needs of users.

Visitors were also queried about area features complementary to the NRSP experience. These features can be divided into natural (e.g., water quality, water level, outdoor attractions) and service-related groupings (e.g., shopping, eating places, boat rentals, guide services). Among those surveyed, water quality and water level were far and away the most important features. In fact, the third most important feature to visitors was other outdoor attractions. The service-related features not specifically related to users' outdoor experience were rated much lower in importance. For example, shopping was rated last of all area features.

In general, conditions for these features were highly correlated with importance rankings. Outdoor attractions, water quality, and water level ranked as the top three area features in terms of observed current conditions. Eating places, shopping, and

bait/tackle sales ranked as the lowest in terms of conditions of area features related to users' recreation experience. These results are based on averages across all users surveyed, but it would appear that at least a couple of conclusions could be drawn. First, the water and the potential for other outdoor recreation activities are the most important factors for the majority of users. Next, the fact that those issues ranked highest in terms of importance are also ranked highest in terms of condition suggests that major management problems are not apparent. Finally, the most noticeable difference in importance and condition between area features occurs with eating-places. The importance ranks somewhere in the middle of the 11 features listed, but the condition is ranked dead last. Taken together, the implication is that users are primarily focused on and happy with the natural features of NRSP, however, they may be a market for improved dining opportunities.

The NRSP clearly contributes to the economic activity in the region and to the economic welfare of park users. In this study, we focused only on water venue users (about 15-25%) of all park visits. The estimated 155 thousand visits annually to the NRSP for water-based recreation accounted for over $5 million in total spending for their entire trip. Of this amount, close to $2.5 million was spent by locals and nonlocals in the four-county economy.

Spending by nonlocals led to significant economic impacts in the area. Nonlocal spending in the counties and towns surrounding the NRSP totaled approximately $2 million and is responsible for generating about $2.3 million in total economic output. This amount of economic output supports approximately 50 local full-time job equivalents and creates about $750 thousand in personal income.

Water-based recreation at the NRSP also generates considerable economic benefits for park users. These benefits represent the difference in what users would pay above what they are paying for park access. Based on conservative assumptions and the use of the travel cost methodology, it appears that the park generates between $1.6 and $3.4 million in net economic benefits per year to the 155 thousand water recreation participants. On average, this amounts to approximately $16 per person per trip.

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Appendix A.

New River Water Trail On-Site-Local Questionnaire

1. Survey # _____ 2. Date_____ 3. Time_____
4. Location_____ 5. Interviewer_____
6. Activity/Modes: Canoe Kayak Motorboat Tube Fishing Other _____

1. What is your residence Zip Code? _____

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

3. About how far did you travel to get where you entered the New River today? _____miles

4. About how long did it take to get from home to where you entered the New River? _____minutes

5. Where did you enter the New River today? A. Austinville B. Foster Falls –upper C. Foster Falls – lower D. Allisonia E. Other _____

6. Where do/did you exit the New River today? A. Austinville B. Foster Falls –upper C. Foster Falls – lower D. Allisonia E. Other _____

7. What is your primary reason for being on the New River today? A. Canoeing B. Kayaking C. Boating D. Tubing E. Fishing F. Other_____

8. How much time did you spend on the River during this visit? _____hours _____minutes

9. How many, including yourself, were in your group? _____ people

10. Are you part of an organized group? Yes No Group name _____

11. Counting this visit, how many different times have you visited the New River in the past 12 months? _____

12. If the New River were not available for recreation today, would you have gone to another place with similar features? Y N If Yes, Name_____ Location_____

13. Counting this visit, about how much did your household spend in the last 12 months on goods and services related to your use of the New River? A. less than $50 B. $50-100 C. $100-250 D. $250-500 E. $500-1000 H. $1000-1500 I. more than $1500 _____

NOTE: on major items like boats, try to consider what percentage of annual use is on the New River E.g., a canoe costing $1000 which you use 50% of the time on the New River would account for $500. Only count what you purchased within the past year (include gas, oil, bait, service to boats, food, fees, etc)

14. About how much of this money was spent in Wythe, Carroll, Grayson, and Pulaski Counties?
A. more than 90% B. 75- 90% C. 50-75% D. 25-50% E. less than 25%

Please rate the following: first importance to you and then conditions you observed today (if they apply).

Use Issues:	**Importance to you**				**Current conditions**			
1. Safety/security	High	Med	Low	None	Excel	Good	Fair	Poor
2. Amount of crowding	High	Med	Low	None	Excel	Good	Fair	Poor
3. Parking	High	Med	Low	None	Excel	Good	Fair	Poor
4. Restrooms	High	Med	Low	None	Excel	Good	Fair	Poor
5. Avoiding conflicts with others	High	Med	Low	None	Excel	Good	Fair	Poor
6. Maps/Guidebooks of the River	High	Med	Low	None	Excel	Good	Fair	Poor
7. Signage	High	Med	Low	None	Excel	Good	Fair	Poor
8. Public Access	High	Med	Low	None	Excel	Good	Fair	Poor
9. Boat Ramps	High	Med	Low	None	Excel	Good	Fair	Poor

Please rate the following: first importance to you and then conditions (only if they apply).

Area Features:	**Importance to you**				**Current conditions**			
1. Canoe-in camping	High	Med	Low	None	Excel	Good	Fair	Poor
2. Eating places	High	Med	Low	None	Excel	Good	Fair	Poor
3. Shopping for gifts	High	Med	Low	None	Excel	Good	Fair	Poor
4. Historical attractions	High	Med	Low	None	Excel	Good	Fair	Poor
5. Outdoor attractions	High	Med	Low	None	Excel	Good	Fair	Poor
6. Shuttle/ boat rentals	High	Med	Low	None	Excel	Good	Fair	Poor
7. Guide services	High	Med	Low	None	Excel	Good	Fair	Poor
8. Bait/Tackle sales	High	Med	Low	None	Excel	Good	Fair	Poor
9. Outdoor Equipment	High	Med	Low	None	Excel	Good	Fair	Poor
10. Water Quality	High	Med	Low	None	Excel	Good	Fair	Poor
11. Water Quantity	High	Med	Low	None	Excel	Good	Fair	Poor

Please state whether you Strongly Agree, Agree, Disagree, or are Uncertain about the following 5 statements:

1. I would make use of a web site that provides trip planning information such as outfitter and guide contacts, reservations for boats, equipment, campsites, etc. SA A D U

DEMOGRAPHIC INFORMATION

1. How many people, including yourself, are in your household? _____

2. How many people, including yourself, in your household use the New River for recreation? _____

3. What is the highest level of education in your household? A. High school B. College C. Other _____

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

5. What is your employment status? (circle all) A. Student B. Employed
   C. Retired D. Part-time E. Not currently employed

6. Which interval represents your annual household income? A. Under $40,000
   B. $40,000 - $80,000 C. $80,000 - $120,000 D. More than $120,000
   E. Prefer not to answer this question

THANK YOU FOR YOUR TIME

New River Water Trail On-Site-Nonlocal Questionnaire

1. Survey # _____ 2. Date_____ 3. Time_____
4. Location_____ 5. Interviewer_____
6. Activity/Modes: Canoe Kayak Motorboat Tube Fishing Other _____

1. What is your residence Zip Code? _____

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

3. About how far did you travel to get where you entered the New River today?
   _____miles

4. About how long did it take to get from home to where you entered the New River?
   _____minutes

5. Where did you enter the New River today? A. Austinville B. Foster Falls –upper
   C. Foster Falls – lower D. Allisonia E. Other _____

6. Where do/did you exit the New River today? A. Austinville B. Foster Falls –upper
   C. Foster Falls – lower D. Allisonia E. Other _____

7. What is your primary reason for being on the New River today? A. Canoeing B. Kayaking
   C. Boating D. Tubing E. Fishing F. Other_____

8. How much time did you spend on the River during this visit? _____hours
   _____minutes

9. How many, including yourself, were in your group? _____ people

10. Are you part of an organized group? Yes No Group name _____

11. Counting this visit, how many different times have you visited the New River in the past 12 months? _____

12. If the New River were not available for recreation today, would you have gone to another place with similar features? Y N Name_____
    Location_____

Please rate the following: first importance to you and then conditions you observed today (only if they apply).

Use Issues:	**Importance to you**				**Current conditions**			
1. Safety/security	High	Med	Low	None	Excel	Good	Fair	Poor
2. Amount of crowding	High	Med	Low	None	Excel	Good	Fair	Poor
3. Parking	High	Med	Low	None	Excel	Good	Fair	Poor
4. Restrooms	High	Med	Low	None	Excel	Good	Fair	Poor
5. Avoiding conflicts	High	Med	Low	None	Excel	Good	Fair	Poor
6. Maps/Guidebooks of the River	High	Med	Low	None	Excel	Good	Fair	Poor
7. Signage	High	Med	Low	None	Excel	Good	Fair	Poor
8. Public Access	High	Med	Low	None	Excel	Good	Fair	Poor
9. Boat Ramps	High	Med	Low	None	Excel	Good	Fair	Poor

Area Features:	**Importance to you**				**Current conditions**			
1. Canoe-in camping	High	Med	Low	None	Excel	Good	Fair	Poor
2. Eating places	High	Med	Low	None	Excel	Good	Fair	Poor
3. Shopping for gifts	High	Med	Low	None	Excel	Good	Fair	Poor
4. Historical attractions	High	Med	Low	None	Excel	Good	Fair	Poor
5. Outdoor attractions	High	Med	Low	None	Excel	Good	Fair	Poor
6. Shuttle/ boat rentals	High	Med	Low	None	Excel	Good	Fair	Poor
7. Guide services	High	Med	Low	None	Excel	Good	Fair	Poor
8. Bait/Tackle sales	High	Med	Low	None	Excel	Good	Fair	Poor
9. Outdoor Equipment	High	Med	Low	None	Excel	Good	Fair	Poor
10. Water Quality	High	Med	Low	None	Excel	Good	Fair	Poor
11. Water Quantity	High	Med	Low	None	Excel	Good	Fair	Poor

Please state whether you Strongly Agree, Agree, Disagree, or are Uncertain about the following statement:

1. I would make use of a web site that provides trip planning information such as outfitter and guide contacts, reservations for boats, access sites, equipment rental, campsites, etc.
   SA A D U

2. How did you find out about the New River? A. Friends/relatives B. Internet C. Magazine D. Newspaper E. Other _____

3. What is your greatest concern regarding management of the New River?_____

EXPENDITURES We would like to ask you about your ESTIMATED EXPENSES for this trip to the New River. The information will be used to calculate the economic effects of the New River on the local economy.

1) How many nights total will you be away from home on this trip? _____ nights
   Including yourself, how many are in your spending party? _____ people
   Is the New River the main reason for your trip to this area of Virginia. Y N

In Column A below, estimate spending by your party for your whole trip. In Column B below, estimate your spending in the New River area of Virginia.

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 within for the whole trip	B. Spending by your party 15 miles of the New River
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)	_____	_____
River Related:		
Canoe, kayak, boat or tube rentals	_____	_____
Shuttle or guide service	_____	_____
Park use, entry, or parking fees	_____	_____
Any other expenses:		
Other services, souvenirs, or equipment	_____	_____

DEMOGRAPHIC INFORMATION

1. How many people, including yourself, are in your household? _____

2. How many people, including yourself, in your household use the New River for recreation? _____

3. What is the highest level of education in your household? A. High school B. College C. Other _____

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

5. What is your employment status? (circle all) A. Student B. Employed C. Retired D. Part-time E. Not currently employed

6. Which interval represents your annual household income? A. Under $40,000 B. $40,000 - $80,000 C. $80,000 - $120,000 D. More than $120,000 E. Prefer not to answer this question

THANK YOU FOR YOUR TIME