# *Blue Ridge Parkway Scenic Experience Project*
# *Final Report*

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***Executive Summary-***

Key results from the southwest Virginia phase of the Blue Ridge Parkway Scenic Experience Project are as follows:

**General conclusions**

- Visitors are very satisfied with the current quality of scenic experience attributes on the southwest Virginia section of the Parkway. This was expressed directly and indirectly through three different survey versions and several different questions formats.
- Our survey results suggest that visitors do not want to see a decline in the scenic experience attributes. This was expressed both in the dollar value estimates of lost satisfaction and in visitor statements regarding future visitation behavior.
- Although visitors may value improvements in scenic experience attributes our survey results suggest that limited Parkway budgets may yield more return if they are invested to maintain the **current quality** levels of this section of the Parkway rather than invested to improve quality.
- Visitors are very loyal to the Parkway. They have visited for many years and will continue visiting even if their favorite view, or 50% of high quality views, decline to low quality. However, although they may continue to visit, 25% to 50% the visitors will decrease their frequency of visits each year depending upon the level of scenic quality decline that occurs. Therefore although visitor expenditures may not actually decrease with small changes in view quality, the *growth* in future expenditures will slow if Parkway view quality decreases.
- *Overall our survey results suggest that declines in attribute quality have a larger impact on Parkway visitors than improvements in attribute quality. This conclusion is evident in both the estimated value of lost satisfaction and in the expected change in visitation from decreases in scenic quality. It is also consistent with the result that visitors are very satisfied with current Parkway conditions.*

**Visitor Satisfaction and Parkway Attribute Preferences**

- Visitors are generally very satisfied with the quality of Parkway attributes with all attributes receiving 65% or greater satisfactory levels and scenic views receiving over 80% satisfaction levels.
- The respondents in this sample noticed most often developments and single houses. 42% considered this their greatest concern as compared to the other concerns presented.
- Of the five Parkway attributes, the scenic quality attributes are all similarly ranked as *most important* and *important* by approximately 50% of the sample.

The rankings are as follows (% reported are the combined most important and important)

- Overlook view quality (51.1%)
- Number of overlooks (48.3%),
- Roadside view quality (47%),
- Trails (37.8%)
- Activity areas (29%)

**The Welfare Effects of Changes in Parkway Attributes**

- The average estimated value of a visitor's increased satisfaction each year from a one level *increase* in a Parkway attribute, all other things constant, is:
  - $116 for an increase in roadside scenic view quality from current to high
  - $53 for an increase in overlook scenic quality from current to high
  - $396 for an increase in activity area number and quality
  - $5 for one more overlook
  - $14 for one more mile of quality trail
- The average estimated value of a visitor's lost satisfaction each year from a one level *decrease* in a Parkway attribute, all other things constant, is:
  - $240 from a decrease in roadside scenic view quality from current to low
  - $359 from a decrease in overlook scenic quality from current to low
  - $396 from a decrease in activity area number and quality
  - $5 from one less overlook
  - $14 from one less mile of quality trail
- The average estimated value of a visitor's increased satisfaction from a one level increase in *all* the attributes together is $584 per year.
- The average estimated value of a visitor's lost satisfaction from a one level decrease in *all* the attributes together is $1014 per year.
- There is no overwhelming support for any funding option as a most preferred method. Federal funds did receive 21% of vote as most preferred by the sample.
- Approximately half the visitors considered each of the three general payment methods (federal funds, state funds, and private donations) as acceptable.
- The mechanisms for federal and state funding most acceptable were tax form check-offs and license plate fees, however these do not get overwhelming support with only 30%-35% of the sample considering these as acceptable.

**Change in Visitor Expenditures when Scenic Quality Changes**

- The visitor in our full project sample to the southwest Virginia section in 2000 has visited for 20.61 years, 2.25 times per year, for 1.96 days and spent $245 per visit or $149 per day.

- As scenic quality declines more respondents are willing to decrease their number of visits (26% to 41%)
- As scenic quality improves an increasing proportion of respondents are willing to increase their visits (33% - 42%).
- 87% of a sub-sample of visitors, who visited on average 2.45 times per year, stated they expect to double their visits next year to an average of 4.74 visits per year (an increase of 2.29 visits), if Parkway scenic quality remains the same.
- If *½ of the moderate views decrease to low quality***,** 26% of this same sub-sample expect to visit on average 3.1 times next year versus the 4.74 visits noted above. Thus, the expected increase in visitation drops to .65 visits as compared to the 2.29 visit increase when scenic quality remains the same.
- Diminishing scenic quality does not necessarily lead directly to a decrease in the visitation levels, but rather slows the level of increase in visitation for next year.
- The *growth* in expenditures that may occur from existing visitors, *if scenic quality remains the same*, is estimated between $371 million to $579 million. This represents the *potential* gains to communities surrounding the Parkway from maintaining the *current level* of scenic quality on this section.
- If scenic quality declines, expenditure *growth* may *decrease* by $69 million to $360 million depending on the level of quality decline and our estimation assumptions. This represents a *decrease* in the *potential* gains for the communities surrounding this section of the Parkway.
- If scenic quality were to increase expenditure *growth* could *increase* by $3 million to $132 million.
- The results suggest that declines in quality have a much larger impact on Parkway expenditures than improvements in quality. This result is consistent with results found elsewhere in this study that visitors are generally satisfied with Parkway conditions and do not want to see declines in conditions.
- 15.4% of the sub-sample stated they would stop visiting the Parkway if *½ the high quality views were reduced to low*.
- 4.6% stated they would stop if their favorite view changed.
- Therefore, even if *½ the high quality views are reduced to the low*, 85% of visitors will continue to visit this section of the Parkway, assuming the sub-sample is representative of all Parkway visitors. Although most visitors will not stop their visits, recall from above that potentially half of the 85% will likely reduce their visitation levels when scenic quality declines, thus slowing or reversing future expenditure *growth* along this section of the Parkway.

### *1.0 Why we did this project*

Many of the scenes along the Parkway are either agricultural/farm scenes, or views off the blue ridge escarpment to valleys below. Agricultural views are the fastest changing scenes in America, and the most likely to be negatively changed by suburban development. In 2000, six Southwest Virginia views had significant quality changes due to intrusions of incompatible development. These changed views are now classified as transitional, commercial, or residential scenes. Since 1948, 75% of farmlands along the Parkway changed from farms to alternative uses. In North Carolina, 10,000 farm acres remain along the Parkway, down from 48,000 in 1948. Addressing the changes in scenic quality requires that the Parkway allocate scarce resources for view preservation, such as increased vegetation management, or purchasing conservation easements, leases, or land.

This study addresses two fundamental questions faced by Blue Ridge Parkway managers regarding the scenic experience of Parkway visitors:

1. What are the benefits, or total economic value[1], from the various attributes of the parkway scenic experience?
2. What is the impact on visitation of a change in view quality, either an increase, or a decrease?

Parkway staff currently use a descriptive ranking system of sites to identify critical sites for preservation. Introducing visitor preferences into the decision process using benefits estimation methods provides estimates that are comparable to mitigation costs. Turner (2000) specifically mentions the importance of benefit valuation to National Park

[1] Total economic value measures the value, or benefits, from a good or service received by the consumers, users, or those who benefit in some way from the good, or service. Total economic value comes from a person's demand for a good or service. See the appendices for more discussion on total economic value and decision making for the Parkway.

management decisions. This study uses economic tools to assist the Parkway in making management decisions addressing the problem of changing scenic quality.

### *2.0 Project Description*

The Blue Ridge Parkway Scenic Experience Project was conducted over three years by economists at Warren Wilson College (formally at Western Carolina University), University of North Carolina at Asheville, the University of Tennessee at Knoxville and Blue Ridge Parkway management assistant and community planner: Laura Rotegard. The study was implemented in three stages: survey design, survey implementation, and data analysis. The survey design, headed by Susan Kask, was completed between Fall 1999 and Spring 2000. This stage involved designing the surveys and view boards needed for the study. An extensive literature review and five focus groups were used to design the surveys. The final design included three survey instruments. Details of these survey instruments are given in the appendices.

The survey was implemented during the Summer and Fall of 2000 and headed by Leah Greden Mathews. This involved the production of the survey (paper and computer versions), training of survey administrators, determining survey implementation logistics, and conducting the survey. Three survey periods were used in the implementation stage including two summer collections and two fall collections on weekends and weekdays. A total of 860 surveys were completed with 831 useable surveys of which 83.5% and 16.5% were computerized and paper surveys respectively. Data preparation was completed in 2001. Details of the survey implementation are provided in the appendices.

The data analysis, headed by Steve Stewart, was completed in the summer of 2002. The data analysis used limited dependent variable statistical methods[2] with LIMDEP software.

The study was funded by the National Park Service, the Blue Ridge Parkway, the Blue Ridge Parkway Foundation, Western Carolina University, and the University of North Carolina at Asheville.

## *3.0 Project Results*

### *3.1 The Sample: Demographics, and Visitor Activities, Satisfaction, and Concerns*

In summary,

- The visitors sampled on the southwest Virginia section of the Parkway are demographically similar to the previous study of Parkway visitors by Brothers and Chen (1997).
- Visitors in our full project sample visit the southwest Virginia section Parkway on average 2.25 times per year and have been visiting on average for 20.61 years.
- They are an active group with a variety of interests.
- In 2000 they had concerns similar to others in the nation with healthcare, education and the environment at the top of their list.
- While on the Parkway they participate in a variety of activities with hiking selected by 65% and visiting a scenic area by 44% of the sample, and visiting scenic sites as the most common activity for 25% of the sample.
- They are generally very satisfied with the quality of Parkway attributes with all attributes receiving 65% or greater satisfactory levels and scenic views receiving over 80% satisfaction levels.
- The sample noticed developments and single houses most and 42% considered this their greatest concern of those presented.

[2] These include logit, multinomial logit, and conditional logit models. More details are provided in the appendices.

### 3.1.1 Demographics

Table 1 below presents the demographics of the full sample[3]

- The sample is wealthier, older, and more educated than the region and nation. Recall this is a sample of visitors to the Parkway and thus we would not necessarily expect them to be similar to the region or nation as whole.
- The demographics of the sample are also similar to the Brothers and Chen (1997) visitor sample from the same region with respect to age, occupation although with a smaller percentage of retirees (18.24% in our sample as compared to 36.67% in the Brothers and Chen sample), and income with over 10% of sample with income over $100,000 and the bulk of the sample between $20,000 and $69,000 with approximately 10% in each decile.
- The Brothers and Chen 1996 sample also had a similar number of college graduates at 48.75%

Table 1: Visitor demographics as compared to selected states and nation

| n=828 | Sample | NC | VA | SC | Nation | Brothers and Chen 1996 sample |
|---|---|---|---|---|---|---|
| Age | 35.4 | 35.3 | 35.7 | 35.4 | 35.3 | 49%>55 years |
| Female | 48% | 51% | 51% | 51.4% | 50.9% | 45% |
| % w/ College degree | 47% | 9.18% | 13.7% | 8.99% | 11.48% | 48.7% |
| Income | 37,629 | 35,320 | 40,259 | 33,325 | 37,005 | 50% between 30,000-59,999 |

Table 2 presents the various activities and interests of visitors and Table 3 shows their perspective on important national issues.

- Our sample is active and involved in outdoor activities including outdoor recreation (69%), gardening (55%), fishing (34%), and hunting (19%).
- In Table 3 we see that most sample visitors ranked education or healthcare as either most important or important, both receiving votes from 84.9 and 81.6 percent of the sample respectively.
- Environmental issues came in third with 79% of visitors ranking this issue as important or most important.

[3] Full sample refers to all survey versions.

Table 2: Visitor activities and interests

| Activity or Interest (n=828) | Number | Percent of full sample |
|---|---|---|
| Outdoor recreation (hiking, kayaking, camping, etc) | 574 | 69.3 |
| Gardening | 451 | 54.5 |
| Religious | 333 | 40.2 |
| Music or theater | 328 | 39.6 |
| Fishing | 279 | 33.7 |
| Social | 269 | 32.5 |
| Environmental awareness or education | 257 | 31 |
| Business or Professional | 220 | 26.6 |
| Hunting or shooting | 159 | 19.2 |
| Civic | 130 | 15.7 |
| Political | 121 | 14.6 |
| Motorcycling | 80 | 9.7 |

Table 3: National issues ranked as important or most important by sample visitors

| National Issue (n=746) | Important[a] | % |
|---|---|---|
| Education | 633 | 84.9 |
| Health care | 609 | 81.6 |
| Environment | 595 | 79.8 |
| Public safety | 521 | 62.9 |
| National defense | 379 | 50.8 |
| Unemployment | 347 | 46.5 |
| Inflation | 292 | 39.1 |
| Other | 41 | 5.5 |

a: Includes both the important and most important ranks

Table 4 shows that

- 67% of our sample resided in North Carolina or Virginia
- Our sample is more regional than the Brothers and Chen 1996 sample with more visitors from NC, slightly more from Virginia, fewer from Florida, more from South Carolina, and 10% less from other parts of the country or world.

Table 4: Zip code origin of sample visitors

| First two digits n=828 | State | Frequency | % | Brothers and Chen 1996 Sample |
|---|---|---|---|---|
| 23 | VA | 20 | 2.4 | 33% |
| 24 | VA | 267 | 32.3 | |
| 27 | NC | 214 | 25.8 | 20.1% |
| 28 | NC | 55 | 6.6 | |
| 29 | SC | 16 | 1.9 | 2.5% |
| 32 | FL | 11 | 1.3 | 4.2% |
| Other | | 245 | 29.6 | 40.2 |

- Our sample has been visiting of the Parkway on average 20.61 years,
- Visitors in our full project sample have visited the southwest Virginia section on average 2.25 times per year.
- On this trip visitors visited on average for 1.96 days.
- Table 5 below shows that our sample has also visited other sections of the Parkway, with the middle section visited the most by 68.8% of the sample...

Table 5: Parkway visitation by sections

| Parkway section n=828 | Percent of sample who have visited | % |
|---|---|---|
| Northern Section | 470 | 56.8 |
| Southwest section | 701[a] | 84.7 |
| Middle section | 570 | 68.8 |
| Southern section | 471 | 56.9 |

a- We should have 828 visitors to this section. Some visitors may not have checked this given it was obvious that they were on this section.

3.1.2 Visitor Activities

Table 6 shows all the activities in which visitors are participating during this visit to the southwest Virginia section of the Parkway. Table 7 shows the activity a visitor identified as their most common use of the Parkway for this particular trip on the southwest Virginia section.

- The top five activities in which visitors partake are hiking, visiting a scenic area, visiting an historic site, camping and picnicking (65.8%, 44.9%, 43.8%, 33.7%, and 20.9%, respectively).
- Visitors' most common activities while on this trip include visiting a scenic area, touring, relaxing, and family outing were listed with percentages at 26.2, 17, 15.3, and 12.4 respectively[4].
- Note that while hiking was identified as an activity by 65% of the sample, only 5.7% identified hiking as their most common activity

Table 6: Visitor activities while on Parkway for this visit

| Parkway Activity[a] (n=828) | Number | % of sample |
|---|---|---|
| Hiking | 545 | 65.8 |
| Visiting a scenic area | 372 | 44.9 |
| Visiting a historical site/museum | 363 | 43.8 |
| Camping | 279 | 33.7 |
| Picnicking | 173 | 20.9 |
| Family outing | 152 | 18.4 |
| Touring | 126 | 15.2 |
| Visiting shops/craft galleries | 79 | 9.5 |
| Relaxing | 78 | 9.4 |
| Visiting a lodge | 49 | 5.9 |
| Rock climbing | 47 | 5.8 |
| Fishing/hunting | 28 | 3.4 |
| Commuting | 21 | 2.5 |
| Other | 10 | 1.2 |
| Creating art | 9 | 1.1 |
| Participating in a group outing | 3 | 0.36 |

a. There are more choices.

[4] The Brothers and Chen (1997) found that 94.7% of their sample visited a scenic area. In our study we focus on what visitors *are doing while on* the Parkway, not their *purpose for choosing* the Parkway as opposed to other vacations sites in the southeast or US. Thus our result is quite different and not comparable to the Brothers and Chen study. Our question format includes many activities that encompass

Table 7: The most common activity while on this trip

| n=828 | Number | % |
|---|---|---|
| Visiting a scenic area | 217 | 26.2 |
| Touring | 141 | 17 |
| Relaxing | 127 | 15.3 |
| Family outing | 103 | 12.4 |
| Hiking | 47 | 5.7 |
| Camping | 43 | 5.2 |
| Visiting a historical site/museum | 28 | 3.4 |
| Other | 24 | 2.9 |
| Picnicking | 23 | 2.8 |
| Visiting shops/craft galleries | 16 | 1.9 |
| Participating in a group outing | 14 | 1.7 |
| Commuting | 10 | 1.2 |
| Visiting a lodge | 7 | 0.8 |
| Hunting/hunting | 6 | 0.7 |
| Rock climbing | 2 | 0.24 |
| Creating art | 2 | 0.24 |

### 3.1.3 Visitor Satisfaction and Concerns

Table 8 presents visitor satisfaction with the attributes of their Parkway scenic experience in southwest Virginia.

- Overall, visitors are satisfied with current Parkway attributes as evidenced by a majority of visitors selecting 4 (satisfied) or 5 (very satisfied) for all the attributes.
- Scenic quality, both overlook and roadside views, received over 80% satisfied with close to 50% very satisfied.
- Satisfaction drops slightly for facilities to 75%
- Trails received a satisfaction level of 46%, however, note that 30% of the sample did not know their satisfaction levels for trails[5]. Of those who had an opinion regarding trails, 63% were satisfied.

scenic viewing, e.g. touring, family outings etc. and therefore allows us to understand the context in which scenic viewing is taking place.

[5] This is likely due to this group not participating in this activity while visiting the Parkway.

Table 8: level of satisfaction for southwest Virginia parkway attributes

| Parkway Characteristic (n=776) | | Not at all satisfied 1 | 2 | 3 | 4 | Very satisfied 5 | Don't know |
|---|---|---|---|---|---|---|---|
| Number of overlooks | # | 2 | 3 | 121 | 222 | 428 | 17 |
| | (%) | (0.3) | (0.4) | (15.6) | (28.6) | (55.2) | (2.2) |
| Scenic quality of overlooks | # | 3 | 34 | 133 | 233 | 410 | 11 |
| | (%) | (0.4) | (4.4) | (17.1) | (30) | (52.8) | (1.4) |
| Scenic quality of roadside views | # | 5 | 40 | 134 | 271 | 368 | 13 |
| | (%) | (0.6) | (5.1) | (17.3) | (34.9) | (47.4) | (1.7) |
| Number of quality trails | # | 4 | 40 | 170 | 170 | 191 | 236 |
| | (%) | (0.5) | (5.1) | (21.9) | (21.9) | (24.6) | (30.3) |
| Number and condition of activity area | # | 10 | 41 | 157 | 266 | 318 | 28 |
| | (%) | (1.3) | (5.3) | (20.2) | (34.3) | (40.9) | (3.6) |

Table 9 below shows the changes visitors noticed while visiting the southwest Virginia section on this trip and it shows their level of concern for these scenic quality changes.

- Subdivision developments and single houses are most noted, however, less than 50% of visitors consider these changes their greatest concern

Table 9: Changes noticed on the Southwest Virginia section and visitors' level of concern

| Changes noticed (n=828) | Frequency of notice | | Greatest concern | | 2nd greatest concern | |
|---|---|---|---|---|---|---|
| | # | % | # | % | # | % |
| Single houses | 617 | 74.5 | 162 | 19.6 | 212 | 25.6 |
| Housing subdivisions | 378 | 45.7 | 193 | 23.3 | 97 | 11.7 |
| Commercial signs | 244 | 29.5 | 70 | 8.5 | 44 | 5.3 |
| Road cuts | 240 | 29.0 | 28 | 3.4 | 38 | 4.6 |
| Power lines | 216 | 26.1 | 47 | 5.7 | 63 | 7.6 |
| Electric towers | 205 | 24.8 | 28 | 3.4 | 42 | 5.1 |
| Telecom towers | 186 | 22.5 | 39 | 4.7 | 35 | 4.2 |
| Logging | 185 | 22.3 | 56 | 6.8 | 38 | 4.6 |
| Air pollution | 157 | 19.0 | 65 | 7.9 | 30 | 3.6 |
| Didn't notice | 121 | 14.6 | 74 | 8.9 | 2 | 0.2 |
| Other | 38 | 4.6 | 13 | 1.6 | 4 | 0.5 |

*3.2 Total Economic Value and Scenic Beauty on the Blue Ridge Parkway*

In summary:

- The *scenic quality* attributes are the most important attributes to visitors.
- *Trails* are second most important and *Activity areas* are third.
- *Overlook quality* had the highest percentage of respondents (48.7%) selecting the high quality for their ideal level of that attribute.
- *Roadside scenic quality* runs second with 44.5% of respondents selecting high quality views as their ideal level.
- *Roadside views*, received the highest percentage of *most important* (27.6%).
- Of the five Parkway attributes, the scenic quality attributes are all similarly ranked as *most important* and *important* by approximately 50% of the sample. The rankings are as follows (% reported are the combined most important and important)
    - Overlook view quality (51.1%)
    - Number of overlooks (48.3%),
    - Roadside view quality (47%),
    - Trails (37.8%)
    - Activity areas (29%)
- There is no overwhelming support for any funding option as a most preferred method. Federal funds did receive 21% of the vote as most preferred by the sample.
- Approximately half the visitors considered each of the three general payment methods (federal funds, state funds, and private donations) as acceptable.
- The mechanisms for federal and state funding most acceptable were tax form check-offs and license plate fees, however these do not get overwhelming support with only 30%-35% of the sample considering these as acceptable.

3.2.1 Introduction

Recall the question faced by Parkway managers mentioned above:

> *What are the benefits, or total economic value from the various attributes of the parkway scenic experience?*

There are many different benefits associated with the Parkway. Table 10 illustrates the various ways visitors may benefit from the Parkway.

Table 10: Benefit types for the Blue Ridge Parkway

- Scenic motorway for cars, motorcycles, etc. – scenic viewing, picnics, historic sites etc.
- Destination for outdoor recreation such as camping, hiking, cycling, picnics, etc.
- Destination for creative pursuits such as photography, painting, writing, etc.
- Destination for school classes for educational purposes – historic sites, museums, hiking, visitor centers, etc.
- Destination for family and group vacations and activities – all of the above, shopping, bed & breakfasts, restaurants, etc.

Who might have these values? The Blue Ridge Parkway is valued by many types of people including: visitors, residents near the Parkway, potential visitors, the general public who may value the existence of the Parkway (a non-use existence benefit), and the general public who may want to endow the Parkway for future generations (a non-use bequest benefit). One person can embody all of these user types, a single user type, or any combination of these user types. In this study we survey only visitors, however, the values they report may also include their non-use existence and bequest values[6].

To address the question above we report the results from a choice modeling survey that analyzes specific visitor preferences regarding visitors' preferred attributes for a recreational experience.

3.2.2 Parkway Attributes and Visitor Preferences

Table 11 defines the five attributes representing the Parkway visitor's scenic experience.

Table 11: Parkway visitor experience attributes

[6] There are several populations of non-users who may receive benefits from the Parkway (option, existence, and bequest) that were not surveyed in this study. It is important to note, therefore, that since this study does not survey a population of non-users (i.e. persons who have not visited the Parkway) our estimates of total economic value are likely lower bounds as we do not include a whole class of 'users' who have non-use values such as the option to use, existence, or bequest values.

| |
|---|
| **Number of Overlooks in 100 miles**: number of overlooks and the average distance between overlooks |
| **Overlook Scenic Quality**: percent of high, medium, and low quality views |
| **Roadside Scenic Quality**: percent of high, medium, and low quality views |
| **Number of Quality Trails**: miles of trails cleared, signed, rated, and maintained. Includes, backcountry, stretcher, and interpretive trails. |
| **Number and Condition of Activity Areas:** Areas where visitor services are provided, such as visitor centers and picnic areas. At a minimum, restrooms are provided. |

Table 12 shows the ideal Parkway attribute bundle visitors selected and their rankings of importance for each attribute.

Table 12: Attribute levels selected by visitors and the rank of importance for each attribute

| Attribute | Number of Overlooks | | Scenic Quality of Overlook Views | | Scenic Quality of Roadside Views | | Number of Quality Trails | | Number and Condition of Activity Areas | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Ideal Level* n=499** | | % | | % | | % | | % | | % |
| High | 155 | 31.1% | 243 | 48.7% | 222 | 44.5% | 150 | 30.1% | 175 | 35.1% |
| Current | 330 | 66.1% | 246 | 49.3% | 262 | 52.5% | 318 | 63.7% | 300 | 60.1% |
| Low | 14 | 2.8% | 9 | 1.8% | 14 | 2.8% | 28 | 5.6% | 22 | 4.4% |
| **Rank n=532** | | | | | | | | | | |
| 1(Most Important) | 98 | 18.4% | 116 | 21.8% | 147 | 27.6% | 135 | 25.4% | 127 | 23.9% |
| 2 | 159 | 29.9% | 156 | 29.3% | 103 | 19.4% | 66 | 12.4% | 27 | 5.1% |
| 3 | 150 | 28.2% | 178 | 33.5% | 116 | 21.8% | 41 | 7.7% | 23 | 4.3% |
| 4 | 58 | 10.9% | 36 | 6.8% | 87 | 16.4% | 130 | 24.4% | 184 | 34.6% |
| 5(Least important) | 64 | 12.0% | 46 | 8.7% | 79 | 14.9% | 156 | 29.3% | 166 | 31.2% |

*Results of ideal level don't include paper-version survey.

- Respondents selected the current level of an attribute as their ideal level 49%-66% of the time. This result is consistent with the earlier observation that respondents were generally satisfied with the quality of Parkway attributes.
- Overlook quality had the highest percentage of respondents (48.7%) selecting the high quality for their ideal level of that attribute.
- Roadside scenic quality is second with 44.5% of respondents selecting high quality views as their ideal level.

- It is important to note that some respondents did identify low attribute levels as ideal for each attribute, but as expected very few did so (1.8%-5.6)
- Interestingly, all the attributes receive a *most important* rank by at least 18% – 27% of respondents suggesting all the attributes play an important role to at least a 1/5 of visitors to this section. In other words, all of the attributes are important for this sample of visitors.
- The number of overlooks has the lowest percentage selected as *most important* (18.4%).
- Roadside views, received the highest percentage of *most important* (27.6%).
- Overlook quality is ranked as *most important* by only 21.8% of sample. However, when we consider both the *most important* and *important* rank levels, the overlook quality is ranked the highest by 51.1% of sample. However, this is not significantly different from the percentage of respondents who selected the other two scenic quality attributes as important or most important.
- The attributes are ranked in the following order
    - Overlook view quality (51.1%)
    - Number of overlooks (48.3%),
    - Roadside view quality (47%),
    - Trails (37.8%)
    - Activity areas (29%)
- Clearly, these rakings suggest that the *scenic quality attributes* are the most important attributes to visitors.
- *Trails* are second most important and *Activity areas* are third.
- Note however, that in the following section our results show visitors made choices contrary to their original rankings. In other words although they said activity areas were third most important, when asked to choose declines or increases of 20% in funding, activity areas became much more important. This is likely a result of the magnitude of the proposed change.

### 3.2.3 Funding Options

Table 13: Visitor preferences for payment method[a]

| Payment option n=303 | # Selected as acceptable | % Sample acceptable | # Selected as Most preferred | % Sample for most preferred |
|---|---|---|---|---|
| Federal funds | 139 | 45.87% | 64 | 21.12% |
| State Funds | 147 | 48.51% | 47 | 15.51% |
| Donation Boxes | 150 | 49.50% | 34 | 11.22% |
| Non-profits Donations | 159 | 52.48% | 22 | 7.26% |
| License Plate Fee | 101 | 33.33% | 22 | 7.26% |
| Federal Tax Form check-off | 106 | 34.98% | 19 | 6.27% |
| Private Donations | 148 | 48.84% | 17 | 5.61% |
| State Gasoline Tax | 55 | 18.15% | 14 | 4.62% |
| Federal Gasoline tax | 54 | 17.82% | 11 | 3.63% |
| State Tax form Check-off | 92 | 30.36% | 10 | 3.30% |
| Federal Income Tax | 52 | 17.16% | 10 | 3.30% |
| State Income Tax | 41 | 13.53% | 9 | 2.97% |
| Other | 10 | 3.30% | 4 | 1.32% |
| No response | na | na | 20 | 6.60% |

(a) Respondents selected a payment method for either their ideal bundle of Parkway attributes, or for the options they selected in the choice survey.

Table 13 shows visitor preferences for the type of payment scheme they would like to use in order to pay for their preferred attribute levels.

- There is no overwhelming support for any funding option as a most preferred method. Federal funds did receive 21% of vote as most preferred by the sample.
- Approximately half the visitors considered each of the three general payment methods (federal funds, state funds, and private donations) as acceptable.
- The mechanisms for federal and state funding most acceptable were tax form check-offs and license plate fees, however these do not get overwhelming support with only 30%-35% of the sample considering these as acceptable.

### 3.2.4 Economic Value of Parkway Attributes: Increases or Decreases in a Single Attribute

In summary:

- A visitor receives an increase in satisfaction value estimated at $116 from an increase in **roadside** scenic quality from the current level to the high level, all other things constant.

- The estimated value of a visitor's increase in satisfaction each year from an increase in **overlook scenic quality** from current to high is $53.
- Although visitors said that **activity areas** had less importance to them than views and trails, they have expressed high estimated values of $396 each year for the increased satisfaction from additional and improved activity areas.
- Finally, the small amount visitors gain in satisfaction from a one unit increase in the **number of overlooks or trails** ($5 for *one* overlook and $14 for *one* mile of trail) may result from the unit of measure, 1 mile of trail and 1 more overlook and/or their preferences for improving these attributes.
- Our results suggest that visitors receive the most satisfaction from improvements to activity areas and from roadside and overlook views. They receive less additional satisfaction from improvements to trails, or an increase in the number of overlooks.
- However, there are potentially positive net gains from improvements to all attributes given the high number of visitors to the Parkway each year and the high value estimates for this sample of visitors.
- Our results suggest that the impact on visitors is greater when view quality declines, than when it increases.
- A decline in all ***overlook views*** from the current level to low imposes a loss in satisfaction valued at $359, all other things constant.
- Visitors in our sample incur a loss in satisfaction valued at $240 from a decline in all ***roadside views*** from the current level to low.
- Decreasing the number and quality of Activity ***areas*** decreases satisfaction for the visitor valued at $396 each year.
- The loss in visitor satisfaction from a decline in the **number of overlooks or trails** is less significant and is valued at $5 for one overlook and $14 for one mile of trail.
- Our results suggest that avoiding the worst scenario of declining quality for any attribute such that they fall to low is very important to visitors and has significant value to them.

Tables 14-16 below summarize the economic values of Parkway attributes.

Table 14 Welfare calculations for a one level *increase* in attributes from the current level.

| **Attribute (Change in attribute)** | **Welfare Gain** | **Unit of measure** |
|---|---|---|
| OVERLOOK (23 → 28 overlooks) | $5 | One overlook |
| LOOKHIGH (56% → 62% high quality views) | $53 | Quality level change from current to high |
| ROADHIGH (45% → 60% high quality views) | $116 | Quality level change from current to high |
| NUMTRAIL (13.2 → 31.5 miles) | $14 | One mile of trail |
| ACTAREA (6 mixed → 9 Good) | $396 | Number and condition of activity areas |

In Table 14 we show the *visitor's dollar value of satisfaction received* from a one level increase in any one of the Parkway's scenic experience attributes, *assuming all other attributes remain at the current level*.

- Visitors receive increased satisfaction valued at $116 from an increase in roadside scenic quality from the current level to the high level, all other things constant. Note this quality change represents a change in low quality views to high quality views such that high quality views account for 60% of total views from 45%.
    - Policy implications: The estimated dollar value of increased satisfaction from a change in some low quality roadside views to high quality views in the southwest Virginia section so that 60% of views are high quality would bring the Parkway visitor to this section on average between $116 of increased satisfaction *each year*.
- If the cost of such a policy is 1 million dollars, then the total benefit to all visitors is approximately 1.16 billion each year if you assume 10 million visitors to the southwest Virginia section ($116 multiplied by the number of visitors to that section).
- A visitor's increased satisfaction each year from an increase in overlook scenic quality from current to high has an estimated average value of $53.
    - Policy implications: The estimated total economic value of improving overlook view quality from 56% high quality views to 62% high quality is $53 each year for one visitor.
- Although visitors said that activity areas had less importance to them than views and trails, they have expressed high values at $396 each year in response to increases in the number and quality of activity areas.
    - Policy Implications The estimated total economic value from increases in the number and quality of activity areas is 3.96 billion dollars each year. As noted above, this value is significantly higher than expected

given that visitors earlier stated a preference for scenic quality attributes. However, the ranking of importance was taken before the proposed increase or decrease was suggested. Thus, when faced with an increased number and quality of areas visitors stated different preferences for these increases.

- Finally, the small amount visitors receive in satisfaction from a one unit increase in overlooks and trails ($5 for *one* overlook and $14 for *one* mile of trail) may result from the unit of measure, 1 mile of trail and 1 more overlook and/or their preferences for improving these attributes.
    - Policy implications: Building 10 additional trail miles yields visitor benefits each year in the amount of $140 ($14 x 10 miles). Given 65% of sample said they hike on the Parkway, these benefits would accrue to at least that group, thus 6.5 million visitors (65% of 10 million) to the southwest Virginia section for a total economic value of $910 million each year for Parkway hikers.
- Our results suggest that visitors receive the most satisfaction from improvements to activity areas, and roadside and overlook views and less satisfaction from improvements to trails, or an increase in the number of overlooks.
- However, there are potentially positive net gains from improvements to all attributes given the high number of visitors to the Parkway each year and the high value estimates for this sample of visitors.
- It is important to note that these values represent the benefits a single visitor for a unit/level increase of **only one attribute at a time** *all other things held constant.* These values **cannot** be summed to value the change in more than attribute. The analysis in Table 16 addresses a simultaneous change in several attributes.

Table 15: Welfare calculations for a one unit *decrease* in attributes from the current level

| **Attribute (Change in attribute)** | **Welfare Loss** | **Unit of measure** |
|---|---|---|
| OVERLOOK (23 → 20 overlooks) | $5 | One overlook |
| LOOKLOW (56% high → 0% high or medium quality views) | $359 | Quality level change from current to low |
| ROADLOW (45% high → 0% high or medium quality views) | $240 | Quality level change from current to low |
| NUMTRAIL (13.2 → 0 miles) | $14 | One mile of trail |
| ACTAREA (6 mixed → 9 good) | $396 | Number and quality of activity areas |

In Table 15 we show the dollar value of lost satisfaction to visitors if any one of the attributes decreases from the current level, all other attributes remain constant. These results are analogous to those above, only the *direction of change* is different.[7]

- Our results show that the impact on visitors is greater when view quality declines, than when it increases. This occurs primarily because of the large decrease in quality that is assumed for the low scenario and the high level of satisfaction with the current levels of Parkway attributes.[8]
- A decline in all ***overlook views*** from the current level to low imposes a loss in satisfaction to visitors in our sample valued at $359. This represents the loss each year from a decline in quality for *all* these views.
    - Policy Implications: Parkway decision-makers can also interpret these values as the *gain* (loss averted) from maintaining views to avoid the decline to 100% low quality views. In other words, if the cost to maintain all views at the current level, is 5 million a year, this result suggests that the annual gain in satisfaction is at least $359 per visitor. To calculate the total economic gain from this policy we multiply to $359 times the number of Parkway visitors each year to get $3.59 billion dollars *each* year
- A visitor in our sample incurs a satisfaction loss valued at $240 from a decline in all ***roadside views*** from the current level to low. This represents the loss *each year* of a decline in quality for all these views.
- Decreasing the number and quality of ***Activity areas*** causes an estimated satisfaction loss to the visitor valued at $396 *each year*.
    - Policy Implications: The implications for roadside views and activity areas are similar to those for overlook views. We can also interpret these values as the *gain* (loss averted) from maintaining *all* roadside views and activity areas to avoid the decline to low levels. Therefore the annual gain from avoiding the decline to low for *all* roadside views is $240 for the visitor each year, or $396 for activity areas. (Note again, that we do not sum these values to determine the value of combined changes in attributes.)

[7] Note that the magnitude of the values changed for the view quality attributes when the frame of the policy changed. This results from the large decline that occurs between the current and low scenarios for scenic views. Recall the low view category for both roadside and overlook views represents a significant reduction to 100% low quality views. This may explain the high compensation requirements.

[8] The current level of views is very high with a majority of views rated as high or medium quality. However, the Parkway faces significant threats to view quality, thus staff consider the low scenario as a very plausible outcome if budgets are reduced. In addition the loss aversion characteristic in human nature also results in higher values when consumers are faced with losses as opposed to improvements.

- The loss in satisfaction to visitors from a decline in the **number of overlooks or trails** is less significant and is valued at $5 for one overlook and $14 for one mile of trail.
    - Policy implications: Losing 1 overlook imposes a satisfaction loss on the visitor each year in the amount of $5. Assuming 10 million visitors to the southwest Virginia section, the total cost is at least $50 million each year for Parkway visitors.
- Our results show that avoiding the worst scenario of declining quality for any attribute such that they fall to low is very important to visitors and has significant value to them.
- It is important to note that these values represent the loss in satisfaction to the visitor for a unit/level decrease of **only one attribute at a time** *all other things held constant.* These values **cannot** be summed to value the change in more than attribute. The analysis in Table 16 addresses a simultaneous change in several attributes.

### 3.2.5 Economic Value of Parkway Attributes: A Simultaneous Increase or Decrease in all Attributes

Table 16 below shows the welfare gains and losses of increasing or decreasing all the attributes as a bundle by one unit/level. Table 17 shows the levels for each attribute for each scenario (high, current, and low).

Table 16: Welfare changes of a simultaneous change in attributes

| Policy | Welfare Loss(-) or Welfare Gain(+) |
|---|---|
| One unit/level increase in all attributes from current to high | $584 |
| | |
| One unit/level decrease in all attributes from current to low | -$1014 |

Table 17: Attribute values for each scenario

| | High | Current | Low |
|---|---|---|---|
| **Number of Overlooks** | 28 | 23 | 20 |
| **Overlook view quality** | | | |
| High quality | 62% | 56% | 0% |
| Medium quality | 38% | 32.5% | 0% |
| Low quality | 0% | 11.5% | 100% |
| **Road view quality** | | | |
| High quality | 60% | 45% | 0% |
| Medium quality | 40% | 35% | 0% |
| Low quality | 0% | 20% | 100% |
| **Trails** (miles) | 31.5 | 13.2 | 0 |
| **Activity Areas** (Number and quality) | 9 Activity Areas<br><br>All in Good Condition | 6 Activity Areas<br><br>1 in Poor Condition<br>4 in Fair Condition<br>1 in Good Condition | 4 Activity Areas<br><br>All in Poor Condition |

- It is important to note that the bundle of attributes is not valued as a linear sum of the parts. Thus, as noted above, one cannot take the values presented in Table 14 or 15 and add them up to get the values shown in Table 16.
- We find that visitors receive less gain in satisfaction from a one unit/level increase in Parkway overall quality than they incur in a satisfaction loss for a one unit/level decline in overall quality. Again, this occurs because of the overall high quality of the Parkway at its current level and the high level of satisfaction visitors have with the current level of Parkway attributes.
- The dollar value of lost satisfaction from decreased Parkway attributes *each year* from a loss in quality from current to low for *all* attributes to the visitor is $1014.
- This compares to the dollar value of increased satisfaction from improved Parkway attributes the visitor receives each year if all attributes increase by one unit/level from current to high of $584[9].
    - Policy Implications: Improving *all* Parkway attributes to the *high* level (e.g. 28 overlooks, all overlook and roadside views at medium or high quality, 31.5 miles of trails, and an increase in the number and quality of activity areas) would yield a gain in satisfaction to the *visitor* each year valued at $584 each year, or a total benefit to all southwest Virginia visitors of $5.8 billion dollars each year.
- Alternatively, losing a quality level for all attributes would yield a loss in satisfaction to the visitor valued at $1014 each year, or a total loss to all visitors to this section of $10 billion dollars. Again, this value is significant due to the large change from current level to low level for each attribute, the high satisfaction for the current level of attributes, the loss aversion nature

[9] Our result finding a significant difference between the benefits of improvements and the costs of declines is consistent with the microeconomic theory of diminishing marginal utility, e.g. as we have more and more of a good or amenity, we receive less and less satisfaction from it. It is also consistent with findings in the literature (Kahnemann and Tversky 1979 for example)

found in humans, and the large number of visitors who visit this section of the Parkway.

We have presented several scenarios of possible attribute changes in Tables 13-15 above. Any combination of attribute changes can be analyzed with the model results presented in the appendices to this report.

3.2.6 Economic Value of Parkway Attributes: Attribute to Attribute Trade-offs

We also present in Table 18 below the rate at which visitors are willing to trade-off one Parkway attribute for another. This helps Parkway managers consider resource to resource trade-offs, another way to consider Parkway management decisions. The results show:

- Visitors are willing to sacrifice a significant number of trails in order to get more and improved activity areas. Recall that although many visitors reported hiking as a Parkway activity, only 5% of the sample reported hiking as their most common activity. Also recall that 30% of the sample did not have any opinion regarding their satisfaction with trails. This leads us to consider this result with care since the majority of our sample is not engaged in a significant amount of hiking, they are willing to sacrifice it for more activity areas. In other words we have an averaging effect. Analyzing only hikers would yield a different result.
- Visitors are willing to give up 40% of one activity area in order to get more roadside or overlook scenic views.

Table 18: Trade-offs between Parkway attributes

| Description | Implied tradeoff |
|---|---|
| # trails an individual would give up for one more overlook | 0.12 miles of trails |
| # trails an individual would give up for one more improved activity area | 29.13 miles of trails |
| # trails an individual would give up to have more high quality road views | 11.58 miles of trails |
| activity areas an individual would give up to have more high quality road views | .397 activity area |
| activity areas an individual would give up to have more high quality overlook views | .389 activity area |

*3.3 Visit Expenditures and the Change in Visits when Scenic View Quality Changes*.

3.3.1 Visit Expenditures for Parkway Visitors by Geographic Region

In Table 19 we present the visit expenditure results from survey version B.

- The visitor in our sample to the southwest Virginia section in 2000 spent $245 per visit or $149 per day.
- Visit expenditures per day are highest for visitors from areas more distant from the Parkway ($229 - $417)
- Visitors farther from the Parkway spend more days during each visit with mean days per visit between 2.4 and 3.4.
- Expenditure patterns are also consistent with an earlier study by Brothers and Chen (1996).

Table: 19: Mean Visit Expenditure by Geographic Region

| Region<br>n=278 | # of visitors | Lodging | % | Food | % | Souvenirs and retail | % | Gas and travel | % | other | % | Total cost this visit | Total cost per day | Mean number of days this visit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NC 27 | 75 | **$ 77.58** | 22.19% | $ 112.71 | 32.24% | $ 56.91 | 16.28% | $ 71.73 | 20.52% | $ 30.71 | 8.78% | $ 349.64 | $ 213.06 | 1.6 |
| NC 28 | 20 | $ 41.33 | 26.11% | $ 46.67 | 29.48% | $ 11.00 | 6.95% | $ 27.00 | 17.06% | $ 32.29 | 20.40% | $ 158.29 | $ 67.84 | 2.3 |
| VA 23 | 8 | $ 199.38 | 42.42% | $ 122.50 | 26.06% | $ 41.88 | 8.91% | $ 45.00 | 9.57% | $ 61.25 | 13.03% | $ 470.00 | $ 229.93 | 3.4 |
| VA 24 | 89 | $ 31.73 | 15.67% | $ 100.05 | 49.40% | $ 29.19 | 14.41% | $ 29.21 | 14.42% | $ 20.33 | 10.04% | $ 202.55 | $ 182.43 | 1.3 |
| SC 29 | 3 | $ 234.00 | 36.85% | $ 191.67 | 30.18% | $ 56.67 | 8.92% | $ 86.00 | 13.54% | $ 66.67 | 10.50% | $ 635.00 | $ 417.50 | 1.7 |
| FL 32 | 11 | $ 111.82 | 38.20% | $ 86.36 | 29.50% | $ 16.82 | 5.75% | $ 46.82 | 15.99% | $ 30.91 | 10.56% | $ 292.73 | $ 103.91 | 3.4 |
| other | 72 | $ 220.94 | 35.63% | $ 129.03 | 20.81% | $ 115.46 | 18.62% | $ 124.68 | 20.10% | $ 64.61 | 10.42% | $ 620.18 | $ 290.81 | 2.4 |
| VB Full sample | 278 | $104.88 | 24.12% | $111.10 | 30.12% | $58.72 | 15.92% | $67.85 | 18.39% | $ 38.14 | 10.34% | $ 368.97 | $ 216.31 | 1.91 |
| Project Full Sample | 821 | na | na | na | na | na | na | na | na | na | na | $ 245.92 | $ 149.33 | 1.96 |
| Brothers et al. 95-96 sample* | 276 | $ 99.44 | 37% | $ 87.13 | 33% | $ 14.27** | 5% | $ 44.83 | 17% | na | na | $ 264.08 | $ 112.85 | 2.34 |

*Includes only non-resident visitors and values are quoted in 1995/6 dollars

**Includes only souvenirs

3.3.2 Visit Change in Response to a Change in Scenic Quality

Table 20 shows the visitor's change in visits in response to scenic quality changes by geographic region.

- As scenic quality declines more respondents are willing to decrease their frequency of visits. This response increases from 26% to 41% of the respondents.

- With increasing quality improvements we see increases in the proportion of respondents willing to increase their visits (33% - 42%).
- In addition, the rate of response does not differ significantly when considering the three regions (NC (27), VA (24) and other) that hold the majority of visitors (87%).

Table 20: The change in visits given a change in scenic quality by geographic region for the visitor

| Region (n=278) | # visitors | Mean Total Exp. | Total Exp. per day | Q10a1 # next Yr | A ½ moderate ↓ low | | B ½ high ↓ moderate | | C 1/5 high ↓ low | | D All moderate ↓ low | | E All low ↑ moderate | | F ½ low & some moderate ↑ high | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | # yes | # visits | # yes | # visits | # yes | # visits | # yes | # visits | # yes | # visits | # yes | # visits |
| NC 27 | 75 | 317.74 | 188.82 | 72 | 18 | 2.8 | 26 | 2.3 | 25 | 1.7 | 34 | 1.4 | 28 | 4.6 | 34 | 5.6 |
| NC 28 | 20 | 138.33 | 65.06 | 18 | 5 | 0 | 6 | 1.8 | 5 | 2.2 | 9 | 0.4 | 6 | 2.2 | 11 | 5.8 |
| VA 23 | 8 | 470.00 | 229.93 | 7 | 4 | 0.6 | 4 | 0.3 | 4 | 0 | 4 | 0 | 2 | 2 | 5 | 2.1 |
| VA 24 | 89 | 202.55 | 182.43 | 89 | 22 | 4.9 | 23 | 4 | 24 | 2.3 | 32 | 2 | 32 | 6.9 | 40 | 7 |
| SC 29 | 3 | 635.00 | 417.50 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| FL 32 | 11 | 292.73 | 103.91 | 3 | 1 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 0 |
| Other | 72 | 620.18 | 290.81 | 49 | 13 | 2.4 | 15 | 1.6 | 14 | 1.6 | 19 | 0.4 | 13 | 2.3 | 13 | 2.3 |
| VB Full sample | 278 | 353.10 | 209.85 | 241 | 63 | 3.1 | 75 | 2.5 | 73 | 1.9 | 100 | 1.3 | 81 | 4.8 | 103 | 5.5 |
| Project full sample | 821 | 245.92 | 149.33 | na | na | na | na | na | na | na | na | na | na | na | na | na |

Using the information in Table 20 above, if we assume that the number of days visitors will visit and the average party size of 3.32 visitors per party[10] are the same as this year, and we use the average proportion of visitors across all regions that are expected to change their number of visits, we can estimate the change in visitor expenditures along the Parkway as a result of scenic quality changes. Tables 21 and 22 summarize these results showing the estimated change in visits and expenditures along the Parkway from scenic quality changes.

- In 2000 visitors in this sample[11] visited the Parkway on average 2.45 times per year. A portion of our sample, 87%, (survey version B) stated they expected to visit next year on average 4.74 times per year, if Parkway scenic quality remains the same.
- Thus, if scenic quality remains at its current level visitors are expected to more than double their visitation on average by 2.29 visits next year.

[10] Brothers and Chen 1996.
[11] Version B sub-sample from the full project

- Note, this increase applies only to the proportion of visitors stating they will be returning next year (87%).

- If *½ of the moderate views decrease to low quality views*, 26% of this same sample expect to visit next year on average 3.1 times next year.
  - This decrease in scenic quality decreases the expected increase in visitation to .65 visits (3.1 – 2.45)
- In the last two cases of scenic quality decline, visits next year are expected to decrease compared to this year.
- Decreasing scenic quality does not necessarily lead directly to a decrease in visitation levels, but rather slows the level of increase in visitation for next year for a proportion of visitors.
- Again note that these visitation changes only apply to a proportion of visitors depending on the size and direction of change in scenic quality (26% - 42%).

Table 21: Change in visits next year given a change in scenic quality

| Scenic Quality change | Proportion of parties that change visits | # visitor parties[b] | Mean visits this year | # of visits next year | Change in # visits next year[a] |
|---|---|---|---|---|---|
| No change | 0.866 | 1064666.83 | 2.45 | 4.74 | 2.29 |
| **A** ½ moderate ↓ low | 0.26 | 276813.38 | 2.45 | 3.1 | 0.65 |
| **B** ½ high ↓ moderate | 0.31 | 330046.72 | 2.45 | 2.5 | 0.05 |
| **C** 1/5 high ↓ low | 0.3 | 319400.05 | 2.45 | 1.9 | -0.55 |
| **D** All moderate ↓ low | 0.414 | 440772.07 | 2.45 | 1.3 | -1.15 |
| **E** All low ↑ moderate | 0.336 | 357728.06 | 2.45 | 4.8 | 2.35 |
| **F** ½ low & some moderate ↑ high | 0.427 | 454612.74 | 2.45 | 5.5 | 3.05 |
| **Model estimate** | | | | | |
| No change | 0.866 | 1064666.83 | 2.45 | 4.55 | 2.10 |
| **D** All moderate ↓ low | 0.414 | 440772.07 | 2.45 | 3.92 | 1.47 |
| **F** ½ low & some moderate ↑ high | 0.427 | 454612.74 | 2.45 | 5.164 | 2.71 |

a - as compared to this year.
b-we assume our sample proportions are representative of the general group of Parkway visitors, that there are 10,000,000 visitors to this section with 3.32 visitors yielding 3012048.2 party visits per year, visiting 2.45 times per year yielding 1229407.4 parties, and that the number of days visiting does not change. The percent of parties who change their visits are based upon the number of parties that are returning next year, 86.6% of all visitor parties.

Table 22 summarizes the scenic conditions that would cause visitors to stop coming to the Parkway completely.

- 16.5% of this survey sample said they would not change their visits under any of the proposed conditions.
- 15.4% of this survey sample stated they would stop visiting the Parkway if *½ the high quality views were reduced to low*.
- 4.6% stated they would stop if their favorite view changed.
- Therefore, if *½ the high quality views are reduced to the low*, 85% of visitors will continue to visit the Parkway, however, at likely lower visitation levels as the results in Table 21 suggest. To make this statement we must assume this sample is representative of all Parkway visitors[12].

Table 22: The scenic conditions that would cause visitors to completely stop coming to the Parkway

| **Scenic Conditions (n=278)** | **# selecting this reason** | |
|---|---|---|
| | **#** | **%** |
| All high ↓ to Moderate | 29 | 10.4 |
| ½ High ↓ to Low | 43 | 15.4 |
| ½ Moderate ↓ to Low | 22 | 7.9 |
| All Moderate ↓ Low | 28 | 10.1 |
| Favorite View changes | 13 | 4.6 |
| No change in visits | 46 | 16.5 |
| Other | 11 | 3.9 |
| No response | 85 | 30.5 |

[12] This sub-sample (Version B, n=278) is very similar in all aspects of their demographics to the full sample of 848 respondents.

Table 23 summarizes the reasons visitors stated that they would not be back next year.

- 12.9% of this survey sample stated they would not be returning next year. Of these only 12 noted that this was their only intended visit to the Parkway. 6 were to visit other sections and 18 had other reasons for not returning.

Table 23: The reasons visitors stated that they would not return next year

| Reasons (n=278) | # selecting this reason for not returning next year |
|---|---|
| Only visit to parkway | 12 |
| Visit other sections | 6 |
| Other | 18 |
| Total no's | 36 |

### *3.4 Change in Visitor Expenditures from Changes in Parkway Scenic Quality*

- The potential *growth* in expenditures from increased visitation by a proportion of current visitors, if scenic quality remains the same, is estimated between $371 million to $579 million. This is due to an expected doubling in visits.
- If scenic quality declines as in case A, potential expenditure growth decreases by $69 million to $107 million.
- In cases C and D we get a potentially larger decline in expenditure growth ranging from as low $42 million to $360 million.
- When scenic quality increases we see growth levels larger than the no change case by $3 million to as high as $132 million.
- If we consider a most conservative estimate our results suggest that declining quality on the Parkway may result in a decline in expenditure growth by $42 million dollars and increasing quality on the Parkway may lead to an increase in expenditure growth by $3 million.
- The results suggest that declines in quality have a larger impact on Parkway expenditures than improvements in quality. This result is consistent with results found earlier in this study that visitors are generally satisfied with Parkway conditions and do not want to see declines in conditions.
- Brothers and Chen (1997) calculate direct expenditures for the southwest Virginia section at $476 million for non-resident visitors and 2.92 million total party visits for 1996. We estimate 459.6 – 716.4 million in direct expenditures from all visitors and 2.29 million party visits for 2000.

Table 24: Summary of the change in visitor expenditure from scenic quality changes*

| Scenic Quality change | Change in expenditure/ visitor[a] | Visitor expenditure growth | Change in expenditure growth | Change in expenditure/ visitor[b] | Visitor expenditure growth | Change in expenditure growth |
|---|---|---|---|---|---|---|
| no change | $716.40 | $579,675,674.18 | | $459.58 | $371,867,763.24 | |
| **A** ½ moderate ↓ low | $203.35 | $471,739,557.38 | -$107,936,116.80 | $130.45 | $302,625,660.95 | -$69,242,102.29 |
| **B** ½ high ↓ moderate | $15.64 | $403,899,784.16 | -$175,775,890.02 | $10.03 | $259,105,765.51 | -$112,761,997.73 |
| **C** 1/5 high ↓ low | -$172.06 | $364,005,947.37 | -$215,669,726.81 | -$110.38 | $233,513,468.79 | -$138,354,294.44 |
| **D** All moderate ↓ low | -$359.77 | $219,173,094.21 | -$360,502,579.97 | -$230.79 | $140,601,739.79 | -$231,266,023.45 |
| **E** All low ↑ moderate | $735.17 | $584,778,845.18 | $5,103,171.00 | $471.62 | $375,141,498.65 | $3,273,735.42 |
| **F** ½ low & some moderate ↑ high | $954.16 | $661,822,551.81 | $82,146,877.63 | $612.10 | $424,565,809.75 | $52,698,046.52 |
| Model estimate | | | | | | |
| No change | $656.96 | $531,580,312.56 | | $421.45 | $341,014,106.02 | |
| **D** All moderate ↓ low | $459.87 | $465,558,037.74 | -$66,022,274.82 | $295.01 | $298,660,154.06 | -$42,353,951.97 |
| **F** ½ low & some moderate ↑ high | $849.05 | $597,946,342.65 | $132,388,304.91 | $544.67 | $383,588,580.45 | $84,928,426.39 |

a-Assumes $312.84/visit b-Assumes $200.69/visit Both expenditure values include all expenditures except gas and travel as much of this likely occurs outside the region. *We assume our sample proportions are representative of the general group of Parkway visitors, that the number of days visiting does not change, and that there are 7,600,000 visitors to this section with 3.32 visitors per party yielding 2289156.6 party visits per year, visiting 2.45 times per year yielding 934,349.6parties.

### *Appendix 1: The Impacts of Decreasing Scenic Quality on the Parkway*

The Blue Ridge Parkway, (hereafter Parkway) one of the nations premier linear parks travels through the southern Appalachian region beginning at the Shenandoah National Park and passing through, or adjoining, 29 counties and 44 jurisdictions in two states, and finally ending at the Great Smoky Mountains National Park and the Cherokee reservation. Over the past ten years the southern Appalachian region has experienced significant population and economic growth, due in part to the scenic amenities of the rural areas in the region (McDaniel, 2000). This population and economic growth imposes a cost to the region in the form of degraded environmental and natural resource quality (SAMAB 1996) and thus to the scenic quality along the Blue Ridge Parkway.

Many of the scenes along the Parkway are either agricultural/farm scenes, or views off the blue ridge escarpment to valleys below. Agricultural views are the fastest changing scenes in America, and the most likely to be negatively changed by suburban development. Last year, six Southwest Virginia views had significant quality changes due to intrusions of incompatible development. These changed views are now classified as transitional, commercial, or residential scenes. Since 1948, 75% of farmlands along the Parkway changed from farms to alternative uses. In North Carolina, 10,000 farm acres remain along the Parkway, down from 48,000 in 1948. Addressing the changes in scenic quality requires that the Parkway allocate scarce resources for view preservation, such as increased vegetation management, or purchasing conservation easements, leases, or land.

Parkway staff currently use a descriptive ranking system of sites to identify critical sites for preservation. Introducing consumer preferences into the decision process

using benefits estimation provides estimates that are comparable to mitigation costs. Turner (2000) specifically mentions the importance of benefit valuation to National Park management decisions. This study uses economic tools to assist the Parkway in making management decisions addressing the problem of changing scenic quality.

A satisfactory visitor experience on the Parkway depends on the quality of the *region's* natural resources and environment *and* the choices made by Parkway officials when allocating their scarce resources. Brothers et al. (1997) found that 90% of visitors to the Parkway visited a scenic area, 63% visited historic sites, and 43% went hiking. Parkway visitors ranked observing the beauty of nature as extremely important to their visit experience along with feeling close to nature and a peaceful vacation.

Although this description of the typical visitor experience is helpful, we have little information about the trade-offs visitors are willing to make regarding the allocation of Parkway resources across the many visitor experiences possible. (e.g. roadside and overlook scenic views, hiking trails, historic sites/museums, picnic areas). Kask (1998) found that visitors were concerned about various view obstructions, with power lines and air pollution being those noticed the most and having high levels of concern. In addition, Kask (1998) found that decreases in scenic quality may lead to a decline in Parkway visitation impacting the tourism industry in adjoining counties.

We also understand the types of views visitors prefer (see Noe and Hammitt 1988), however this does not yield insight on whether visitor experiences would be enhanced if there were more overlooks, or improved roadside landscapes. Again, we do not know the trade-offs visitors are willing to make regarding the attributes of their visit experience. For example, if Parkway staff allow degradation of roadside landscapes, will

this decrease the benefits gained from nearby overlook vistas (e.g. are they complements)? Or, are visitors willing to trade degraded roadside views in exchange for superior overlook views (e.g. are they substitutes)? Can some vistas be lost (e.g. allow trees to block overlooks) while maintaining other vistas, without significant decreases in visitor benefits? If so, is there a threshold distance between overlooks that must be maintained? Understanding tradeoffs and the value of visitor experience attributes allows the Parkway staff to make internal resource allocation decisions. Our study provides this type of information regarding trade-offs and values to the Parkway decision maker.

Furthermore, given the important role of scenic quality to the visitor's recreation experience, decreases in view quality may decrease the quality of a visitor's recreation experience and thus visitor trips to the Parkway. Currently, visitors visit the Parkway on average 3.4 times per year (Kask (1998) and Brothers et. al. (1997)). However, Kask (1998) found that 74% of non-resident visitors to the southern section of the Parkway would reduce their visitation levels if scenic quality were reduced on 25% of Parkway views. A change in visitor demand due to a lower quality recreation experience may have an impact on the regional economy surrounding the Parkway.

Given that most of the scenic quality seen by visitors comes from private land holdings, the Parkway must work with county governments and private citizens in order to effectively manage scenic quality. The most important information to the various stakeholders is the impact of changing scenic quality on their communities.

In summary, this study addresses two fundamental questions faced by Blue Ridge Parkway managers:

3. What are the benefits, or total economic value, from the various attributes of the parkway scenic experience?
4. What is the impact on visitation of a change in view quality, either an increase, or a decrease?

### *Appendix 2: Total Economic Value: Using Economics in Parkway Decisions*[13]

Parkway visitors come to the parkway to 'experience nature' via viewing scenic beauty from the road, overlooks, and from hiking, picnicking, visiting museums, etc. A visitor's experience consists of various activities in which they use a variety of Parkway resources. In order to provide the activities visitors want and to ensure Parkway resources are used efficiently, Parkway staff must make allocation choices for the limited Parkway resources across the various visitor activities.

Weighing the costs and benefits of alternative choices provides information about the efficiency of such choices so that scarce dollars can provide maximum benefits to Parkway visitors. Turner (2000) provides a model showing efficiency criteria that can be used by Parkway staff in determining resource allocation levels for multi-attribute park experiences. However, he notes that the valuation information needed to estimate the total economic value of many park resources is not readily available to implement these efficiency decision criteria.

While it is relatively easy to calculate the costs of decisions, it is more difficult to estimate the benefits of many decisions that Parkway managers need to make. This is because public goods such as scenic beauty, a primary feature of the Parkway experience, are not frequently exchanged in markets (thus they are non-market goods or services) so observable prices and demand curves for these goods and services do not exist in many cases. This does not mean, however, that people do not have preferences for these goods and services. Because Parkway visitors do not purchase their visit in typical markets, it is not always easy to represent visitors' preferences in an economic framework. One way to do this is to use non-market valuation surveys to estimate the total economic value

[13] Parts of this section are adapted from Greden Mathews et al. 2001.

from visitor preferences that may not be captured in entrance fees or other expenditures in national parks.

Total economic value measures the value, or benefits, from a good or service (market or non-market) received by the consumers, users, or those who benefit in some way from the good, or service. Total economic value comes from a person's *demand* for a good or service and depends on a person's: tastes and preferences, income, expectations about the future, information, and the availability and prices of related goods. There are several types of benefits or values from non-market goods and services in addition to the commonly known and considered consumptive, or use, benefits. The four benefit or value categories in total economic value listed in Table A2.1 below.

Table A2.1: Value categories included in total economic value

- **Use value** – net willingness to pay (willingness to pay – expenditures) to use a good or service in the current time period
- **Option value** – willingness to pay for the *option* to possibly use the good or service in some future time period
- **Existence value** – willingness to pay for the knowledge that the good or service *exists* even though no use is contemplated
- **Bequest value** – willingness to pay for the *endowment* of the good or service for future generations

The *non-use* values (option, existence, and bequest) all represent non-market public goods. The public good nature of these goods implies that the option, existence, or bequest 'use' of the resource, such as scenic beauty, by one person does not diminish the amount of the resource remaining for other persons (non-rivalry). Furthermore, one person cannot exclude other persons from 'using' the resource (non-exclusivity). These *non-use* values (option, existence, and bequest) are added to *use* values to give total economic value, since they do not diminish *use* values in any way.

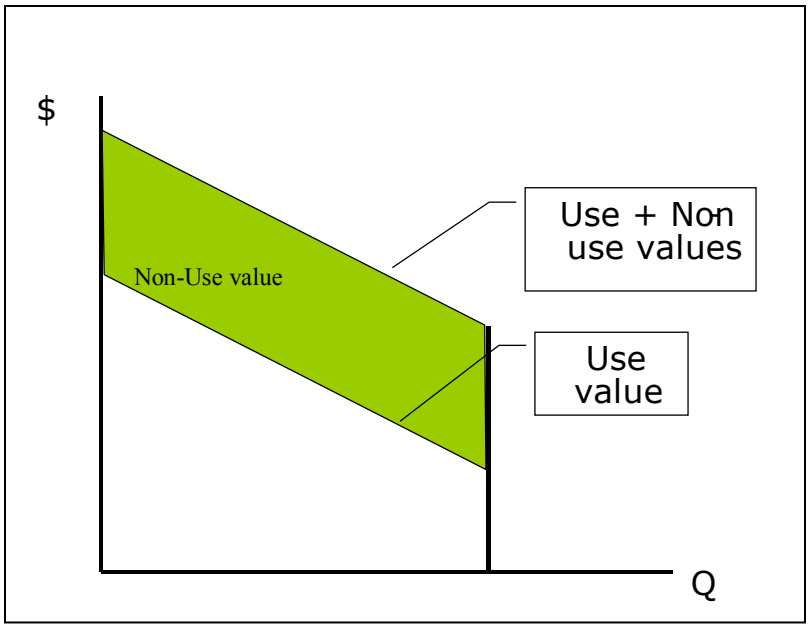



**Figure A2.1: Total economic value equals the sum of use and non-use values**

Figure A2.1 shows an individual's demand for a good or service separated into two parts: the use value (white) reflecting their demand to *use* a good or service and the *non-use* value (green) reflecting their option, existence and/or bequest benefits from the good or service.

The impact of ignoring non-use values may or may not be significant depending of the good or service valued. Data on non-market public goods show wide variation in the relative use and non-use values. (Loomis and Walsh, 1997) However, since there are often many more non-users than users of non-market goods, in the aggregate non-use values may be significantly higher and thus provide a significant contribution to aggregate total economic value. This is important to remember in the resource allocation decision process for Parkway managers.

*Total Economic Value and Scenic Beauty on the Blue Ridge Parkway*

There are many different benefits associated with the Parkway. Table A2.2 illustrates the various ways users and non-users may benefit from the Parkway.

Table A2.2: Benefit types for the Blue Ridge Parkway

- Scenic motorway for cars, motorcycles, etc. – scenic viewing, picnics, historic sites etc.
- Destination for outdoor recreation such as camping, hiking, cycling, picnics, etc.
- Destination for creative pursuits such as photography, painting, writing, etc.
- Destination for school classes for educational purposes – historic sites, museums, hiking, visitor centers, etc.
- Destination for family and group vacations and activities – all of the above, shopping, bed & breakfasts, restaurants, etc.

All three types of benefits (option, existence, and bequest) are associated with the Parkway: Those who may value the option to use the Parkway in the future may value any of the above potential uses. Those who value its existence, may value it for the above reasons, or for other reasons. Those with bequest values may value the Parkway so that future generations can pursue the above activities.

Who might have these values? The Blue Ridge Parkway is valued by many types of people including: visitors, residents near the Parkway, potential visitors, the general public who may value the existence of the Parkway, and the general public who may want to endow the Parkway for future generations[14]. One person can embody all of these user types, a single user type, or any combination of these user types.

In this study we survey only visitors, however, the values they report may also include their non-use values. Our study does not specifically explore the separate value types for Parkway visitors and there are several populations who may have non-use values for the Parkway that were not surveyed in this study. It is important to note,

[14] These may include individuals from both with in the US and outside the US.

therefore, that since this study does not survey a population of non-users (i.e. persons who have not visited the Parkway) our estimates of total economic value are likely lower bounds as we do not include a whole class of 'users' who have non-use values such as the option to use, existence, or bequest values.

## *Appendix 3: Methodology*[15]

Although there are several non-market valuation methods available to aid decision makers, each with its strengths and limitations (Freeman 1993, Hausman 1993, Smith 1996), selection of the appropriate method depends upon the non-market 'good' under study. For this study we use the stated preference approach, since we are estimating benefits from a visitor's parkway scenic experience and we wish to understand how visitation levels may change in response to a change in quality of the 'goods' studied.

The stated preference approach is sometimes referred to as a "direct" approach to understanding preferences since it involves directly asking individuals to state their preferences for some characteristic of the environment, or natural resource, in question. In contrast to the revealed preference methods[16], the stated preference methods do not use actual observed market behavior as the basis of benefit measurement. The Contingent Valuation method, the most commonly used stated preference approach, has been used extensively in measuring the benefits of a variety of public goods, especially environmental quality. This is primarily due to the flexibility and applicability of the methodology, since contingent valuation can be tailored to study "virtually anything that can be made comprehensible to respondents" (Field 1994, 151). This approach creates a contingent market for a public good in which respondents can express their preferences for the good. This includes goods and services such as the existence value for endangered species (Boyle and Bishop 1987, Bowker and Stoll 1988). Variations on the

[15] Parts of this section were adapted from Greden Mathews et al. 2001

[16] The revealed preference methods estimate values for non-market goods using consumer behavior revealed in the marketplace through either expenditures on complementary market goods or travel expenditures.

contingent valuation method include contingent ranking and contingent choice surveys, where respondents rank and/or select their preferred outcomes, respectively.

Choice modeling, another stated preference method, can also be used to estimate values for goods such as scenic beauty and recreation services (e.g. Adamowicz et. al. 1997, and Roe et. al. 1996) This approach is a form of conjoint analysis often used in the Marketing field to understand consumer preferences for the different attributes of a good, e.g. the attributes of a car, or a frozen food. The approach uses rated-pairs, ranking surveys, paired comparisons, or multi-option comparisons (e.g. Johnson and Desvousges 1997, Roe et. al. 1996, Johnson et al. 1999, Blamey et al. 1998) that allow respondents to evaluate the trade-offs between multiple attributes for a given good or service. This approach yields implicit weights for the different attributes and implicit prices, or part-worths, when a dollar denominated attribute is included. Choice modeling is often done with a series of six to eight choices with regards to the amenity (Bennett 1999, Johnson et al. 1999). For example, each choice can represent a different park management option. Each management option represents different levels of park attributes including the entrance fee, number and condition of hiking trails, level of scenic quality, number of campsites, miles of paved roads, and the like; one of the options describes the current state of the park. Respondents then 'state' their preferences by choosing the alternative they most prefer. By analyzing the results of a series of these choices made by many individuals, it is possible to estimate an implicit price for each attribute (i.e., number of campsites).

In this study we use a choice modeling survey to analyze specific visitor preferences regarding visitors' preferred attributes for a recreational experience. From

this survey we estimate implicit prices for the various Parkway experience attributes. It is the multi-attribute nature of the visitor activities and the need by Parkway staff to understand their resource allocation across the different attributes of these activities that requires the use of the choice modeling approach. This approach allows visitors to state the trade-offs they are willing to make between the different attributes of their visit, e.g. between overlook, roadside views, picnic areas, etc.

We also use a flexible contingent valuation survey[17] where we allow respondents to define their attribute levels and then provide us a willingness to pay to receive these levels on their next visit. The flexible survey method provides an alternative format that captures attribute values and allows respondent's to specify their most preferred attribute levels rather than using researcher defined levels.

We use a contingent choice survey where respondent's state their potential change in visitation behavior resulting from changes in scenic quality (increase or decrease). This is a similar approach to the commonly used contingent valuation method for the estimation of benefits from improving the quality of public goods (e.g. Bockstael e. al. 1987). In this case we create a contingent market in which respondent's can express their preferences for a non-market good (scenic quality) by changing their level of visitation.

[17] See Kask et al. forthcoming for a more detailed discussion of the flexible contingent valuation approach.

### *Appendix 4: Survey Design*

*The Choice Modeling Survey (survey version C):*

This survey elicits information about whether visitors prefer more or improved hiking trails, overlook areas, roadside scenes, visitor facilities, or some combination of these services. In addition, using a monetary attribute in the survey, we estimate an implicit price for each attribute and we estimate the benefit of maintaining the current quality of scenic views along the Parkway by estimating user willingness to pay.

Attribute definition and communication for the Parkway's alternative policy options were the design challenges we faced with this survey. The attributes must be demand relevant, policy relevant and measurable (Blamey et al. 1998). And policy options should not include more than seven attributes, but less is better (Johnson et al. 1999).

We first identified visitor uses of the Parkway, as well as, staff resources for funding these Parkway uses. Thus, we took both a demand and supply perspective when identifying the attributes. Using two focus groups comprised of both Parkway staff and visitors, a set of five independent attributes emerged. Table A4.1 presents the five attributes representing the Parkway visitor's scenic experience.

Table A4.1: Parkway visitor experience attributes

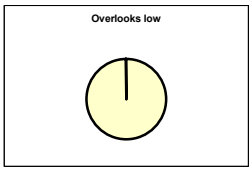
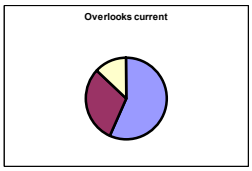
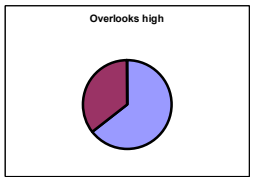
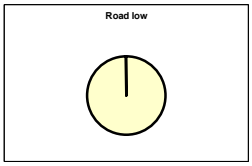
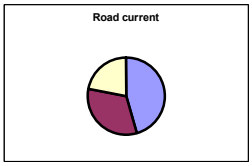
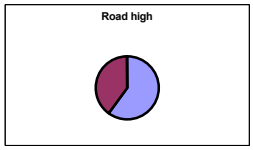
| |
|---|
| Number of Overlooks in 100 miles: number of overlooks and the average distance between overlooks |
| Overlook Scenic Quality: percent of high, medium and low quality views |
| Roadside Scenic Quality: percent of high, medium and low quality views |
| Number of Quality trails: miles of trails cleared, signed, rated, and maintained. Includes, backcountry, stretcher, and interpretive trails. |
| Number and Condition of Activity Areas: Areas where visitor services are provided, such as visitor centers and picnic areas. At a minimum, restrooms are provided. |

Using these attributes, we created alternative policy scenarios using different attribute levels. These were combined with a monetary attribute to complete the attribute sets provided in each choice. A choice consisted of three scenarios; two scenarios with new attribute levels placed against a third scenario given as the status quo with no new funding. Survey respondents were asked to select their most preferred scenario in each choice.

Each attribute had three possible policy levels, High, Current and Low, and were based upon actual policy options facing the Parkway. The policy scenarios presented different combinations of attribute levels suggesting possible trade-offs. Respondents were given nine different choice sets to which they responded. Survey scenarios were randomly selected for each respondent to achieve an orthogonal survey design[18]. Table A4.2 presents the possible levels for each attribute. A sample choice set is given in Table A4.3. An explanation of how the view quality levels are determined follows.

[18] We used both computer and paper versions for this survey. The computer versions had random selection for 8 of the nine choice sets, with one fixed set across all respondents. The paper version had 10 different surveys with variations in the choice sets in each version. Nine sets were given in each paper survey, also

Table A4.2: Attribute levels for the southwest Virginia section of the Blue Ridge Parkway

| *Characteristic Levels* | | | |
|---|---|---|---|
| *Characteristics* | *Low* | *Current level* | *High* |
| ***No. of Overlooks in 100 miles*** | 20 overlooks<br><br>Average distance between overlooks 6 miles | 23 overlooks<br><br>Average distance between overlooks 4 miles | 28 overlooks<br><br>Average distance between overlooks 2 miles |
| Overlook Scenic Quality Percent of<br><br>High Quality views<br>Medium Quality<br>Low Quality |  |  |  |
| Roadside Scenic Quality Percent of<br><br>High Quality views<br>Medium Quality<br>Low Quality |  |  |  |
| ***No. of Quality Trails*** | **0** | **13.2** | **31.5** |
| ***Number and condition of activity areas*** | **4 Activity Areas**<br><br>**All in Poor Condition** | **6 Activity Areas**<br><br>**1 in Poor Condition**<br>**4 in Fair Condition**<br>**1 in Good Condition** | **9 Activity Areas**<br><br>**All in Good Condition** |

Information from the Scenic Quality Assessment (Johnson, Orr, and Rotegard, 1997) was used to communicate the quality of Parkway views. The inventory provided a framework for view identification and description, (e.g. the vividness, intactness, and uniqueness) of roadside and overlook views, and provided the baseline of the current state of view quality. Seventy-two volunteers in five counties over two summers conducted the Scenic Quality Assessment to learn about the views on the southwest Virginia section of the Parkway. This provided baseline information on the region's 194 views, addressing the number, type, and condition of the views. Teams of three to five local citizens rated each view along the Parkway for its amount of scenic quality by adding up points for the presence of vividness (expansiveness, framing, depth, focal

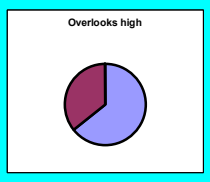
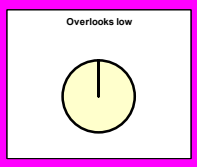
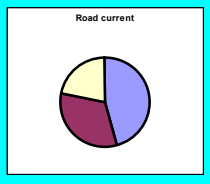
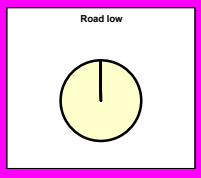
with one set fixed across all surveys. Versions of the paper survey were randomly assigned to those who chose not to do the computerized version of the survey.

point, variety and ephemeral images) **intactness, and uniqueness.** A view's **intactness** is the characteristic most influenced by development along the Parkway. Perfect intactness occurs when a scene does not have any intrusive, or disruptive elements in it. Most of the scenes along the Parkway are either agricultural/farm scenes, or views off the blue ridge escarpment to valleys below.

Table A4.3: Sample choice presented to respondents in choice modeling survey for the Blue Ridge Parkway

CHOICE SET # 1 Please select the option that best represents your preferences regarding the management of the characteristics of the southwest Virginia portion of the Blue Ridge Parkway.

I select ☐ **Option A** ☐ **Option B** ☐ **Option C**

| **Parkway Charactertistic** | **Option A**<br>**Maintain only scenic quality** | **Option B**<br>**Improve overlook views & trails, others stay at current level** | **Option C**<br>**No new $**<br>**Decline from current state** |
|---|---|---|---|
| ***Annual payment from preferred funding source*** | **$80** | **$120** | **$0** |
| ***No. of Overlooks in 100 miles*** | **20 overlooks**<br>**Average distance between overlooks is 6 miles** | **28 overlooks**<br>**Average distance between overlooks is 2 miles** | **20 overlooks**<br>**Average distance between overlooks is 6 miles** |
| ***Overlook Scenic Quality***<br>Percent of<br>High Quality views<br>Medium Quality<br>Low Quality |  |  |  |
| ***Roadside Scenic Quality***<br>Percent of<br>High Quality views<br>Medium Quality<br>Low Quality |  |  |  |
| ***No. of Quality Trails:*** miles of trails cleared, signed, rated, and maintained. Includes, backcountry, stretcher, and interpretive trails. | **0** | **31.5** | **0** |
| ***Number and condition of activity areas*** (e.g. picnic areas), visitor centers, restrooms, museums, and other structures and facilities for maintenance, operations, repairs, new structures, etc. | **4 Activity Areas**<br>**All in Poor Condition** | **9 Activity Areas**<br>**All in Good Condition** | **6 Activity Areas**<br>**1 in Poor Condition**<br>**4 in Fair Condition**<br>**1 in Good Condition** |

Views with high scores (10-17 points) had the most scenic quality, followed by views with medium quality (7-9 points) and views with no scenic quality (1-6 points). The attribute levels, given in Table A4.2 and used in the choice sets, used the level of

intactness and the overall quality score for each view to determine a view's category as high, medium, or low. The inventory provided the data needed to create the pie charts showing the total number of views on the Parkway. The high category for both roadside and overlook views included 64% views with high scores and 36% views with medium scores[19]. The current level had 45.5% high quality, 32.5% medium, and 22% low quality views for roadside views and had 55% high quality, 27.5% medium, and 17.5% low quality views for overlook views. The low category had 100% low quality views for both roadside and overlook views. Four focus groups assisted with general survey design and with the presentation of choice sets and information on view quality. The groups preferred pie charts with a minimal amount of text descriptions as the presentation form for view quality information in the choice sets.

View boards using photographs and text were created to communicate the meaning of changing view quality to survey respondents. Specific descriptions and presentation approaches of the scenic quality levels and background information were tested by focus groups. The view boards included 18 photographs covering three general topics: "Views along the Parkway are changing," "Vegetation is filling in areas that used to be open," and "75% of farm lands have changed use since 1948." Photographs illustrated the changes occurring and the different quality levels. A view book presenting "A Day along the Blue Ridge Parkway" was also provided as a reminder for visitors of what the scenic experience involves in its entirety.

[19] Note that the in high category we assume 20 low quality roadside views are deleted and that tree growth is allowed to obscure views for these 20 low quality roadside views. Consequently for the high category the total number of views decreases to 174 (134 roadside and 40 overlook) high and medium quality views. Recall the views total was 194 (154 roadside and 40 overlook) for the current and low categories.

Prior to selecting their most preferred policy scenario respondents selected their funding option. A flexible funding option was used in the survey as a result of focus group concerns about how money was collected and spent on the Parkway. Given the many views of the 'best' approach for Parkway funding, the research team decided to allow respondents to choose the option they preferred. In total ten options were provided with eight option under three broad categories of Federal, State, and Local funding. A voluntary donation option and an "other" category were the additional two options offered. Surveys respondents were also asked to consider their budgets and expenses for the year and to make their responses as if they would actually pay these amounts.[20]. The survey also included explanations of the problems facing the Parkway, the need for policy action, and the importance of visitor preferences in choosing a course of action. These comments were included in order to reduce the potential for hypothetical bias and to encourage respondents to treat the survey seriously (Cummings and Osborne 1999).

*The Flexible Contingent Valuation Survey (survey version A)*

This survey uses the same set of attribute and attribute levels presented in Table A4.2. However, rather than presenting respondents with a choice set of policy options from which to choose, respondents were asked to identify the "ideal" levels they would like for each attribute on the Parkway and to rank these with respect to importance for their scenic experience. This survey also asked respondents to value their ideal attribute bundle using a single dichotomous choice question with a maximum willingness to pay follow-up question as illustrated in Figure A4.1 below. The dollar amounts used in the

[20] The values of the annual payment from respondents preferred funding source used in the choice sets were randomly assigned from the following set: $5, $10, $25, $50, $80, $125, $200.

question were randomly assigned from among the same amounts used in survey version C: $5, $10, $25, $50, $80, $125, $200.

As in the choice modeling survey respondents selected their funding option and were asked to consider their budgets and expenses for the year and to consider their decisions as if they would actually pay these amounts. This survey also included explanations of the problems facing the Parkway, the need for policy action, and the importance of visitor preferences in choosing a course of action. These notations were given in the survey to reduce the potential for hypothetical bias and to encourage respondents to treat the survey seriously (Cummings and Osborne 1999).

*12) Please answer this next question realistically, keeping in mind your budget and the expenses you normally have during the year. Be realistic about how much money you are willing to designate from your budget **to the southwest Virginia section of the Parkway**. For our research results it is important that you answer this question as if you would **actually be paying this sum this year**. Your answers are anonymous and confidential.*

12) **Given your ideal level of Parkway characteristics** (described in question 10**), and your most preferred funding option**, (question 11) would you be willing to pay $25.00 **this year** in order to ensure that your ideal levels of **ALL** Parkway characteristics would be realized **next year** on the SW Va. Section of the Blue Ridge Parkway? **(Circle one)**

1. Yes
2. No

b) The **most** I am willing to pay **this year** is $_____ in order to ensure that **ALL** of my ideal characteristic levels would be realized **next year** on the southwest Virginia section of the Blue Ridge Parkway. **(Fill in a dollar amount)**

c) If you answered **$0.00** for the question above, please tell us why? **(Circle the letter that best explains your response)**

a) I don't want to pay any more taxes or fees
b) I shouldn't have to pay to take care of the Parkway.
c) I don't think the Parkway will deteriorate.
d) I don't have sufficient income to pay anything at this time.
e) I don't believe my characteristic levels will be supplied next year.
f) The Parkway is not that important to me.
g) Other_____

**Figure A4.1: Sample willingness to pay question from the flexible contingent valuation survey**

*The Contingent Choice Survey (survey version B)*

This survey used a single attribute, view quality, contingent market to elicit expected changes in visitation behavior if alternative view quality levels occurred. Several scenarios representing both increases (two scenarios) and decreases (four scenarios) in quality were presented to each respondent. View quality in this survey combined both overlook and roadside views totaling 194 views. This survey uses the same view panels and view quality levels that were used in choice modeling and the flexible contingent valuation surveys discussed above. A sample contingent choice question is given in Figure A4.2 below. Only respondents who expected to return to the Parkway the following year were asked to complete this survey.

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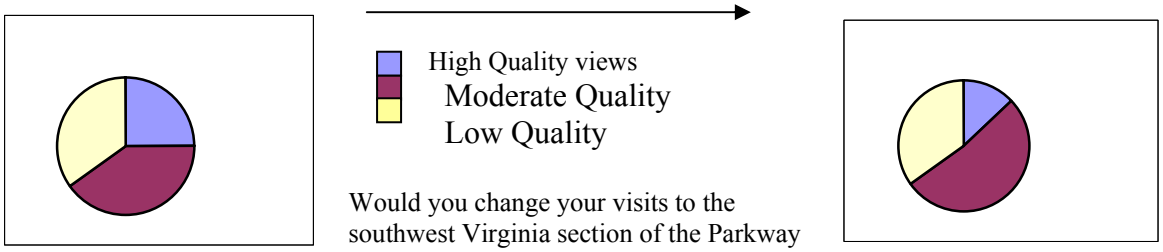
Assume that you notice during this trip on the southwest Virginia section of the Blue Ridge Parkway that:

**<u>half</u> of the <u>High</u> Quality views dropped one scenic quality level resulting in <u>Moderate</u> Quality views**.

This change is represented in the pie charts below.

**Current condition** **Hypothetical condition**




Would you change your visits to the southwest Virginia section of the Parkway ***next*** year? **(Circle one of the responses below)**

a) No
b) Yes → my new number of visits next year would be _____
c) Not sure

**Figure A4.2: Sample visitation question in the contingent choice survey**

As in the previous survey formats discussed respondents selected their funding option and were asked to consider their budgets and expenses for the year and to consider their decisions as if they would actually pay these amounts. This survey also included explanations of the problems facing the Parkway, the need for policy action, and the importance of visitor preferences in choosing a course of action...

All three surveys began with warm-up questions about visitor uses, attitudes, and concerns about the Parkway, and concluded with the standard demographic questions.

### *Appendix 5: Survey Implementation*

Once survey design was complete for each of the three surveys (VA, VB, VC)[21], computerized versions of the surveys were created using Sawtooth Software's Choice Based Conjoint (CBC) and Ci3 software programs. The questions on the computerized and paper versions were the same, including the cover picture; the computerized survey featured a progress indicator so that respondents could gauge how many questions they had remaining in the survey. Prior to implementation, an additional focus group was held (June 2000, UNC Asheville) to gather feedback on the layout, readability, and accessibility of the computerized survey.

Summer and fall are the prime seasons for visits to the Blue Ridge Parkway. Parkway visitor data suggested that there was a difference between summer and fall visitors, with families with children making up a larger portion of summer visitors and older individuals accounting for more fall visits. In addition, there was a perceived difference between weekend and weekday visitors with more retirees making Parkway visits during the week. In order to gather a representative sample of each type of visitor—summer and fall, weekend and weekday—survey implementation was staggered over summer and fall 2000 and included both weekends and weekdays. In all there were four distinct sets of implementation days: July 21-23 (Friday-Sunday), August 11-13 (Friday-Sunday), October 7-8 (Saturday-Sunday), and October 13-17 (Friday-Tuesday). The last set of implementation days coincided with peak fall leaf color, when the Blue Ridge Parkway experiences its highest visitation levels.

[21] Recall version A (VA) refers to the flexible contingent valuation survey, version B (VB) refers to the contingent choice survey, and version C (VC) refers to the choice modeling survey.

The survey was implemented on the southwest Virginia section of the Parkway, as this is the section with a completed scenic quality assessment. Parkway visitors often visit particular sections during a single trip, thus presenting the Parkway to visitors in sections is consistent with visitation patterns. Implementation occurred at a central location, Mabry Mill, where visitors routinely stop and visit for an extended period thus increasing the ease of intercepting potential respondents and increased the chance of visitor's willingness to stop to complete the survey.

Mabry Mill features a short walking trail with historic structures and displays; easels with enlarged photos of the southwest Virginia section of the Blue Ridge Parkway signaling the survey implementation site were assembled within sight of this trail. As individuals viewed the photos, they were asked if they had any questions about the display and if they were interested in completing a survey about scenic quality along the Blue Ridge Parkway. If they answered affirmatively, they were led to a computer station and given instructions on how to complete the survey and gain assistance if needed. If individuals indicated they did not wish to use the computer to fill out the survey, they were offered a paper version of the survey. Respondents were randomly assigned one of three versions of the computerized survey (VA, VB, or VC). Assignment of the computerized surveys was random since the interceptors were not aware of the version on a computer when they seated respondents. Paper surveys were kept in a stack that alternated VA, VB, VC and were assigned to respondents based on which version was on top of the stack. In addition to the individuals that were intercepting respondents, additional members of the implementation team were available to answer questions. Figure A5.1 shows the implementation site.

**Figure A5.1: Survey implementation site in southwest Virginia (Mabry Mill)**

The survey asked respondents to look at several items that provided additional information to assist them during the survey. These included: 1) View Books containing photos of the southwest Virginia section of the Blue Ridge Parkway; 2) a View Panel which had representations of High, Moderate, and Low Quality views; and 3) Table 1, which contained Characteristic Levels for the Southwest Virginia Section of the Blue Ridge Parkway. Copies of the View Books and Table 1 were placed on the table where respondents were seated; copies of the View Panel were available both on the table and on easels surrounding the survey area.

Upon completion of the survey, respondents were invited to fill out an address label if they wished to receive a copy of the results of the survey, as well as accept refreshments and a token gift of appreciation (a Blue Ridge Parkway postcard or bookmark).

Over 800 responses were gathered over the 13 implementation days, though not all of these were usable responses. The breakdown of these responses, by type

(computerized versus paper) and by version (VA, VB, VC), appears in Table A5.1. A majority of the 831 total responses, 694 or 83.5%, were completed on the computer. Version A (VA) had the largest number of responses when broken down by version: 303 total, versus 278 and 250 for VB and VC, respectively.

Table A5.1: Responses by type and by version

| Survey Version | Computerized | Paper | Total Responses |
|---|---|---|---|
| VA | 251 | 52 | 303 |
| VB | 223 | 55 | 278 |
| VC | 220 | 30 | 250 |
| Total Responses | 694 (83.5%) | 137 (16.5%) | 831 |

### *Appendix 6: Results: The Sample*

Table A6.1 below presents the demographics of the full sample[22] Note that the sample is older and more educated than the region and nation. Recall this is a sample of visitors to the Parkway and thus we would not necessarily expect them to be similar to the region or nation as whole. The demographics of the sample are also similar to the Brothers and Chen (1997) visitor sample.

Table A6.1 Visitor demographics as compared to selected states and nation

| n=828 | Sample | NC | VA | SC | Nation | Brothers and Chen 1996 sample |
|---|---|---|---|---|---|---|
| Age | 35.4 | 35.3 | 35.7 | 35.4 | 35.3 | 49%>55 years |
| Female | 48% | 51% | 51% | 51.4% | 50.9% | 45% |
| % w/ College degree | 47% | 9.18% | 13.7% | 8.99% | 11.48% | 48.7% |
| Income | 37,629 | 35,320 | 40,259 | 33,325 | 37,005 | 50% between 30,000-59,999 |

Table A6.2 shows that 67% of our sample resides in North Carolina and Virginia comparable to Brothers and Chen (1997) at 53%. Our sample is more local than the Brothers and Chen sample with more visitors from North Carolina, slightly more from Virginia, fewer from Florida, more from South Carolina, and 10% less from other parts of the country and world.

[22] Full sample refers to all survey versions.

Table A6.2: Zip code origin of sample visitors

| First two digits n=828 | State | Frequency | % | Brothers and Chen 1996 Sample |
|---|---|---|---|---|
| 23 | VA | 20 | 2.4 | 33% |
| 24 | VA | 267 | 32.3 | |
| 27 | NC | 214 | 25.8 | 20.1% |
| 28 | NC | 55 | 6.6 | |
| 29 | SC | 16 | 1.9 | 2.5% |
| 32 | FL | 11 | 1.3 | 4.2% |
| Other | | 245 | 29.6 | 40.2 |

We also found that our sample has been visiting of the Parkway on average 20.61 years, and have visited this section on average 2.25 times per year. On this trip visitors we visiting on average for 1.96 days. Table A6.3 below show that our sample has also visited other sections of the Parkway, with the middle North Carolina section visited the most by 68% of our sample.

Table A6.3: Parkway visitation by sections

| Parkway section n=828 | Percent of sample who have visited | % |
|---|---|---|
| A Northern VA Section | 470 | 56.8 |
| C Middle NC section | 570 | 68.8 |
| D Southern NC section | 471 | 56.9 |

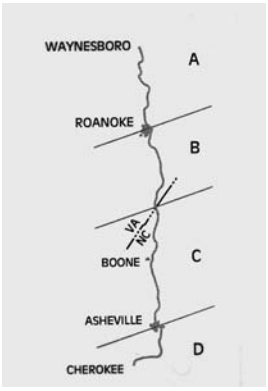



Table A6.4 presents the various activities and interests of visitors and Table A6.5 shows their perspective on important national issues. In addition to various other activities our sample is active and involved in outdoor activities including outdoor recreation (69%), Gardening (55%), fishing (34%), and hunting (19%). In Table A6.5 we see that most sample visitors ranked education or healthcare as either most important or important, both receiving votes from 84.9 and 81.6 percent of the sample respectively. Environmental issues came in third with 79% of visitors ranking this issue as important

or most important. Interestingly, a Pew research center poll taken in January 2002 found 86% of their sample (1201) considered environmental issues as a top priority or important but lower priority[23].

Table A6.4: Visitor activities and interests

| Activity or interest (n=828) | Number | Percent of full sample |
|---|---|---|
| Outdoor recreation (hiking, Kayaking, camping, etc) | 574 | 69.3 |
| Gardening | 451 | 54.5 |
| Religious | 333 | 40.2 |
| Music or theater | 328 | 39.6 |
| Fishing | 279 | 33.7 |
| Social | 269 | 32.5 |
| Environmental awareness or education | 257 | 31 |
| Business or Professional | 220 | 26.6 |
| Hunting or shooting | 159 | 19.2 |
| Civic | 130 | 15.7 |
| Political | 121 | 14.6 |
| Motorcycling | 80 | 9.7 |

Table A6.5: National issues ranked as important or most important by sample visitors

| National Issue (n=746) | Important[a] | % |
|---|---|---|
| Education | 633 | 84.9 |
| Health care | 609 | 81.6 |
| Environment | 595 | 79.8 |
| Public safety | 521 | 62.9 |
| National defense | 379 | 50.8 |
| Unemployment | 347 | 46.5 |
| Inflation | 292 | 39.1 |
| Other | 41 | 5.5 |

a: Includes both the important and most important ranks

Table A6.6 shows what visitors to the southwest Virginia section of the Parkway are doing when they visit the Parkway. This table shows all the activities in which they are participating during their visit. Table A6.7, shows the activity a visitor identified as

[23] Source: http://poll.orspub.com

their most common use of the Parkway for that particular trip on the southwest Virginia section. Note that 65.8% of the visitors say that hiking is one of their activities while on this trip, while only 5.7% say it is their most common activity. This suggests that many Parkway visitors visit trails, but only a few have visited for the primary purpose of hiking. 44.95 of sample has identified scenic viewing as an activity, with 26.2% identifying this as their most common activity. Scenic viewing is the activity selected as most common by the most visitors. The Brothers and Chen (1997) found that 94.7% of their sample visited a scenic area. In our study we focus on what visitors *are doing while on* the Parkway, instead of their *purpose for choosing* the Parkway as opposed to other vacations sites in the southeast or US as was done in the Brothers and Chen study. Thus our result is quite different and not comparable to their study. Our question format includes many activities that encompass scenic viewing, e.g. touring, family outings etc. which allows us to understand the context in which scenic viewing is taking place.

Note the top five activities identified are hiking, visiting a scenic area, visiting an historic site, camping and picnicking (65.8%, 44.9%, 43.8%, 33.7%, and 20.9%, respectively). However, when we asked their most common activity while on this trip, we found that visiting a scenic are, touring, relaxing, family outing, and hiking were listed with percentages at 26.2, 17, 15.3, 12.4 and 5.7 respectively.

Table A6.6: Visitor activities while on Parkway for this visit

| Parkway Activity[a] (n=828) | Number | % of sample |
|---|---|---|
| Hiking | 545 | 65.8 |
| Visiting a scenic area | 372 | 44.9 |
| Visiting a historical site/museum | 363 | 43.8 |
| Camping | 279 | 33.7 |
| Picnicking | 173 | 20.9 |
| Family outing | 152 | 18.4 |
| Touring | 126 | 15.2 |
| Visiting shops/craft galleries | 79 | 9.5 |
| Relaxing | 78 | 9.4 |
| Visiting a lodge | 49 | 5.9 |
| Rock climbing | 47 | 5.8 |
| Fishing/hunting | 28 | 3.4 |
| Commuting | 21 | 2.5 |
| Other | 10 | 1.2 |
| Creating art | 9 | 1.1 |
| Participating in a group outing | 3 | 0.36 |

a. There are more choices.

Table A6.7: The most common activity while on this trip

| Most Common Parkway Activity (n=828) | Number | % |
|---|---|---|
| Visiting a scenic area | 217 | 26.2 |
| Touring | 141 | 17 |
| Relaxing | 127 | 15.3 |
| Family outing | 103 | 12.4 |
| Hiking | 47 | 5.7 |
| Camping | 43 | 5.2 |
| Visiting a historical site/museum | 28 | 3.4 |
| Other | 24 | 2.9 |
| Picnicking | 23 | 2.8 |
| Visiting shops/craft galleries | 16 | 1.9 |
| Participating in a group outing | 14 | 1.7 |
| Commuting | 10 | 1.2 |
| Visiting a lodge | 7 | 0.8 |
| Hunting/hunting | 6 | 0.7 |
| Rock climbing | 2 | 0.24 |
| Creating art | 2 | 0.24 |

Table A6.8 presents visitor satisfaction with the attributes of the Parkway experience. Note that overall visitors are satisfied with current parkway characteristics. Scenic quality, both overlook and roadside views, receives over 80% satisfied with close to 50% very satisfied. Satisfaction drops slightly for facilities to 75% and more for trails with a satisfaction level of 46%, however, note that 30% of the sample did not know their satisfaction levels for trails[24].

Table A6.8: Level of satisfaction for southwest Virginia Parkway attributes

| Parkway Characteristic (n=776) | | Not at all satisfied 1 | 2 | 3 | 4 | Very satisfied 5 | Don't know |
|---|---|---|---|---|---|---|---|
| Number of overlooks | # | 2 | 3 | 121 | 222 | 428 | 17 |
| | (%) | (0.3) | (0.4) | (15.6) | (28.6) | (55.2) | (2.2) |
| Scenic quality of overlooks | # | 3 | 34 | 133 | 233 | 410 | 11 |
| | (%) | (0.4) | (4.4) | (17.1) | (30) | (52.8) | (1.4) |
| Scenic quality of roadside views | # | 5 | 40 | 134 | 271 | 368 | 13 |
| | (%) | (0.6) | (5.1) | (17.3) | (34.9) | (47.4) | (1.7) |
| Number of quality trails | # | 4 | 40 | 170 | 170 | 191 | 236 |
| | (%) | (0.5) | (5.1) | (21.9) | (21.9) | (24.6) | (30.3) |
| Number and condition of activity area | # | 10 | 41 | 157 | 266 | 318 | 28 |
| | (%) | (1.3) | (5.3) | (20.2) | (34.3) | (40.9) | (3.6) |

Table A6.9 below shows the changes visitors noticed while visiting the southwest Virginia section on this trip and their level of concern for these scenic quality changes. Note that subdivisions and single houses are most noted and over 40% of visitors consider these their greatest concern

[24] This is likely due to this group not participating in this activity while visiting the Parkway.

Table A6.9: Changes noticed on the southwest Virginia section and visitors' level of concern

| Changes noticed (n=828) | Frequency of notice | | Greatest concern | | 2nd greatest concern | |
|---|---|---|---|---|---|---|
| | # | % | # | % | # | % |
| Single houses | 617 | 74.5 | 162 | 19.6 | 212 | 25.6 |
| Housing subdivisions | 378 | 45.7 | 193 | 23.3 | 97 | 11.7 |
| Commercial signs | 244 | 29.5 | 70 | 8.5 | 44 | 5.3 |
| Road cuts | 240 | 29.0 | 28 | 3.4 | 38 | 4.6 |
| Power lines | 216 | 26.1 | 47 | 5.7 | 63 | 7.6 |
| Electric towers | 205 | 24.8 | 28 | 3.4 | 42 | 5.1 |
| Telecom towers | 186 | 22.5 | 39 | 4.7 | 35 | 4.2 |
| Logging | 185 | 22.3 | 56 | 6.8 | 38 | 4.6 |
| Air pollution | 157 | 19.0 | 65 | 7.9 | 30 | 3.6 |
| Didn't notice | 121 | 14.6 | 74 | 8.9 | 2 | 0.2 |
| Other | 38 | 4.6 | 13 | 1.6 | 4 | 0.5 |

In summary, our visitor sample to the southwest Virginia section of the Parkway are demographically similar to the previous study by Brothers and Chen (1997). They visit the Parkway on average 2.25 times per year and have been visiting for 20.61 years. They are an active group with a variety of interests and in 2000 they had concerns similar to others in the nation with healthcare, education and the environment at the top of their list. While on the Parkway they participate in a variety of activities with visiting scenic sites as the most common for 25% of the sample. They are generally very satisfied with the quality of Parkway attributes.

Table A6.10: Visitor preferences for payment method[a]

| Payment option n=303 | # Selected as acceptable | % Sample acceptable | # Selected as Most preferred | % Sample for most preferred |
|---|---|---|---|---|
| Federal funds | 139 | 45.87% | 64 | 21.12% |
| State Funds | 147 | 48.51% | 47 | 15.51% |
| Donation Boxes | 150 | 49.50% | 34 | 11.22% |
| Non-profits Donations | 159 | 52.48% | 22 | 7.26% |
| License Plate Fee | 101 | 33.33% | 22 | 7.26% |
| Federal Tax Form check-off | 106 | 34.98% | 19 | 6.27% |
| Private Donations | 148 | 48.84% | 17 | 5.61% |
| State Gasoline Tax | 55 | 18.15% | 14 | 4.62% |
| Federal Gasoline tax | 54 | 17.82% | 11 | 3.63% |
| State Tax form Check-off | 92 | 30.36% | 10 | 3.30% |
| Federal Income Tax | 52 | 17.16% | 10 | 3.30% |
| State Income Tax | 41 | 13.53% | 9 | 2.97% |
| Other | 10 | 3.30% | 4 | 1.32% |
| No response | na | na | 20 | 6.60% |

(a) Respondents selected a payment method for either their ideal bundle of Parkway attributes, or for the options they selected in the choice survey.

Table A6.10 shows visitor preferences for the type of payment scheme they would like to use in order to pay for their preferred attribute levels. There is no overwhelming support for any payment method as a visitor's most preferred method, however, payments using federal funds, state funds, donation boxes, non-profit donations, and private donations were all considered acceptable by approximately 50% of the sampled visitors. The mechanisms for federal and state funding most acceptable were tax form check-offs and license plate fees, however these do not get overwhelming support with only 30%-35% of sample considering these as acceptable.

### *Appendix 7: The Modeling Framework*

Below we discuss the modeling framework for each survey instrument: Contingent Behavior, Contingent Valuation, and the Choice model.

*Contingent Behavior/Contingent Valuation*

Contingent Valuation and Contingent Behavior models seek to measure the value of a non-market good by evaluating a set of responses to hypothetical questions. In a contingent behavior model, people are asked a direct question such as:

> "Assume that you notice, during this trip on the southwest Virginia section of the Blue Ridge Parkway, that views change by X, would you change your number of visits next year? If yes,, my new number of visits would be ____?"

If we aggregate the results of many responses to this question, we can estimate the demand for trips as a function of scenic quality.

Contingent valuation methods directly ask respondents about the values they place on a change in an environmental service. Although contingent valuation questions take on several forms, the open-ended (dichotomous choice) format asks:

> "Would you be willing to pay $X in order to ensure your ideal levels of all Parkway characteristics would be realized next year on the southwest Virginia section of the Parkway?"

The respondent in contingent valuation is asked to balance the gain in welfare due to improvement in their attribute bundle with the loss in welfare from forgone income to pay for the bundle. The maximum willingness to pay that we would expect from the individual is the payment that just leaves the respondent indifferent between having the original attribute bundle and original income and having their ideal bundle and income reduced by her willingness to pay. This would leave utility (or her satisfaction) constant.

Contingent behavior and contingent valuation approaches are somewhat controversial because they rely on a person's stated intentions, in contrast to the actual, observed behavior used in the travel cost and hedonic models discussed above (e.g., Diamond and Hausman 1994, Kahn and Bjornstad 1996). Despite the controversy many economists agree that contingent methods do provide useful information for evaluating policy changes such as those considered in this report (Arrow et al 1993.).

*Choice Models*

Choice models examine individuals' preferences by asking them to consider the tradeoffs that they are willing to make. In contrast to contingent valuation, which asks individuals to explicitly state their willingness to pay for a proposed change in environmental quality, preferences in a choice model are "revealed" as the respondent is asked to consider a series of scenarios where they must choose their most preferred outcome from a series of possible outcomes (choice sets). This allows the researcher to obtain the tradeoffs that an individual is willing to make between any attributes presented in the choice sets, as well as allow the estimation of willingness to pay.

Within the survey, the consideration of substitutes is part of the selection process. The utility or satisfaction of an alternative received by a respondent is a function of the levels of each of the alternative's attributes. Because there are multiple alternatives from which the respondent can choose, she can use the levels to judge the relative merits of each alternative. Thus the role of substitute levels is explicitly recognized. In traditional contingent valuation, the role of substitutes is relegated to a reminder sentence or two in the description of the good.

We utilize a random utility framework (RUM), which is widely used in dichotomous choice contingent valuation and travel cost modeling, to explain individuals' preferences for alternative sets of scenic experience characteristics on the Blue Ridge Parkway. RUM models rely on choice behavior and assume that individuals will choose the alternative that gives them the highest level of utility, i.e., RUM models estimate the probability that an individual will select an alternative based on the levels of the attributes of each possible alternative. If the utility of alternative *i* is greater than the utility of alternative *j*, the individual will choose it. Utility is comprised of both deterministic (scenic quality, number of trails, income, etc) and random, individual-specific, components that are unobservable to the researcher. The RUM framework is directly estimable from choice model data and is estimated using the nested logit techniques that have been developed in the transportation and marketing research literature. For a review of choice and conjoint modeling techniques, see Adamowicz, et al (1994) Boxall et al (1996), Louviere (1996), or Roe, et al (1996).

*Choice Model Data*

Descriptive Statistics and Results

Table A7.1 below presents the descriptive statistics for the choice survey data in the computerized format.[25]

[25] Due to data format difficulties the paper survey data were not included in this analysis ( 30 observations).

Table A7.1: Descriptive statistics (Choice Model – Computerized Version)

| Variables/Expected Sign | Definition | Mean | Std.Dev. | Min Value | Max Value | Cases |
|---|---|---|---|---|---|---|
| *PMT (-)* | Cost of providing option in $ | 47.491 | 63.508 | 0 | 200 | 5256 |
| *OVERLOOK (+)* | Number of overlooks in 100 miles of parkway | 22.013 | 3.913 | 15 | 28 | 5256 |
| *NUMTRAIL (+)* | Number and quality of trails | 15.766 | 9.842 | 0 | 35 | 5256 |
| *ACTAREA (+)* | Number and Condition of activity areas | 0.114 | 0.667 | -1 | 1 | 5252 |
| *CHOICE (NA)* | Equals one if option chosen | 0.333 | 0.471 | 0 | 1 | 5256 |
| *LOOKHIGH (+)* | Equals one if overlook comprises mainly high quality views | -0.329 | 0.817 | -1 | 1 | 5257 |
| *LOOKLOW (-)* | Equals one if overlook comprises mainly low quality views | -0.329 | 0.817 | -1 | 1 | 5257 |
| *ROADHIGH (+)* | Equals one if roadway comprises mainly high quality views | -0.331 | 0.819 | -1 | 1 | 5257 |
| *ROADLOW (-)* | Equals one if roadway comprises mainly low quality views | -0.336 | 0.814 | -1 | 1 | 5257 |
| *YEARS (?)* | Number of years individual has been visiting parkway | 19.60 | 14.45 | 0 | 66 | 5256 |
| *DURATION (+)* | Length of this visit in days | 2.13 | 4.00 | 1 | 50 | 5256 |
| *FREQVISIT (+)* | Equals one if user is a frequent visitor to parkway | 0.301 | 0.459 | 0 | 1 | 5256 |

Table A7.2 above shows the ideal Parkway attribute bundle visitors selected. In this group (computerized choice survey) the respondents selected the current level of an attribute as their ideal level 45%-66% of the time. This result is consistent with the earlier observation that respondents were generally satisfied with the quality of Parkway attributes. Overlook quality was the only attribute that had 53% of respondents selecting the high quality for their ideal level of that attribute. Roadside scenic quality runs second with 44.5% of respondents selecting high quality views as their ideal level. It is important to note that some respondents did identify low attribute levels as ideal for each attribute, but as expected very few did so (1.8%-3.7%). This result is expected and is also evident in the willingness to pay and accept values reported below.

Table A7.2: Characteristic levels selected by visitors for the computerized choice model survey

| Characteristic | Number of Overlooks | | Scenic Quality of Overlook Views | | Scenic Quality of Roadside Views | | Number of Quality Trails | | Number and Condition of Activity Areas | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Ideal Level * (n=218))** | | % | | % | | % | | % | | % |
| High | 74 | 33.9 | 114 | 52.3 | 97 | 44.5 | 66 | 30.3 | 84 | 38.5 |
| Current | 140 | 64.2 | 100 | 45.9 | 116 | 53.2 | 144 | 66.1 | 130 | 59.6 |
| Low | 4 | 1.8 | 4 | 1.8 | 5 | 2.3 | 8 | 3.7 | 4 | 1.8 |
| **Rank (n=245)** | | | | | | | | | | |
| 1(Most Important) | 36 | 13.33% | 48 | 17.78% | 63 | 23.33% | 67 | 24.81% | 56 | 20.74% |
| 2 | 82 | 33.74% | 65 | 26.75% | 53 | 21.81% | 31 | 12.76% | 12 | 4.94% |
| 3 | 65 | 26.97% | 90 | 37.34% | 54 | 22.41% | 20 | 8.30% | 12 | 4.98% |
| 4 | 31 | 13.14% | 16 | 6.78% | 40 | 16.95% | 51 | 21.61% | 98 | 41.53% |
| 5(Least Important) | 31 | 13.03% | 27 | 11.34% | 36 | 15.13% | 77 | 32.35% | 67 | 28.15% |

*Results of ideal level don't include paper-version survey.

Interestingly, respondents ranking attributes as *most important* give all five Parkway attributes fairly equal weights with the number of overlooks having the lowest percentage selected as *most important* (13.33%), and roadside views, trails and activity areas each selected by approximately 20% of sample as *most important* (20-24%). Overlook quality is ranked as *most important* by only 17.78% of sample. However, when we consider both the *most important* and *important* rank levels, the number of overlooks is ranked the highest by 47.77% of sample, with roadside view quality (45.14%), overlook view quality (44.53%), trails (37.57%) and activity areas (25.68%) following behind in levels of importance.

The results from the conditional logit estimation of the choice model are presented in Table A7.3. The modifier "conditional" comes from the nature of the choice task: an individual makes a choice of a "state of the world", which has a particular set of characteristics, given that other states of the world are available to him. Decisions are not

made in a vacuum – there are usually alternative choices available when each choice is made. This is the economist's notion of opportunity cost, or the next best alternative. In the Parkway example, each individual is faced with a set of feasible outcomes for the Parkway, and she is then asked to choose her most preferred outcome. Recall the choice sets presented in Table A4.3 in Appendix 4 above.

Table A7.3 Estimated conditional logit Results for computerized choice survey

| Variable | Coefficient | Standard Error | T-stat | P-value |
|---|---|---|---|---|
| *PMT* | -0.001** | 0.001 | -1.996 | 0.046 |
| *OVERLOOK* | 0.002 | 0.007 | 0.229 | 0.819 |
| *LOOKHIGH* | 0.159*** | 0.046 | 3.497 | 0.001 |
| *LOOKLOW* | -0.264*** | 0.048 | -5.514 | 0.000 |
| *ROADHIGH* | 0.162*** | 0.046 | 3.528 | 0.000 |
| *ROADLOW* | -0.205*** | 0.047 | -4.315 | 0.000 |
| *NUMTRAIL* | 0.014*** | 0.003 | 4.763 | 0.000 |
| *ACTAREA* | 0.408*** | 0.041 | 9.884 | 0.000 |
| *ASC1xYear* | 0.008** | 0.004 | 2.102 | 0.036 |
| *ASC1xDuration* | 0.118** | 0.034 | 3.436 | 0.001 |
| *ASC1xFrequency* | 0.025 | 0.143 | 0.173 | 0.863 |
| *ASC2xYear* | 0.000 | 0.004 | -0.119 | 0.905 |
| *ASC2xDuration* | 0.127*** | 0.034 | 3.715 | 0.000 |
| *ASC2xFrequency* | 0.507*** | 0.139 | 3.661 | 0.000 |
| Number of observations | | 1748 | | |
| Log-likelihood ( R ) | | -1798.8215 | | |
| Log-likelihood ( U ) | | -1909.8642 | | |
| McFadden's $\rho^2$ | | .063 | | |

The interpretation of the coefficients of choice models under multinomial logit can be confusing. For continuous variables and standard dummy variables, a positive

coefficient on a variable can be interpreted as increasing the probability that an alternative is chosen as the level of that variable increases. In the case of binary variables, a positive coefficient indicates that options with the variable present are more likely to be chosen. The effects coded variables have a slightly different interpretation: a positive sign indicates that individuals are more likely to choose alternatives containing that variable instead of the status quo alternative.

The variables LOOKHIGH, LOOKLOW, and ROADHIGH, ROADLOW are effects coded. To find the coefficient of the omitted level, we take the sum of the negative of each of the coefficients that are included: e.g. the status quo level of overlook views, LOOKSQ would be calculated thus: LOOKSQ=-(0.159)+(-0.264)=0.105.

The alternative-specific constants (ASC) in a discrete-choice model, much like the constant term in a traditional binary logit model, serve to incorporate any variation in the dependent variable that is not explained by the choice set attributes or respondent characteristics.

In this model, the choice activities of each subject generate 27 observations in the data set, but a given subject's socioeconomic characteristics are invariant across the 27 observations. It is only possible to control for socioeconomic effects through interactions with the alternative specific constants. In this model we employ interactions for the length of an individual's experience with the parkway, the duration of her present trip, and the frequency with which she visits the parkway. For example, the interaction between the alternative-specific constant for choice set 1 and the number of years experience the individual has with the parkway is given by (ASC1xYEARS) in Table A7.3 . The interpretation of the interaction between the ASCs and the socioeconomic

variables is complicated as well. ASC1*YEARS is positive and significant, indicating that individuals who have been visitors in the past have a higher probability of choosing Option A in any of the nine choice sets.[26] The other socioeconomic interaction terms have similar interpretations.

The parameters of the model show the correct signs and the joint power of the model is acceptable, as evidenced by a McFadden's $\rho^2$ of .063. The signs of the coefficients on several of the attribute variables are encouraging.

The coefficients on all of the variables are of the correct sign. The sign of PMT, which represents the dollar payment presented in the choice set, is negative as expected, and is significant at the $\alpha$=.05 level indicating that an individual is less likely to choose alternatives having higher costs. The variable OVERLOOK, which represents the number of overlooks in the area is of the correct sign but is insignificant. LOOKHIGH and LOOKLOW, which indicate the composition of views in each alternative option are of the correct sign, and significant at the $\alpha$=.01 level, indicating that individuals seek to avoid alternatives that have lower quality views and are more likely to choose alternatives with higher quality views than the status quo. ROADLOW, which, if present indicates that the roadside views in that alternative are of low quality, is negative and significant at the $\alpha$=.01 level. ROADHIGH is positive and significant at the $\alpha$=.01 level. The variables NUMTRAIL and ACTAREA are positive and significant at the $\alpha$=.01 level, indicating that an alternative is more likely to be chosen as the number of trails and activity areas increases.

[26] This is something that neoclassical economic theory cannot explain. We (meaning the economic profession) have no theory to explain why individuals having more experience with the parkway would be more likely to choose Option A over the others. We suspect that respondents do not view the presentation

The inclusion of socioeconomic terms requires interaction with the alternative-specific constants as discussed above. DURATION is positive an significant at the α=.01 level, indicating that individuals who visit for longer periods are more likely to select away from the status quo. Individuals who have more experience with the parkway, as indicated in the variable YEARS, are more likely to choose Option A rather than the status quo. Finally, frequent visitors to the parkway, FREQUENT, are more likely to choose Option B than the status quo.

Selected Welfare Results

As an example of the utility of the choice model framework, we compute WTP results for three scenarios. Choice models are very flexible in this regard. In contrast to contingent valuation, which is constructed by design to estimate the benefits or costs for a single policy change, choice models allow the researcher to calculate these for a change in the level of any (or all) attribute(s).

As is the case with the calculation of willingness to pay in traditional contingent valuation type models, compensating variation (the income adjustment necessary to leave the individual indifferent between old attributes levels and new levels) is given by

$$CV = -\frac{1}{\beta_{\$}}\left(status\ quo\ utility - utility\ of\ new\ policy\right)$$

where $\beta_{\$}$ is the coefficient on the PMT (or other monetary) variable.

If we are interested in learning about the value that users of the Parkway have for trails, we could use the above equation to estimate the compensating variation or willingness to pay for the addition of new trails.

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of the choice sets as a random design. There is some systematic reason that those with more BRP experience select Option A more frequently than the status quo.

Because our variable on trails measures the number of quality trails accessible to the visitor, the calculated willingness-to-pay figure of $13.67 can be interpreted as saying that a survey respondent would be willing to make an average annual payment of $13.67 to increase the number of trails by 1 from the status quo level.

We can estimate the welfare gain/loss from other attribute changes in a similar manner. For example, if we suppose that over time the quality of all overlook views will decrease to a lower quality due to development, we can use the models to estimate the value of lost well-being from this change. In this case the calculation of the above equation leads to a welfare loss (willingness to accept) of $359.21 from a decrease in overlook views from the status quo to low quality. This tells us that a respondent would need to receive in compensation on average $359.21 for a decline in overlook view quality.

The same procedure could be used to estimate the welfare gain of increasing the number of overlooks. The willingness to pay to increase the number of overlooks by one is $4.83. It is worthwhile to note that once the choice model is estimated we can assess the welfare change from the status quo to any combination of attributes, even if those combinations did not appear as options within the choice sets. A summary of values are given in Tables A7.4 – A7.6 below.

In Table A7.4 we show the estimated value of a change in welfare, or the visitors willingness to pay to get, a one unit increase in any one of the Parkway's scenic experience attributes, all other things held constant. For example, our results show that welfare increases by $116.28 if roadside scenic quality is increased from status quo to high, all other things constant. Note this quality change represents a change in 14 views

from low to medium (4) and high (10) quality (see Table A4.2 in Appendix 4 above). This result is sufficiently different from visitor's willingness to pay for increases in overlook scenic quality improvements from status quo to high ($52.53). This may be a result of the general high level of satisfaction among visitors regarding view quality, however, both overlooks and roadside views were ranked highly for satisfaction among visitors. This may also reflect a preference for improving roadside views over overlooks. Finally, the smaller benefit visitors receive to add one more overlook ($4.83) and to add one more mile of trail ($13.61) for an increase of one unit may very well be a result of the unit of measure, one mile of trail and one more overlook.

How can Parkway decision-makers use this information? These results represent the value of increased satisfaction from improvements along the Parkway. Therefore if the Parkway is considering a large trail project that is expected to cost $100,000 to build 10 additional miles of trail, the results suggest the visitor would receive an increase in satisfaction valued at $136.10 of benefit ($13.61 x 10 miles). If you have 10,000 visitors hiking trails, then this translates into a total economic value of $1,361,000 for visitors. One could compare this to the cost of providing the additional 10 miles of trail to see whether the addition of trails represents a net increase in social welfare. Using the same approach, one can see that the estimated values of increasing the quality of roadside views and activity areas can increase visitor benefits significantly. Although the values for the number of overlooks and their quality appear small, with aggregation they increase significantly. It is important to note that these values represent the average estimated value of increased satisfaction to visitors for a unit increase of one attribute *all other things held constant.*

Table A7.4 Welfare calculations for one unit *increase* in attributes from the status quo level.

| Attribute | WTP |
|---|---|
| OVERLOOK | -$4.82 |
| LOOKHIGH | -$52.53 |
| ROADHIGH | -$116.28 |
| NUMTRAIL | -$13.61 |
| ACTAREA | -$396.42 |

In Table A7.5 we show the estimated value of lost satisfaction to visitors if any one of the attributes decreases from the status quo by one unit, all other things constant. These results are analogous to those above, only the direction of change is different. From the results we find that visitors in our sample require compensation of $359.20 to accept a decline in overlook views from the status quo to low. This represents the payment that a visitor would have to receive to accept lower quality views and still maintain his original utility level.

Do note that the magnitude of the values changed for the view quality attributes when the frame of the policy changed. Our results suggest that the impact on visitors is greater when view quality declines, than when it increases. Recall the low view category for both roadside and overlook views represents a significant reduction to 100% low quality views. This may explain the high compensation requirements.

Parkway decision-makers can also interpret these values as the estimated value of satisfaction preserved when views are maintained at their current status quo level. In other words, if the cost to maintain views is $5 million a year, this result suggests that the annual gain from avoiding a decline to low roadside views is $359.20 per visitor, or $3.5 billion for all visitors to the southwest Virginia section. Note again, that these results represent values for a unit change in the attribute, all other things constant. Table A7.6

below presents the welfare changes from increasing or decreasing all the attributes simultaneously by one unit.

Table A7.5: Welfare calculations for one unit *decrease* in attribute from the status quo level

| Attribute | WTA |
|---|---|
| OVERLOOK | $4.82 |
| LOOKLOW | $359.20 |
| ROADLOW | $240.37 |
| NUMTRAIL | $13.60 |
| ACTAREA | $396.42 |

It is important to note that the bundle of attributes is not valued as a linear sum of the parts. Thus one cannot simply sum the values presented in Table A7.4 or A7.5. In Table A7.6 we find that visitors are willing to pay less for a one unit increase in Parkway overall quality that they must receive in compensation for a one unit decline in overall quality; again, the frame of reference matters. The results in Table A7.6 suggest the value of the loss in visitor satisfaction from their Parkway visit is $1,014.44 if all attributes declined by one unit. This compares to the value of the gain in satisfaction they receive if all attributes increase by one unit of $583.68.

Table A7.6: Welfare for simultaneous changes in attributes

| Policy | WTP(-) or WTA (+) |
|---|---|
| One unit increase in all attributes | -$583.68 |
| | |
| One unit decrease in all attributes | $1014.44 |

We have presented several scenarios of possible attribute changes above. Any combination of attribute changes can be analyzed with the model results presented above.

Other measures of value

We can use the coefficients from Table A7.3 to estimate the rate at which individuals are willing to tradeoff one attribute for another. These are typically called the part-worths in the conjoint/choice model literature. The most meaningful tradeoff to illustrate is dollars/other attribute and has been discussed above in Tables A7.5 and A7.5. In theory the calculation can also be made in terms of any one attribute for another. For example, a one unit increase in the level of the variable OVERLOOK can be given in

$$Part-worth = -\left(\frac{\beta_{OVERLOOK}}{\beta_{NUMTRAILS}}\right)$$

$$Part-worth = -\left(\frac{0.037}{0.021}\right)$$

$$Part-worth = -1.76$$

terms of the number of trails. This result suggests visitors are willing to trade 1.76 miles of trails to receive one more overlook. This helps us consider resource to resource trade-offs, another way to consider Parkway management decisions.

Table A7.7: Resource to resource part-worths between Parkway attributes

| Description | Implied tradeoff |
|---|---|
| # trails an individual would give up for one more overlook | 0.12 miles of trails |
| # trails an individual would give up for one more improved activity area | 29.13 miles of trails |
| # trails an individual would give up to have more high quality road views | 11.58 miles of trails |
| activity areas an individual would give up to have more high quality road views | .397 activity area |
| activity areas an individual would give up to have more high quality overlook views | .389 activity area |

a. this value is calculated by multiplying the part-worth (the proportion of funding they are willing to trade) by the funding unit given in the survey of 20%.

Table A7.7 above shows the rate at which visitors are willing to trade-off one Parkway attribute for another. Visitors are willing to sacrifice a significant number of trails in order to get more and higher quality activity areas. Recall that although many visitors reported hiking as a Parkway activity, only 5% of the sample reported hiking as their most common activity. Also recall that 30% of the sample did not have any opinion regarding their satisfaction with trails. Since the majority of our sample is not engaged in a significant amount of hiking, they are willing to sacrifice trails for more activity areas. In a sense we have an averaging effect; analyzing only hikers would yield a different result. Finally, visitors are willing to give up .40 of one activity area in order to get more scenic views.

Table A7.8 presents the part-worths in dollar terms estimated from the computerized choice data. These part-worths are calculated from the coefficients in Table A7.3 above, so they do include the influence of socioeconomic factors. All of the part-worths are of the expected sign, but the magnitudes of some of the calculations seem to be unrealistic. Nonetheless, they do provide information on the relative importance of different components of the Parkway visitation experience and it confirms the relative importance of the attributes observed with the welfare data presented above.

Table A7.8 Dollar to resoucre part-worths

| Attribute | WTP (-) or WTA (+) |
|---|---|
| OVERLOOK | -$1.61 |
| LOOKHIGH | -$154.76 |
| LOOKLOW | $256.98 |
| ROADHIGH | -$157.65 |
| ROADLOW | $199.01 |
| NUMTRAIL | -$13.61 |
| ACTAREA | -$396.43 |

Contingent Valuation Results

The variable descriptions and descriptive statistics for the computerized and paper versions of the contingent valuation data (VA survey) can be found in Table A7.11. A few notable statistics follow. Environmental preservation on the Parkway is important to the sample; on a scale of 1-5, with 5 representing strong agreement, the average response to the statement "Environmental preservation should be a priority of local communities" was 4.35. Forty-one percent of the CVM respondents were visiting the Parkway for the first time. The average level of agreement with the statement that "Users of the BRP should pay to protect it" was 3.25. Almost half of the sample (49%) thought that unemployment was the most important national issue. (Note: these data were collected in 2000, when national unemployment levels were below 3%). The average length of visit to the Virginia section of the Parkway is just under two days.

Table A7.11 Variables used in CVM models

| Variable | Description | Mean | Std.Dev. | Minimum | Maximum | Cases |
|---|---|---|---|---|---|---|
| DCYES | 1 if the individual contributes, 0 otherwise | 0.593 | 0.492 | 0 | 1 | 302 |
| FIRSTVISIT | 1 if first-time visitor, 0 otherwise | 0.415 | 0.495 | 0 | 1 | 94 |
| DCBID | Requested bid amount | 67.997 | 64.869 | 5 | 200 | 302 |
| MALE | 1 if male, 0 otherwise | 0.490 | 0.501 | 0 | 1 | 302 |
| COLGRAD | 1 if college graduate, 0 otherwise | 0.216 | 0.412 | 0 | 1 | 301 |
| WHITECOLLAR | 1 if managerial occupation, 0 otherwise | 0.349 | 0.477 | 0 | 1 | 301 |
| AGRICULTURE | 1 if occupation in agriculture, 0 otherwise | 0.023 | 0.151 | 0 | 1 | 301 |
| ENVPRES | Strength of Agreement: "Protecting the environment should be a top priority for *local* communities" | 4.345 | 0.988 | 0 | 5 | 284 |
| PAYPARK | Strength of Agreement: "Users of parkway should pay to protect it" | 3.523 | 1.162 | 0 | 5 | 283 |
| UNEMPLOYIMP | 1 if unemployment most important national issue, 0 otherwise | 0.496 | 0.501 | 0 | 1 | 250 |
| EDUCATIONIMP | 1 if education important national issue, 0 otherwise | 0.908 | 0.290 | 0 | 1 | 250 |
| INCOME | Household income in $ (interval data) | $58,380 | $20,986 | $10,000 | $110,000 | 296 |
| DURATION | Length of visit in days | 1.920 | 2.407 | 0 | 30 | 300 |

| | | | | | | |
|---|---|---|---|---|---|---|
| EXPENSES | Total expenditures on visit | 202.369 | 553.890 | 0 | 5000 | 298 |
| YEARS | Number of years individual has been coming to parkway | 21.342 | 0.378 | 0 | 70 | 301 |
| AGE | Age in years | 55.437 | 14.24 | 24 | 86 | 285 |
| NUMCHILD | Number of children | 0.682 | 1.125 | 0 | 6 | 302 |
| TRAILHIGH | Equals 1 if individual chose large number of trails | -0.298 | .8763 | -1 | 1 | 296 |
| TRAILLOW | Equals 1 if individual chose small number of trails | -0.509 | .6193 | -1 | 1 | 302 |
| ACTHIGH | Equals 1 if individual chose large number of activity areas | -0.261 | .8935 | -1 | 1 | 302 |
| ACTLOW | Equals 1 if individual chose small number of activity areas | -0.503 | .6086 | -1 | 1 | 302 |
| RATEROADVIEW | Individual's rating of satisfaction with the quality of roadside views | 2.684 | 1.4839 | 1 | 5 | 302 |
| RATETRAILS | Individual's rating of satisfaction with the number of trails | 3.414 | | 0 | 5 | 288 |

A few expected results can be found in the inspection of the data. Since we survey only Parkway visitors, the average age and income of the sample appears to be larger than in traditional survey research, with an average age of 55.4 years and an average income just below $60,000 per year. The average number of children at .68 is lower than the national average given the age of our sample and the wording of our questions ("How many children under the age of 18 live in your home?).

Table A7.12 below shows the ideal Parkway attribute bundle visitors selected for the contingent valuation survey sample. In this group the respondents again selected the current level of an attribute as their ideal level 48%-62% of the time. This result is consistent with the earlier observation that respondents were generally satisfied with the quality of Parkway attributes and the choices made by the computerized choice survey sample. Overlook quality was the only attribute that had 42.7% of respondents selecting the high quality for their ideal level of that attribute. Roadside scenic quality runs a very close second with 41.4% of respondents selecting high quality views as their ideal level. It is important to note that some respondents did identify low attribute levels as ideal for

each attribute, but as expected very few did so (1.7%-6.6%). This result is expected and is also evident in the willingness to pay and accept values reported below.

Interestingly, respondents ranking attributes as *most important* give all five Parkway attributes fairly equal weights with the number of overlooks having the lowest percentage selected as *most important* (17.56%), and roadside views, trails and activity areas each selected by approximately 20% of sample as *most important* (19-23%). Overlook quality is ranked as *most important* by only 17.26% of sample. However, when we consider both the *most important* and *important* rank levels, the number of overlooks is ranked the highest by 57.8% of sample, with roadside view quality (49.9%), overlook view quality (66.9%), trails (37.5%) and activity areas (27.9%) following behind in levels of importance.

Table A7.12: Characteristic Levels selected by visitors for the contingent valuation survey, n=286

| Characteristic | Number of Overlooks | | Scenic Quality of Overlook Views | | Scenic Quality of Roadside Views | | Number of Quality Trails | | Number and Condition of Activity Areas | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Ideal Level** | | % | | % | | % | | % | | % |
| High | 81 | 26.8 | 129 | 42.7 | 125 | 41.4 | 84 | 27.8 | 91 | 30.1 |
| Current | 190 | 62.9 | 146 | 48.3 | 146 | 48.3 | 174 | 57.6 | 170 | 56.3 |
| Low | 10 | 3.3 | 5 | 1.7 | 9 | 3.0 | 20 | 6.6 | 18 | 6.0 |
| **Rank** | | | | | | | | | | |
| 1(Most Important) | 62 | 17.56% | 68 | 19.26% | 84 | 23.80% | 68 | 19.26% | 71 | 20.11% |
| 2 | 77 | 40.31% | 91 | 47.64% | 50 | 26.18% | 35 | 18.32% | 15 | 7.85% |
| 3 | 85 | 46.70% | 88 | 48.35% | 62 | 34.07% | 21 | 11.54% | 11 | 6.04% |
| 4 | 27 | 11.64% | 20 | 8.62% | 47 | 20.26% | 79 | 34.05% | 86 | 37.07% |
| 5(Least Important) | 33 | 13.75% | 19 | 7.92% | 43 | 17.92% | 79 | 32.92% | 99 | 41.25% |

Multinomial logit was used to estimate the discrete choice contingent valuation model. These results are found in Table A7.13. The coefficients of the explanatory

variables in the logit model speak to the probability of observing the variable on the left hand side. A positive variable on the right hand side leads to an increase in the probability that the left hand side variable is observed. In this case, the left hand side variable is Choice, whether the survey respondent chose to contribute the requested amount for an improvement in quality of the Parkway. We test several specifications. The generalized specification is:

$$Choice = \alpha + \beta_1 DCBID + \beta_2 Demographics + \varepsilon$$

Respondents in the CV exercise were asked to choose their "ideal levels" of the attributes number of overlooks, scenic quality of overlook views, scenic quality of roadside views, number of quality trails, and number and condition of activity areas. They were then asked to rank them in importance from most to least important. Finally, they were asked whether they would be willing to contribute a fixed sum (that varied across respondents from $5 to $200) to have their "ideal" combination of BRP attributes. We employ a multinomial logit model to estimate willingness to pay. We control for the self-chosen levels of attributes and the respondents ranking of the importance of those attributes. Table A7.13 reports the results of the flexible scenario contingent valuation estimation.

Table A7.13 Flexible scenario contingent valuation model

| Variable | Coefficient | Std Error | t-stat | P-value |
|---|---|---|---|---|
| DCBID | -0.0179 | 0.0026 | -6.961 | 0 |
| *MALE* | -0.6817 | 0.3015 | -2.261 | 0.0238 |
| *COLGRAD* | 0.6920 | 0.3767 | 1.837 | 0.0662 |
| *WHITECOLLAR* | 0.7337 | 0.3246 | 2.26 | 0.0238 |
| *AGRICULTURE* | 2.1927 | 1.1511 | 1.905 | 0.0568 |
| *ENVPRES* | -0.2326 | 0.1117 | -2.083 | 0.0373 |
| *PAYPARK* | 0.2319 | 0.1118 | 2.075 | 0.038 |
| *UNEMPLOYIMP* | -0.8057 | 0.2923 | -2.757 | 0.0058 |
| *EDUCATIONIMP* | 0.8049 | 0.2922 | 2.755 | 0.0059 |

| | | | | |
|---|---|---|---|---|
| *INCOME* | 0.0018 | 0.0011 | 1.62 | 0.1052 |
| *TRAILHIGH* | 0.5185 | 0.2818 | 1.84 | 0.0658 |
| *TRAILLOW* | -0.9255 | 0.4068 | -2.275 | 0.0229 |
| *ACTHIGH* | -0.6222 | 0.2850 | -2.183 | 0.029 |
| *ACTLOW* | 0.7564 | 0.4361 | 1.734 | 0.0828 |
| *RATEROADVIEW* | -0.0009 | 0.0014 | -0.675 | 0.4995 |
| *RATETRAILS* | 0.0020 | 0.0013 | 1.483 | 0.138 |
| Number of Observations | | 302 | | |
| Log-Likelihood | | -150.587 | | |
| Log-Likelihood(0) | | -204.108 | | |
| Mcfadden's Rho-square | | 0.26222 | | |

The results controlling for the flexible scenario are consistent with expectations. The coefficient on DCBID is negative as expected, and is significant at the α=.01 level, suggesting that individuals are less likely to contribute as the requested amount increases. Male is negative and significant at the α=.01 level. College graduates, white collar workers, and those working in agriculture are more likely to contribute. Respondents who believed that environmental protection is the responsibility of locals were less likely to contribute while those holding the view that "users of the parkway should protect it" were more likely than the sample as a whole to contribute.

Those holding the opinion that unemployment is the most important problem in America were less likely to pay to provide quality improvements. Those believing that education is the most important problem in the US were more likely to choose to protect the BRP. Income is of the correct sign, but is not significant at conventional levels.

Now we turn to the analysis of the self-selected levels of attributes – the flexible scenario. Individuals who chose higher numbers of trails than the current level were more likely to contribute. Conversely, those who chose lower levels of trails were less likely to contribute. Individuals from the sample who selected more activity areas were less likely to contribute the requested amount, while those who chose fewer activity areas were

more likely to contribute. Finally, we included the ratings of the current level of the most important attributes as determined by survey respondents. Those were the quality of roadside views and the number of trails. Both were insignificant.

Using the estimated results to calculate welfare measures, we find that the average survey respondent is willing to pay $20.89 to get his desired combination of attributes. The change in welfare is found by calculating the payment, CS, that makes an individual just indifferent between the level of indirect utility provided by the status quo, say indirect utility level $v^1$, and the level of indirect utility provided by $v^o$ is given by :

$$v^1(p^1, q^1, m - CS, z) + \varepsilon^1 = v^0(p^0, q^0, m, z) + \varepsilon^0$$

where $p^i$ represents prices, quality attributes are given by $q^i$, income is represented by $m$, and individual characteristics are given by $z$. Solving for CS gives:

$$CS = \frac{1}{\beta_{DCBID}}\left(status\ quo\ utility - utility\ of\ new\ policy\right)$$

The change in welfare from the status quo to that provided by the individual's desired improvement in Parkway scenic quality is given by CS and is also known as willingness to pay or WTP.

Both contingent valuation models above include the data from the paper and computer formats of the field surveys. To test for differences between the predicted choices in each model, a dummy variable, PFORMAT, was set equal to one if the data

were from the paper version of survey and zero otherwise. This variable was included in specifications of Models 1 and 2 above and was never found to be significant at any conventional level, indicating no difference between the datasets. The variable PFORMAT was subsequently dropped from further consideration.

## *Appendix 8: Contingent Choice Model*

*Change in Visits Model and Visit Expenditures*

Now we turn to the examination of the contingent behavior data. We employ a count data modeling framework to examine the contingent behavior decisions. In this survey, as with the choice and contingent valuation surveys, individuals are queried about their perceptions of the BRP experience, their rankings of the importance of BRP attributes, and their expenditures. They are then asked to provide an accounting of the number of visits in the past year and whether they expect to visit more or less next year. In the contingent behavior data, our baseline or status quo is the subject's statement about the expected number of visits next year if scenic quality remains at the current level. We then analyze the impact of a decline in quality and an improvement in quality on the visitors expected level of visitation in the next year. Table A8.1 summarizes the results from the three estimates

Table A8.1: The predicted change in the number of annual visits from changes in scenic view quality.

| **View Quality n=278** | **Predicted Number of visits** | **Change in visits per year** |
|---|---|---|
| Current Level | 4.551 | na |
| All Medium views decrease to Low quality views | 3.992 | .559 |
| ½ the low and some medium views increase to high quality views | 5.164 | .613 |

In Table A8.1 we see that visitors are expected to visit the southwest Virginia section 4.5 times next year. If scenic quality declines visitors reported that they would reduce their visits by .559 on average, and they would increase their visits by .613 if scenic quality increased. Tables A8.2-A8.4 present the model results for each case.

Table A8.2: Estimated visits to the southwest Virginia section of the Blue Ridge Parkway next year when scenic quality remains at the current level

| (Dependent variable=TIMES) | | | | |
|---|---|---|---|---|
| Variable | Coeff | Std.Error | T-stat | Mean of X |
| Constant | 0.3066 | 0.141 | 2.172 | |
| *FEMALE* | -0.0187 | 0.002 | -8.419 | 0.475 |
| *AGE* | 0.0188 | 0.002 | 9.115 | 50.553 |
| TOTEXP | -0.0002 | 0.000 | -2.887 | 364.811 |
| *YEARS* | 0.0142 | 0.002 | 7.248 | 23.296 |
| Number of Observations | 278 | | | |
| Log-Likelihood | -1899.637 | | | |
| Log-Likelihood(0) | -1985.793 | | | |
| Predicted number of trips | 4.551 | | | |

The average number of predicted trips in the status quo scenario (no change in conditions) for the sample is 4.55 trips per year. Trips increase with age and past experience with the BRP, as evidenced by positive significant coefficients on AGE and YEARS. Trips are will decline as the cost of trips (TOTEXP) increases or if the respondent is female.

Next we examine the case in which all of the moderate quality views decrease to low quality views. These results are reported in Table A8.3. The coefficients are significant and of the same signs as in the status quo case. In this instance, the predicted number of trips declines to 3.99 as expected. The average individual is less likely to take trips in the future as the quality of views is degraded.

Table A8.3: Estimated visits to the southwest Virginia section of the Blue Ridge Parkway next year with a decline in scenic quality.

| (Dependent variable=NEWVIS4) | | | | |
|---|---|---|---|---|
| Variable | Coeff | Std.Error | T-stat | Mean of X |
| Constant | 0.0948 | 0.152 | 0.623 | |
| *FEMALE* | -0.0187 | 0.002 | -7.876 | 0.475 |
| *AGE* | 0.0188 | 0.002 | 8.468 | 50.553 |
| *TOTEXP* | -0.0002 | 0.000 | -2.669 | 364.811 |
| *YEARS* | 0.0177 | 0.002 | 8.449 | 23.296 |
| Number of Observations | 278 | | | |
| Log-Likelihood | -1896.447 | | | |
| Log-Likelihood(0) | -1980.187 | | | |
| Predicted number of trips | 3.992 | | | |

Table A8.4 presents the case where half of the low quality and some of the moderate quality views improved resulting half high quality views. All variables are significant and of the correct signs as above. The predicted number of trips with improve views increases to 5.164 per survey respondent per year.

Table A8.4: Estimated visits to the southwest Virginia section of the Blue Ridge Parkway next year with an increase in scenic quality

| (Dependent variable=NEWVIS6) | | | | |
|---|---|---|---|---|
| Variable | Coeff | Std.Error | T-stat | Mean of X |
| *Constant* | 1.0030 | 0.098 | 10.216 | |
| *FEMALE* | -0.0134 | 0.002 | -6.999 | 0.475 |
| *AGE* | 0.0137 | 0.002 | 7.833 | 50.553 |
| *TOTEXP* | -0.0002 | 0.000 | -3.701 | 364.811 |
| *YEARS* | 0.0018 | 0.001 | 3.330 | 23.296 |
| Number of Observations | 278 | | | |
| Log-Likelihood | -1965.929 | | | |
| Log-Likelihood(0) | -2027.941 | | | |
| Predicted number of trips | 5.164 | | | |

Table A8.5 presents the travel expenditures data by geographic region. Note that as expected the travel expenditures per day are highest for visitors from areas more

distant from the Parkway, especially those from the "other" category and South Carolina. Visitors from farther away also spend more days on the Parkway during each visit with mean days per visit between 2.4 and 3.4, thus increasing their trip costs. Expenditure patterns are also consistent with the earlier study by Brothers and Chen (1997).

Table: A8.5: Mean Visitor Expenditures by Geographic Region

| Region<br><br>n=278 | # of visitors | Lodging | % | Food | % | Souvenirs and retail | % | Gas and travel | % | other | % | Total cost this visit | Total cost per day | Mean number of days this visit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NC 27 | 75 | **$ 77.58** | 22.19% | $ 112.71 | 32.24% | $ 56.91 | 16.28% | $ 71.73 | 20.52% | $ 30.71 | 8.78% | $ 349.64 | $ 213.06 | 1.6 |
| NC 28 | 20 | $ 41.33 | 26.11% | $ 46.67 | 29.48% | $ 11.00 | 6.95% | $ 27.00 | 17.06% | $ 32.29 | 20.40% | $ 158.29 | $ 67.84 | 2.3 |
| VA 23 | 8 | $ 199.38 | 42.42% | $ 122.50 | 26.06% | $ 41.88 | 8.91% | $ 45.00 | 9.57% | $ 61.25 | 13.03% | $ 470.00 | $ 229.93 | 3.4 |
| VA 24 | 89 | $ 31.73 | 15.67% | $ 100.05 | 49.40% | $ 29.19 | 14.41% | $ 29.21 | 14.42% | $ 20.33 | 10.04% | $ 202.55 | $ 182.43 | 1.3 |
| SC 29 | 3 | $ 234.00 | 36.85% | $ 191.67 | 30.18% | $ 56.67 | 8.92% | $ 86.00 | 13.54% | $ 66.67 | 10.50% | $ 635.00 | $ 417.50 | 1.7 |
| FL 32 | 11 | $ 111.82 | 38.20% | $ 86.36 | 29.50% | $ 16.82 | 5.75% | $ 46.82 | 15.99% | $ 30.91 | 10.56% | $ 292.73 | $ 103.91 | 3.4 |
| other | 72 | $ 220.94 | 35.63% | $ 129.03 | 20.81% | $ 115.46 | 18.62% | $ 124.68 | 20.10% | $ 64.61 | 10.42% | $ 620.18 | $ 290.81 | 2.4 |
| VB Full sample | 278 | $104.88 | 24.12% | $111.10 | 30.12% | $58.72 | 15.92% | $67.85 | 18.39% | $ 38.14 | 10.34% | $ 368.97 | $ 216.31 | 1.91 |
| Project Full Sample | 821 | na | na | na | na | na | na | na | na | na | na | $ 245.92 | $ 149.33 | 1.96 |
| Brothers et al. 95-96 sample* | 276 | $ 99.44 | 37% | $ 87.13 | 33% | $ 14.27** | 5% | $ 44.83 | 17% | na | na | $ 264.08 | $ 112.85 | 2.34 |

*Includes only non-resident visitors and values are quoted in 1995/6 dollars
**Includes only souvenirs

*Change in Visitor Expenditures when Scenic Quality Changes*

Next we consider the impact on neighboring communities from the change in visitation to this section of the Parkway that occurs with changes in scenic quality. This allows us to understand the returns communities receive if they invest in their scenic quality, or the loss they incur if they do not.

Table A8.6 shows the detailed responses to the survey questions for each of the four cases of scenic quality decline (Q11-Q14) and the two cases of scenic quality increase (Q16-Q17). In this Table we see that as the change in scenic quality continues to worsen more respondents are willing to change their number of visits. This response

increases from 26% to 41% of the respondents. Furthermore, with improvements in quality we see increases in the proportion of respondents willing to change their visits when the level of improvement increases (33% - 42%).

In addition the rate of response does not differ significantly when considering the three regions (NC (27), VA (24) and other) that hold the majority of visitors (87%). Only the "other" group varied in their response to change visits when improvements were presented (26.5% as compared to range of 35%-44% (Q16- 35%-38% and Q17 – 44%-47%)) for each improvement scenario. This is to be expected given this group travels farther and as noted earlier, all visitors consider the Parkway very satisfactory already.

Table A8.6: The Visitor's Changes in Visits in Response to Scenic Quality Changes by Geographic Region

| **Region (n=278)** | **# visitors** | **Mean TC** | **TC per day** | **Q10a1 # next Yr** | **A (Q11)** ½ moderate ↓ low | | **B (Q12)** ½ high ↓ moderate | | **C(Q13)** 1/5 high ↓ low | | **D (Q14)** All moderate ↓ low | | **E (Q16)** All low ↑ moderate | | **F (Q17)** ½ low & some moderate ↑ high | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **# yes** | **# visits** | **# yes** | **# visits** | **# yes** | **# visits** | **# yes** | **# visits** | **# yes** | **# visits** | **# yes** | **# visits** |
| NC 27 | 75 | 317.74 | 188.82 | 72 | 18 | 2.8 | 26 | 2.3 | 25 | 1.7 | 34 | 1.4 | 28 | 4.6 | 34 | 5.6 |
| NC 28 | 20 | 138.33 | 65.06 | 18 | 5 | 0 | 6 | 1.8 | 5 | 2.2 | 9 | 0.4 | 6 | 2.2 | 11 | 5.8 |
| VA 23 | 8 | 470.00 | 229.93 | 7 | 4 | 0.6 | 4 | 0.3 | 4 | 0 | 4 | 0 | 2 | 2 | 5 | 2.1 |
| VA 24 | 89 | 202.55 | 182.43 | 89 | 22 | 4.9 | 23 | 4 | 24 | 2.3 | 32 | 2 | 32 | 6.9 | 40 | 7 |
| SC 29 | 3 | 635.00 | 417.50 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| FL 32 | 11 | 292.73 | 103.91 | 3 | 1 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 0 |
| Other | 72 | 620.18 | 290.81 | 49 | 13 | 2.4 | 15 | 1.6 | 14 | 1.6 | 19 | 0.4 | 13 | 2.3 | 13 | 2.3 |
| VB Full sample | 278 | 353.10 | 209.85 | 241 | 63 | 3.1 | 75 | 2.5 | 73 | 1.9 | 100 | 1.3 | 81 | 4.8 | 103 | 5.5 |
| Project full sample | 821 | 245.92 | 149.33 | na | na | na | na | na | na | na | na | na | na | na | na | na |

Using the information from A8.6, if we assume that the number of days visitors will visit next year and an average party size of 3.32 visitors per party[27] are the same as this year,, and we use the average proportion of visitors across all regions expected to change their number of visits, we can estimate the change in visitor expenditures along the Parkway as a result of scenic quality changes. Tables A8.7 and A8.8 summarize these

results showing the estimated change in visits and expenditures along the Parkway from scenic quality changes.

In Table A8.7 we see that in 2000 visitors in this sub-sample[28] visited the Parkway on average 2.45 times per year. A portion of our sample, 87%, (survey version B) stated they expected to visit next year on average 4.74 times per year, if there is no change in Parkway scenic quality. Thus, with no change in scenic quality visitors are expected to increase their visitation on average by 2.29 visits next year. Our statistical model above estimated this expected increase at 2.09 visits next year. Note, this increase applies only to the proportion of visitors stating they will be returning next year (87%).

If Parkway view quality declines such that ½ of the moderate views decrease to low quality views, 26% of sample stated a different level of expected visits next year at 3.1 visits on average. Thus with a decrease in scenic quality, the expected increase in visitation from this years average of 2.45 for next year decreases to .65 visits (3.1 – 2.45) as compared to the 2.29 (4.74 – 2.45) visits without a change in scenic quality (see column 6 in the Table below). In the last two cases of scenic quality decline, visitors' expected visits next year actually decrease compared to this year. Our results suggest that decreasing scenic quality does not necessarily lead directly to a decrease in the visitation levels, but rather slows the level of increase in visitation for next year. Only if scenic quality changes are significant, as in cases C and D, do we see actual declines in visitation levels compared to this year. Improving scenic quality increases the rate of increase in visitation as seen in cases E and F below. Again note that these visitation

[27] Brothers and Chen 1997.
[28] The version B survey respondents

changes only apply to a proportion of returning visitors depending on the size and direction of change in scenic quality (26% - 42%).

We also examine the change in visitation using the model estimates given above. The results are similar except for case D, where an overall increase in visits as compared to this year is estimated ( 2.45 → 3.92 visits).

Table A8.7: Change in Visits Next Year Given a Change in Scenic Quality

| Scenic Quality change | Proportion of parties that change visits | # visitor parties[b] | Mean visits this year | # of visits next year | Change in # visits next year[a] |
|---|---|---|---|---|---|
| No change | 0.866 | 1064666.83 | 2.45 | 4.74 | 2.29 |
| **A** ½ moderate ↓ low | 0.26 | 276813.38 | 2.45 | 3.1 | 0.65 |
| **B** ½ high ↓ moderate | 0.31 | 330046.72 | 2.45 | 2.5 | 0.05 |
| **C** 1/5 high ↓ low | 0.3 | 319400.05 | 2.45 | 1.9 | -0.55 |
| **D** All moderate ↓ low | 0.414 | 440772.07 | 2.45 | 1.3 | -1.15 |
| **E** All low ↑ moderate | 0.336 | 357728.06 | 2.45 | 4.8 | 2.35 |
| **F** ½ low & some moderate ↑ high | 0.427 | 454612.74 | 2.45 | 5.5 | 3.05 |
| **Model estimate** | | | | | |
| No change | 0.866 | 1064666.83 | 2.45 | 4.55 | 2.10 |
| **D** All moderate ↓ low | 0.414 | 440772.07 | 2.45 | 3.92 | 1.47 |
| **F** ½ low & some moderate ↑ high | 0.427 | 454612.74 | 2.45 | 5.164 | 2.71 |

a - as compared to this year.
b-we assume our sample proportions are representative of the general group of Parkway visitors, that there are 7,600,000 visitors to this section with 3.32 visitors per party yielding 2,289,156.6 party visits per year, visiting 2.45 times per year yielding 934,349.6 parties, and that the number of days visiting does not change. The percent of parties who change their visits are based upon the number of parties that are returning next year, 86.6% of all visitor parties.

To calculate the impact on visitor expenditures, seen in Table A8.8 below, we make several assumptions as noted above. We use two estimated values for average visit expenditures, a lower value based upon our full project sample and a larger value based upon the survey version B sample, $200.69 and $312.84 respectively. Both values

exclude gas and travel expenditures as much of these likely occur outside the region. The calculations presented show first the growth in expenditures that may occur if scenic quality remains the same. These estimates range from $371 million to $579 million depending on the average trip value and the estimation procedure used.

If scenic quality declines as in case A, expenditure growth decreases by $69 million to $107 million. In cases C and D, where a decline in visitation compared to current levels occurs, we get a much larger decline in expenditure growth ranging from $42 million to $360 million, again depending on the expenditure values used and the estimation procedure used. When scenic quality increases we see growth levels larger than the no change case by $3 million to $132 million.

Estimating the impact of changing scenic quality is a very difficult task. As shown from the table below, the magnitude of change can vary significantly depending on the level of trip expenditures we use and the estimation procedure used. If we consider a most conservative estimate our results suggest that declining quality on the Parkway may result in a decline in expenditure growth by $42 million dollars and increasing quality on the Parkway may lead to an increase in expenditure growth by $3 million.

In summary, the results suggest that declines in quality have a larger impact on Parkway expenditures than improvements in quality. This result is consistent with results found earlier in this study that visitors are generally satisfied with Parkway conditions and do not want to see declines in conditions.

Table A8.8: Summary of the Change in Visitor Expenditure from Scenic Quality Changes*

| Scenic Quality change | Change in expenditure/ visitor[a] | Visitor expenditure growth | Change in expenditure growth | Change in expenditure/ visitor[b] | Visitor expenditure growth | Change in expenditure growth |
|---|---|---|---|---|---|---|
| no change | $716.40 | $579,675,674.18 | | $459.58 | $371,867,763.24 | |
| **A** ½ moderate ↓ low | $203.35 | $471,739,557.38 | -$107,936,116.80 | $130.45 | $302,625,660.95 | -$69,242,102.29 |
| **B** ½ high ↓ moderate | $15.64 | $403,899,784.16 | -$175,775,890.02 | $10.03 | $259,105,765.51 | -$112,761,997.73 |
| **C** 1/5 high ↓ low | -$172.06 | $364,005,947.37 | -$215,669,726.81 | -$110.38 | $233,513,468.79 | -$138,354,294.44 |
| **D** All moderate ↓ low | -$359.77 | $219,173,094.21 | -$360,502,579.97 | -$230.79 | $140,601,739.79 | -$231,266,023.45 |
| **E** All low ↑ moderate | $735.17 | $584,778,845.18 | $5,103,171.00 | $471.62 | $375,141,498.65 | $3,273,735.42 |
| **F** ½ low & some moderate ↑ high | $954.16 | $661,822,551.81 | $82,146,877.63 | $612.10 | $424,565,809.75 | $52,698,046.52 |
| Model estimate | | | | | | |
| No change | $656.96 | $531,580,312.56 | | $421.45 | $341,014,106.02 | |
| **D** All moderate ↓ low | $459.87 | $465,558,037.74 | -$66,022,274.82 | $295.01 | $298,660,154.06 | -$42,353,951.97 |
| **F** ½ low & some moderate ↑ high | $849.05 | $597,946,342.65 | $132,388,304.91 | $544.67 | $383,588,580.45 | $84,928,426.39 |

a-Assumes $312.84/visit b-Assumes $200.69/visit The expenditure figures include all visitor expenditure categories except gas and travel as much of this likely occurs outside the region. *We assume our sample proportions are representative of the general group of Parkway visitors, that the number of days visiting does not change, and that there are 7,600,000 visitors to this section with 3.32 visitors per party yielding 2,289,156.6 party visits per year, visiting 2.45 times per year yielding 934,349.6 parties.

Finally, in Tables A8.9 and A8.10 we show respondents' reasons for stating they would not return next year and the scenic conditions respondents identified that would lead them to stop coming to the Parkway. In the first case only 36 (12.9% of this survey sample) visitors stated they would not be returning next year. Of these only 12 noted that this was their only intended visit to the Parkway. 6 were to visit other sections and 18 had other reasons for not returning.

Table A8.9: The Reasons Visitors Stated That They Would Not Return Next Year

| Reasons (n=278) | # selecting this reason for not returning next year |
|---|---|
| Only visit to parkway | 12 |
| Visit other sections | 6 |
| Other | 18 |
| Total no's | 36 |

In Table A8.10 it is interesting to note that very few visitors will completely stop coming to the Parkway. 30.5% of the sample did not respond to this question, 16.5% said they would not change their visits under any of the proposed conditions. Only 15.4% of this survey sample (n=278) stated they would stop visiting the Parkway if *½ the high quality views were reduced to low*. Only 4.6% stated they would stop if their favorite view changed. These results suggest that even if 50% of the high quality views are reduced to the low, 85% of visitors will continue to visit the Parkway, assuming this sample is representative of all Parkway visitors[29] to this section. The proportion of visitors willing to stop visiting the Parkway decreases as the level of change diminishes.

Table A8.10: The scenic conditions that would cause visitors to completely stop coming to the Parkway

| Scenic Conditions (n=278) | # selecting this reason # | % |
|---|---|---|
| No response | 85 | 30.5 |
| No change in visits | 46 | 16.5 |
| ½ High ↓ to Low | 43 | 15.4 |
| All high ↓ to Moderate | 29 | 10.4 |
| All Moderate ↓ Low | 28 | 10.1 |
| ½ Moderate ↓ to Low | 22 | 7.9 |
| Favorite View changes | 13 | 4.6 |
| Other | 11 | 3.9 |

[29] This sub-sample (Version B, n=278) is very similar in all aspects of their demographics to the full sample of 848 respondents.

## *Appendix 9: Choice Modeling Primer*

Calculation of Part Worths or Implicit Prices

We can take the estimated coefficients from the multinomial logit regression (Table A7.3) that is used to estimate the choice model and use them to calculate implicit prices, or part-worths, for each variable with respect to all of the other variables in the model. Table A7.3 reports the results of estimates of the following model (demographics are suppressed):

$$\begin{aligned} Choice = const + \beta_1 PMT + \beta_2 Overlook + \beta_3 Lookhigh + \beta_4 Looklow + \beta_5 Roadhigh \\ + \beta_6 Roadlow + \beta_7 Numtrail + \beta_8 Actarea + \beta_9 DEMOGRAPHICS \end{aligned} \quad \text{(A9.1)}$$

In theory, the implicit price (part-worth) is the negative of the ratio of any two of the $\beta$'s and provides the measure of tradeoffs that individuals in the sample would be willing to make between those two variables that is implied by the data. Further, that tradeoff is made while holding utility constant. The implicit price, then, is the marginal rate of substitution between two goods upon which indifference curves are based. Figure A9.1 provides an illustration.

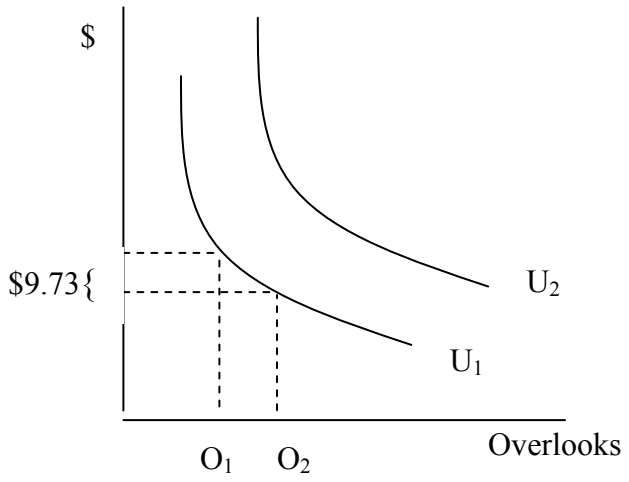


**Figure A9.1. Indifference curves and the Marginal Rate of Substitution**

Figure A9.1 provides an illustration of the concept of indifference curves in economic analysis. The curves $U_1$ and $U_2$ are indifference curves. Each curve shows the various combinations of income and number of overlooks for which an individual has the same level of utility, or well being. In other words, an individual may be indifferent between having a large amount of income and very few overlooks and an alternate situation where he has a smaller amount of income and more overlooks. An individual would be indifferent between combinations on a given indifference curve, say $U_1$, but would prefer $U_2$ to $U_1$, because $U_2$ offers a higher level of utility.

Using the estimated coefficients from Table A7.3 and the example reported in the main document,

$$Part-worth = -\left(\frac{\beta_{OVERLOOK}}{\beta_{PMT}}\right)$$

$$Part-worth = -\left(\frac{0.037}{0.004}\right)$$

$$Part-worth = -\$9.73$$

The calculation of $-9.73 is the amount of income that an individual would be willing to forego to gain an increase of one overlook (from the current level of 23 overlooks).[30] It is represented in Figure A9.1 as a movement along indifference curve $U_1$ as individuals are exposed to an increase in overlooks from $O_1$ to $O_2$. This is the rate at which individuals will substitute overlooks for income and is the slope of an indifference curve. Note that economists typically estimate this marginal rate of substitution at a specific point along an indifference curve. In our data, which only includes discrete shifts in the amount of overlooks, we are essentially calculating MRS along an arc, or segment of the indifference curve between $O_1$ and $O_2$.

Calculating Compensating Variation Measures

We can use the estimates from equation A9.1 above to calculate utility-theoretic estimates of changes in welfare. The implicit prices reported above are useful to gain insight about the importance of attributes to individuals, but they do not take into account the change in well being, or welfare that would likely come from an increase or decrease in the level of an attribute.

This is not a fault of implicit prices and the MRS concept, but merely a different way to think about tradeoffs.

[30] See Table 17 in main report.

From an economist's perspective, the value of a policy change, such as a program to increase the number of overlooks in the BRP, is the change in the economic welfare of the users of the Parkway as the number of overlooks increase. This is calculated as an economic surplus measure. There are various versions of this surplus measure that are appropriate given different specifications of property rights to the change in question, and whether the individual can readjust consumption bundles after the change.[31] All versions of the measure calculate an individual's willingness to pay, or willingness to accept, to move between different indifference curves, i.e., the tradeoff she is willing to make to move from her initial level of utility to the level of utility implied by the change in trails (or any environmental change).

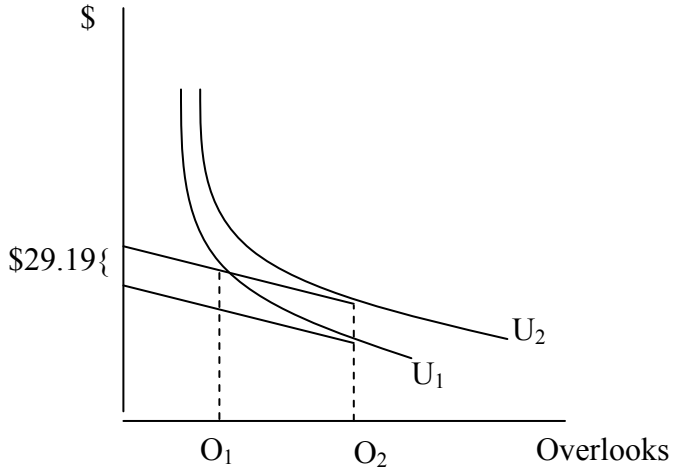


**Figure A9.2. Calculation of Welfare Measures**

Figure A9.2 gives the Hicksian *compensating surplus* measure. It represents an individual's willingness to pay to move from $O_1$ to $O_2$ level of overlooks assuming he has

[31] See Freeman (1993) for a comprehensive treatment of the surplus measures.

no property right to the change and he cannot optimally readjust his consumption bundle. It represents the increase in well being of having more overlooks assuming that one is not entitled to more overlooks, but an increased number is provided. It can be thought of the income adjustment necessary to leave him as well off after the change as he was before the change, i.e., a payment of $29.19 would take him back to his initial level of utility, $U_1$. We can use the Hicksian *compensating variation* measure if we can assume that the individual could readjust to the policy change.

All of the welfare measures calculated in the report follow the procedures outlined below. To calculate welfare, we must calculate the welfare an individual would have when faced with each unique combination of attributes. Any change in the level of an attribute or combination of attributes will change utility.

We calculate utility directly from the parameters estimated in equation A9.1 and the levels of each of the attributes for each scenario we wish to evaluate. For example, the utility of the status quo in the paper version of the choice model (Table A7.3) is given by:

$$\begin{aligned} Util\ \ of\ \ SQ\ \ &= -.004\ \ PMT\ \ + .037\ \ SQOverlook\ \ \ \ + .26\ \ SQLookhigh \\ &- .660\ \ SQLooklow\ \ \ \ - .285\ \ SQRoadHigh \\ -.882 SQRoadlow &+ +.021 Numtrail + 1.137 SQActarea + \beta_9 DEMOGRAPHICS, etc \end{aligned} \quad \text{(A9.2)}$$

Where SQ* represents the status quo level of each attribute. Then one performs a similar calculation for each alternative scenario of interest. For each alternative, merely insert the levels of the attributes that are appropriate for the alternative. Then, the surplus measures can be calculated using the formula:

$$CS = -\frac{1}{\beta_{PMT}}\left(status\ quo\ utility - utility\ of\ new\ policy\right) \qquad \text{(A9.3)}$$

If we are calculating welfare with a choice model we can change the levels of attributes in any combination, even if those combinations did not appear as options within the choice sets.

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