E C O N O M I C S B U L L E T I N

Estimating nonuse values using conjoint analysis

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Abstract

Conjoint analysis is a stated−preference technique for eliciting valuations of nonmarket, multi−attribute commodities. Recently it has begun to be used in environmental economics as an alternative to contingent valuation. In applications to environmental economics, though, conjoint analysis has been used to estimate use values or total values—the sum of use and nonuse values. We show a simple way to estimate the value of a resource to those who should have only nonuse values and illustrate using two surveys about national parks in Maine.

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1. Introduction

Conjoint analysis is a stated-preference technique for eliciting valuations of nonmarket, multi-attribute commodities. Recently it has begun to be used in environmental economics as an alternative to contingent valuation (Mackenze 1993; Adamowicz, Louviere, and Williams 1994; Segal 1995; Roe, Boyle, and Teisl 1996; Garrod, G.D. and K.G. Willis 1997; Stevens, Barrett, and Willis 1997; Adamowicz, Boxall, and Williams 1998; Stevens *et al* 2000; Earnhart 2001; Haefele and Loomis 2001; Hanley, Mourato, and Wright 2001; Baarsma 2003; Alberini *et al* 2003). In applications to environmental economics, conjoint analysis has been used to estimate use values or total values—the sum of use and nonuse values (McConnell 1983; Walsh, Loomis, and Gillman 1984). We show a simple way to estimate the value of a resource to those who should have only nonuse values and illustrate using two surveys about national parks in Maine.

The U.S. National Park System provides multiple benefits to the nation's citizens. In addition to the recreational benefits received by visitors, many citizens get nonuse benefits from the parks. That is, they get utility from the existence of the parks, even though they may never plan to visit them. These nonuse values are central to the economic justification of national parks (Turner 2002) and efficient management of the parks should take into account the impact on nonuse values of visitor activities and park management decisions.

This paper reports on two surveys that use conjoint analysis to estimate whether there are significant nonuse values for two parks in Maine and what features of the parks generate these values. The surveys also allow the estimation of nonuse values generated by the economic impact of the parks on the surrounding communities. Although the evidence is preliminary, the results strongly suggest that conjoint analysis can identify nonuse values.

The first of our surveys addresses a proposed new Maine North Woods National Park and Preserve. This proposal has turned out to be quite controversial, with many local residents arguing vehemently against it. An important question, therefore, is whether other residents of Maine and of the rest of the country would get sufficient use and nonuse values from the park to override the local objections. An advantage of analyzing a park that does not now exist is that it minimizes the likelihood of embedding on the part of survey respondents. Embedding is when the value respondents claim, in hypothetical scenarios, to have for a particular place is in fact the value they have for similar places in general. For example, respondents may give their value for preserving national parks in general instead of a particular park. Since it is clear that the Maine North Woods National Park and Preserve would be an addition to the existing park system, it is likely that respondents are giving their valuations of the new park only.

The subject of our second survey is Acadia National Park, one of the most visited parks in the National Park System. Park managers face several difficult problems, however, in balancing the importance of preservation of natural features and wildlife of the park, desires of visitors, and impacts on residents of surrounding communities. As with the North Woods park, the magnitude of nonuse values is an important piece of information for efficient management.

The next section of the paper describes the conjoint analysis method. Then we report the results of our two surveys. We conclude with observations about what we have learned about the Maine parks and about the conjoint analysis method.

2. Conjoint Analysis

In a conjoint analysis, survey respondents are asked to rate scenarios. Each scenario is made up of varying levels of a collection of attributes. One of the attributes is a payment of some kind. Every respondent is given multiple scenarios to rate (5 in our surveys), one of which is the status quo. Respondents' ratings can be used to measure their marginal willingness to pay for different attributes. Changes in consumer surplus created by changes in attributes can also be calculated.

The theoretical underpinnings of the conjoint analysis model begin by relating the rating individual *j* gives to a scenario *i* to the utility she receives, which is represented by an indirect utility function that depends on the price associated with scenario *i* , scenario characteristics **a**, the individual's income *I*, and individual characteristics **x**:

$$r^{ij}\left(P^i, \mathbf{a}^i, I^j, \mathbf{x}^j\right) = \phi\left(V\left(P^i, \mathbf{a}^i, I^j, \mathbf{x}^j\right)\right). \quad (1)$$

The function ϕ is a transformation function mapping indirect utility into ratings. Following Roe, Boyle, and Teisl (1996) and Stevens, Barrett, and Willis (1997), we will use a ratings difference model where the dependent variable is the difference between the rating individual *j* gives to scenario *i* and the rating individual *j* gives to the scenario representing the status quo:

$$r^{ij}\left(P^i, \mathbf{a}^i, I^j, \mathbf{x}^j\right) - r^{0j}\left(P^0, \mathbf{a}^0, I^j, \mathbf{x}^j\right) = \phi\left(V\left(P^i, \mathbf{a}^i, I^j, \mathbf{x}^j\right)\right) - \phi\left(V\left(P^0, \mathbf{a}^0, I^j, \mathbf{x}^j\right)\right). \quad (2)$$

Equation (2) can be estimated once it is parameterized; individual *j*'s marginal willingness to pay (MWTP) for a change (away from the status quo) in attribute a_k is found by implicit differentiation:

$$\frac{\partial P}{\partial a_k} = -\frac{\partial r^{ij} / \partial a_k}{\partial r^{ij} / \partial P}. \quad (3)$$

Depending on the parameterization of the model, this MWTP may or may not depend on individual characteristics.

3. Maine North Woods National Park and Preserve: Description

The subject of our first survey is the proposed Maine North Woods National Park and Preserve in northern Maine. Supporters of this initiative argue that the park's creation will provide protection for imperiled wildlife; restore and protect forestlands and the water quality of rivers and lakes that have been damaged by years of clear-cutting, herbicidal spraying, and road building due to logging practices; ensure access to and continuation of recreational activities such as hiking, camping, boating, and fishing within park confines, and guarantee access to hunting, trapping, and snowmobiling within preserve acreage; create for the residents of Maine further economic opportunities in tourism, park management, and in managed, sustainable logging; and curb the recent trend of large amounts of land changing hands from historic logging companies, known for maintaining the woods as forest land, to out-of-state investment groups geared towards short-term profits and development.

The supporters of the park initiative are having a tough time convincing Maine residents, however. Various groups are adamantly opposed to the government purchase of land for the creation of a National Park and Preserve. Among their arguments are that the state government already owns enough property to ensure public access to lands; an increased amount of federally owned land may jeopardize the rights of private property owners; the Park and Preserve must be financed through federal taxes, making every citizen help pay for a park that few may ever visit; hunting, trapping, and snowmobile rights may diminish with the establishment of the park; a

large influx of tourists coming to the park would create congestion and pollution; and the creation of the park would diminish the logging industry, which has supported the northern Maine economy for hundreds of years, with many Maine citizens working in the forests and mills.

Both the proponents and opponents of the park are arguing about both use values and nonuse values of the park. We constructed a survey instrument to shed light on the magnitudes of both kinds of values, but we were especially interested in identifying nonuse values. So we included, among the series of demographic and attitudinal questions that each respondent was asked to answer in addition to rating five scenarios (including the status quo), the following question: "Have you in the past visited or do you plan to visit and/or recreate in the Maine North Woods?" If respondents who answer negatively to this question demonstrate positive willingness to pay for the proposed park, they must have nonuse values for it. Answers by respondents who answer the visitation question affirmatively presumably reflect both use and nonuse values. So, while the aggregate nonuse values of visitors and nonvisitors cannot be estimated separately from use values, nonvisitors' responses can show whether nonuse values exist and what factors influence them.

4. The Maine North Woods National Park and Preserve: The Survey Instrument

The survey was designed and pretested based on the Total Design Method (Dillman 1978). The survey contained a cover letter and two-page introduction describing the proposed park, summarizing the arguments made by both proponents and opponents, and giving some information about the current state of the Maine north woods; definitions of and descriptions of the attributes used in the scenario (see Table I); the scenario ratings form (see Table II); and demographic and attitudinal questions, including whether the respondent has visited or plans to visit the Maine North Woods.

A final version of the survey was mailed to 1000 individuals; follow-up reminder postcards were sent after about a month and replacement surveys were sent to those who had not responded by 2-3 weeks after the postcard was sent. Of the 1000 surveys sent, 400 went to randomly selected residents of Maine, 300 to randomly selected residents of the rest of the New England states, and 300 to randomly selected residents of the rest of the United States. 61 surveys were returned as undeliverable; 164 were returned with at least one scenario in addition to the status quo rated. Since each respondent rated up to four scenarios in addition to the status quo, there were potentially 656 observations in the sample; because of missing data, the actual final sample size is 631.

5. The Maine North Woods National Park and Preserve: Results

Assuming a linear ratings function,

$$r^{ij} = \theta + \alpha P^i + \mathbf{a}^i \beta + \gamma I^j + \mathbf{x}^j \delta + \varepsilon^{ij}, \qquad (4)$$

the difference between respondent *j*'s ratings of scenario *i* and the status quo scenario is a function only of the attribute levels of scenario *i*. Any individual-specific characteristics get differenced out and the effects of the attribute levels of the status quo scenario become the intercept term. The marginal willingness to pay for a change in an attribute is measured as the negative of the ratio of the coefficients on that attribute and on the annual tax; for example, the estimated MWTP for a larger park is the negative of the ratio of the coefficients on park size and the annual tax. Preliminary results suggest that our conclusions are not changed markedly by

using more general ratings functions including those for which individual characteristics can affect valuation.

Table III shows coefficient estimates resulting from estimating a double-hurdle tobit model using the whole sample and using subsamples defined by respondents' answers to the visitation question. Since the access attribute has five levels and the development attribute four, sets of dummy variables are used in each case. The omitted category for access is the "no change" attribute level while the omitted category for development is "very large increase." The survey asked respondents to rate each scenario from 1 to 9, with 1 being highly desirable and 9 being highly undesirable, so for ease of interpretation we defined the ratings difference to be $r^{0j} - r^{ij}$. Thus positive values indicate that scenario *i* is rated higher than the status quo scenario. Positive coefficients on attributes indicate that the attribute is desirable. The dependent variable ranges from –8 to 8; its censored nature at both ends is the reason for using a double-hurdle tobit model.

The coefficient estimates for the pooled sample, using all 631 observations, mostly have the expected sign. A higher tax payment reduces the rating of a scenario; this effect is statistically significant at the one percent level. Larger parks and larger portions managed as national parks (thus providing more wilderness protection) are desirable; these effects are statistically significant at the five percent level. None of the estimated coefficients on the access variables or on the number of logging jobs lost or the number of tourism jobs gained is statistically significant. Smaller increases in development are successively more desirable; the coefficients on the dummy variables representing a moderate increase in development and a slight increase in development are each statistically significant at the one percent level. Finally, though more congestion leads to a lower rating, the effect is not statistically significant.

The magnitudes of the implied MWTP for park size and the national park portion of the park and preserve seem reasonable: the MWTP per person for an increase in park size of 3000 acres, which is approximately one percent of the park size being suggested by proponents, is about 12 cents, while the MWTP for an increase of 10 percent in the portion of land given the highest level of protection is about 14 dollars per person. On the other hand, the MWTP to have moderate instead of a very large increase in development is over $180 per person.

These estimates, however, are estimates of total value, including both use and nonuse values. By splitting the sample based on whether respondents think they will ever visit the Maine North Woods, we can find out whether nonuse values exist. Coefficient estimates resulting from estimating the ratings difference model using the sample of respondents who never plan to visit the locale of the proposed park should represent nonuse values, while estimates based on the sample of respondents who have visited or plan to visit the Maine North Woods should combine use and nonuse values. A likelihood ratio test indicates that the differences between the coefficients in the last two columns of Table III are statistically significant at the one percent level.

The middle column of coefficient estimates in Table III suggests that there are nonuse values associated with the park. Comparison of the estimates in the last two columns of Table III yields some surprises, however. Potential visitors place a much higher value on the portion of the park and preserve managed as a national park. We expected the reverse since managing the land as a national park puts more restrictions on the recreational use of the land. But respondents who do not plan to visit do not seem to care about the portion managed as a national park, while potential visitors' MWTP for a 10 percent increase in the national park portion is estimated to be about 19 dollars per person. This apparent greater interest in wilderness protection is also reflected by the

generally greater impact of the development attribute dummy variables in the sample of potential visitors. Respondents were instructed that greater development corresponds to less wilderness protection, so the positive and highly significant coefficients on the dummy variables representing the least development suggest a high value placed on wilderness protection. A potential explanation is that visitors have higher nonuse values than do nonvisitors; this is consistent with the belief that visiting a national park makes one more conscious of the value of similar places. Nonvisitors, however, are apparently willing to pay more than visitors for a larger park: about $44 per million acre increase in park size versus about $30. The other surprise is that potential visitors do not seem to value the potential gain in tourism jobs, while those who never plan to visit do seem to have a nonuse value for these tourism jobs: the coefficient on the tourism job gain attribute is statistically significant at the five percent level and implies a MWTP per person of about 25 cents per job.

The fact that taxes seem to have a stronger negative effect for respondents who never plan to visit the park is not surprising. Many respondents who never plan to visit the park may feel that their taxes are in part subsidizing the recreational activities of others. Respondents who do plan to visit the park, on the other hand, may be willing to pay higher taxes since they expect to obtain recreational value from the park.

6. Acadia National Park: Description

Acadia National Park, established in 1929, comprises over 46,000 acres of glaciated coastline and island landscape. More than 22 lakes and ponds, dozens of streams and wetland areas, and 26 mountains contribute to the flourishing natural environment of Acadia and support a diverse habitat for an array of wildlife and wilderness species.

Acadia receives over 3 million visitors per year who participate in recreational activities such as hiking, biking, climbing, swimming, boating, horseback riding, canoeing, sightseeing, and a variety of educational programs that teach individuals about Acadia's cultural history and diverse ecosystem. Unrestricted access has caused congested hiking trails and rock-climbing sites. Rare plants and endangered habitats that line paths or prosper in rock surfaces have been damaged and in some cases destroyed. Additionally, the vehicles associated with the influx of tourists are creating pollution that damages wildlife and wilderness, especially native plants in the area such as broad-leaf aster and dogbane.

Acadia also suffers due to wind streams bringing pollutants such as nitrogen oxides, volatile organic chemicals, ozone, mercury, and acid precipitation from industries in the midwest and northeast as well as industries adjacent to the Park. Smog alters the view for tourists and creates hazardous conditions for hikers and park enthusiasts as well as for trees and wildlife.

The quality of views from the park has been further altered by development associated with tourism. Logging practices and industrial construction also contribute to the changing landscape surrounding the Park, affecting its scenic nature. Additionally, the influx of tourists has caused a boom in commercial development and concessions both within and outside park confines. Nearby towns now experience high levels of congestion, traffic, and development. The government and environmental agencies are currently exploring an appropriate balance between tourism and wildlife and wilderness preservation.

7. Acadia National Park: The Survey Instrument

We developed the survey instrument for Acadia in the same manner as that for the North Woods, with similar elements. Table IV shows the attribute descriptions and Table V shows the scenario rating form. The biggest differences between the Acadia and North Woods survey designs were that the Acadia survey included three payment attributes and respondents were asked separately whether they had visited the park in the past and whether they planned to visit in the future. Asking separately about past and anticipated future use of the park should enable us to split the sample into three groups: one for which all values derived from the park should be existence values, one for which option values will be combined with nonuse values, and one for which use and nonuse values are combined. Due to the relatively small sample size, however, our preliminary results split respondents into two groups, similar to the North Woods analysis. The first group comprises those who say they have never visited the park and never plan to do so; their responses should reflect nonuse values only. The second group comprises those who say they have visited the park in the past and/or they plan to visit in the future; their responses should reflect both use and nonuse values.

In addition to an annual tax payment, fees for parking and for using the park's Loop Road were included as attributes. The Loop Road is the way most visitors access the most heavily congested portion of the park, including Cadillac Mountain; there is currently a fee to drive on the Loop Road during the summer season. But many other points of interest in the park, including many hiking and biking trails, can be accessed without driving on the Loop Road. There is currently no fee for parking at these other points of interest and trailheads.

We mailed the survey to 1000 households, with reminder postcards sent after 2-3 weeks to those who had not responded. After another 2-3 weeks, we sent a second copy of the survey to nonrespondents. Of the 1000 households, 400 were in Maine, 300 in the rest of New England, and 300 in the rest of the country. The preliminary results reported here are based on 159 surveys that were returned with at least one scenario rated. As was the case with the North Woods survey, each response had up to four alternative scenarios rated, so the potential number of observations was 636. Because of missing values, the final sample size was 624.

Three of the scenario attributes had seven levels: opportunities for recreation on foot, opportunities for recreation using autos, and effect on the tourism industry. In each case, the omitted category in our empirical model is the "unchanged" level. The scenic preservation attribute had four levels: exceptional, high, average, and poor; the empirical model used "poor" as the omitted category. Similarly, the pollution attribute had three levels: high, moderate, and low; "low" served as the omitted category.

8. Acadia National Park: Results

Table VI shows selected results of estimating a double-hurdle tobit model using a linear ratings function. None of the variables omitted from the table were statistically significant in any of the three models shown.

Neither the parking fee nor the Loop Road fee was a statistically significant determinant of ratings in any of the models. The annual tax attribute had a statistically significant coefficient estimate for the overall sample and for visitors, but not for nonvisitors. We expected that nonvisitors would not care about the two user fees, since they would never expect to pay them, while they would respond negatively to increases in the annual tax payment. Instead, none of the fees seemed to affect their ratings by a statistically significant amount, though in the case of the

annual tax this may be because of the small sample size; the point estimate was very close to that of the overall sample.

The only attribute for which there is strong evidence of nonuse value is opportunities for recreation using automobiles. More precisely, nonvisitors clearly have an aversion to increasing the amount of automobile-based recreation in Acadia. Surprisingly, preservation of the scenery for which Acadia is so well known does not seem to generate nonuse values, though the "average" level of the attribute (though not "high" or "excellent") does have a (barely) statistically significant coefficient estimate.

Visitors, on the other hand, value several of the park attributes. Scenic preservation is clearly important to visitors; the MWTP per person for excellent instead of poor scenic preservation is just about $300 per year. Visitors are also willing to pay to avoid high pollution levels. Only the largest increase in auto-based recreation generates a statistically significant effect on ratings, and similarly only the largest decrease in the tourism industry near the park has a statistically significant effect.

Congestion did not appear to matter to either visitors or nonvisitors. Neither group cared about foot-based recreation opportunities either. While increases in auto-based recreation were seen as bad, decreases did not lead to higher scenario ratings. Similarly, decreases in tourism were valued but increases did not lead to lower ratings.

9. Conclusions

Judging from the results of the surveys reported here, conjoint analysis is a promising technique for eliciting the nonuse values as well as use values generated from parks and similar areas with multiple attributes. By surveying a broad range of respondents, including some who never expect to visit the park, the existence of nonuse values can be demonstrated clearly.

For the proposed park, there do seem to be significant nonuse values, especially for park size, access to recreational opportunities, and the extent of development that would accompany the creation of the park. There also seems to be an existence value for the tourism jobs the new park would create, but not the logging jobs that would be lost. Surprisingly, congestion does not seem important to either visitors or nonvisitors.

Compared to the proposed park, Acadia National Park does not seem to give rise to as many nonuse values, though this may be an artifact of the small sample we obtained. Visitors value many attributes of the park, though surprisingly congestion did not seem to concern them. But the only attribute that was a statistically significant determinant of nonvisitors' ratings of scenarios was auto-based recreation opportunities.

TABLE I
Maine North Woods National Park and Preserve
DESCRIPTION OF ATTRIBUTES:

Park Size – This measure is based upon acreage and encompasses both Preserve and general access areas (the entirety of the federal purchase). It is important to note that as Park size increases, it is probable that the logging industry will decrease and the tourism industry will increase. Also, a larger Park will probably result in more wilderness protection, including both wildlife and biodiversity, though other management decisions will also affect wilderness protection.

National Park Portion – This describes the percentage of the total federal purchase of land that will be managed as a National Park. The remaining percentage will be managed as a National Preserve, which allows more consumptive activities such as hunting and trapping and may allow snowmobiling. Higher National Park portions will likely result in more wilderness protection.

Access – This corresponds to the level of guaranteed access to Park and Preserve lands for recreational use compared to the present conditions in Maine. Presently access to private land must be granted by the owner. A slight increase in access to lands indicates that the creation of a Park and Preserve would guarantee slightly more public access when compared to the present state. The larger the increase in access, the greater the amount of land that will be set aside by the government for guaranteed public use. Activities include hiking, canoeing, camping, fishing, boating, paddling, biking, wildlife watching, etc. Access might decrease if management decisions regarding the Park and Preserve land include restrictions on the number of visitors allowed.

Logging Job Loss – This number corresponds to the number of jobs lost in the logging industry per year as a result of the creation and management of a Park and Preserve.

Tourism Job Gain – This number corresponds to the number of jobs created in the tourism industry per year as a result of the creation and management of a Park and Preserve.

Development – This variable describes how much of the land in northern Maine will be developed for real estate and business purposes. This might take the form of concessions operations in the Park and Preserve or purchase by private owners, independent of the Park and Preserve and tourism. Associated with development is the preservation of trees, plants, and animal habitats (particularly endangered or threatened species such as the bald eagle, timber wolf, Canada lynx, Atlantic salmon, New England Cottontail, and bog turtle) so that higher levels of development correspond to *lower* levels of wilderness protection.

Other visitors encountered – This corresponds to the average number of individuals one may see in a day while visiting the Park.

Tax Increase – Any decision to create and manage a Park and Preserve will require federal funding of some kind. The extent to which your taxes will increase is uncertain and depends on the various decisions that are made. This attribute refers to the amount, in dollars, of an increase in each household's income taxes paid to the federal government per year as a result of the creation and management of a Park and Preserve.

TABLE II
Maine North Woods National Park and Preserve
Scenario Rating Form (Example)

Scenario Descriptions

	Park Size (mil. acres)	Park Portion (percent)	Change in Access	Logging Jobs Lost	Tourism Jobs Gained	Increase in Development	Other Visitors Encountered	Tax Increase (dollars/year)
Scenario 1	0	---	No Change	150	0	large	0 to 4	0
Scenario 2	2.5	50	Slight Decrease	500	150	large	0 to 4	130
Scenario 3	1.5	50	Slight Increase	250	500	slight	0 to 4	25
Scenario 4	0.75	30	Moderate Increase	150	250	very large	20 to 29	195
Scenario 5	0.75	90	Moderate Decrease	250	250	moderate	0 to 4	150

Scenario Rating

Please rate how desirable each scenario is overall by circling one number in each row of the following table:

	Highly Desirable	Quite Desirable	Desirable	Slightly Desirable	Neither Desirable nor Undesirable	Slightly Undesirable	Undesirable	Quite Undesirable	Highly Undesirable
Scenario 1	1	2	3	4	5	6	7	8	9
Scenario 2	1	2	3	4	5	6	7	8	9
Scenario 3	1	2	3	4	5	6	7	8	9
Scenario 4	1	2	3	4	5	6	7	8	9
Scenario 5	1	2	3	4	5	6	7	8	9

TABLE III
Maine North Woods National Park and Preserve
Double-Hurdle Tobit Coefficient Estimates from Ratings Difference Equations
(standard errors in parentheses)

Variable	*Pooled sample*	*No visitation sample*	*Visitation sample*
Intercept	-1.14176 (0.97061)	-1.20498 (1.29329)	-0.82667 (1.31094)
Annual Tax	-0.00920*** (0.00336)	-0.01024** (0.00467)	-0.00808* (0.00445)
Size (millions of acres)	0.37895** (0.19081)	0.45454* (0.25593)	0.24336 (0.25947)
Portion managed as Park	0.01309** (0.00643)	0.00859 (0.00894)	0.01527* (0.00850)
Access: moderate increase	0.26990 (0.58790)	-1.19276 (0.80067)	1.45711* (0.78356)
Access: slight increase	0.33775 (0.60901)	1.41028* (0.84845)	-0.13996 (0.80499)
Access: slight decrease	-0.52376 (0.58591)	-0.64926 (0.85792)	-0.40294 (0.75714)
Access: moderate decrease	0.24151 (0.59879)	0.57153 (0.80778)	0.00926 (0.80877)
Logging job loss	0.00013 (0.00085)	0.00012 (0.00124)	-0.00037 (0.00110)
Tourism job gain	0.00053 (0.00087)	0.00255** (0.00126)	-0.00056 (0.00113)
Development: large increase	0.44533 (0.52794)	-0.63188 (0.73530)	0.97874 (0.70151)
Development: moderate increase	1.68749*** (0.53168)	2.14144*** (0.73585)	1.33468* (0.70404)
Development: slight increase	2.64492*** (0.54855)	0.99836 (0.74743)	3.53383*** (0.73070)
Visitors encountered	0.00035 (0.01722)	-0.02404 (0.02442)	0.01853 (0.02267)
Log likelihood function	-1739.4	-589.3	-1126.2
Sample size	631	226	405

*** statistically significant at the 1% level (two-tailed test)
** statistically significant at the 5% level (two-tailed test)
* statistically significant at the 10% level (two-tailed test)

TABLE IV
Acadia National Park
DESCRIPTION OF ATTRIBUTES:

Recreational Opportunities – This measures the number and extent of recreational activities allowed in the park at one time. **On Foot** recreational activities include hiking, biking, swimming, climbing, canoeing, sea kayaking, horseback riding, wilderness and wildlife watching, etc., whereas **Auto Dependent** activities include scenic viewing and exploration while riding in a transportation vehicle. *It is important to note* that as recreational opportunities available to the public increase, protection and preservation of wilderness, wildlife, and cultural history will decrease. Alternatively, decreased recreational access and increased wildlife, wilderness, and cultural history protection are associated with a smaller number of trails open to the public and fewer visitors granted access into the park at one time.

Scenic Preservation – This describes the quality of view of the landscape inside Acadia and of lands surrounding the Park. A high quality of view indicates little disruptions in the landscape, with minimal visual effects from development of businesses and homes, from logging practices, and from pollution in the form of haze and visibility. A low quality of view reflects significant disruptions in the landscape caused by development, pollution, and clear-cutting.

Pollution – The level of this characteristic measures the amount of pollution present in the water, air, and land of Acadia National Park. The most notable sources of pollution are from industrial practices such as logging and business development and the high volume of commercial tours in and around the park. High levels of pollution indicate wilderness, wildlife, and natural history deterioration and reduce the overall enjoyment and health of visitors to the park. While low levels of pollution are beneficial to the environment, costs to and restrictions on businesses in surrounding areas tend to increase due to environmental compliance measures.

Other visitors encountered – This corresponds to the average number of visitors encountered in a day at Acadia.

Tourism Business – This describes the trade-off between business profits and overcrowding of towns surrounding Acadia. An increase in the tourism business is associated with higher profits and employment but increased congestion from visitors, cars, and buses while a decrease of the tourism industry would result in decreased profits and employment but less congestion.

Costs: *Depending on the levels of the other attributes, managing Acadia National Park will likely require funding beyond that currently provided by visitors and the National Park Service. The next three attributes describe different funding possibilities, which may be used alone or in combination.*

Weekly Park Loop Fee – This fee describes the amount of money a visitor must pay for a weekly pass to access Park Loop Road, the most scenic stretch of the park and home to some of Acadia's most famous sites and trails. The fee is per person per week.

Parking Fee – This fee refers to the amount charged per/car per/day to park in the primary parking facilities throughout the park. Individuals who use the Park for hiking, walking, biking, swimming, etc, would be subject to this charge.

Annual Tax – This tax is the extra amount every individual nationwide would have to pay each year to help pay for the new management practices of Acadia National Park.

TABLE V
Acadia National Park
Scenario Rating Form (Example)

Scenario Descriptions

	Recreation: On Foot	Recreation: Auto Dependent	Scenic Preservation	Pollution	Other Visitors Encountered	Tourism Business	Weekly Loop Road Fee	Parking Fee	Annual Tax
Scenario 1	Slight Increase	Large Decrease	High	Low	No change	Large Decrease	5	8	105
Scenario 2	Remain Unchanged	Moderate Decrease	High	High	5% increase	Moderate Decrease	35	8	70
Scenario 3	Moderate Decrease	Remain Unchanged	Exceptional	High	No change	Large Decrease	15	0	80
Scenario 4	Large Decrease	Slight Increase	Average	Low	5% decrease	Large Increase	30	5	80
Scenario 5	Remain Unchanged	Remain Unchanged	High	Moderate	No change	Remain Unchanged	5	0	0

Scenario Rating: *Please rate how desirable each scenario is overall by circling one number in each row of the following table:*

	Highly Desirable	Quite Desirable	Desirable	Slightly Desirable	Neither Desirable nor Undesirable	Slightly Undesirable	Undesirable	Quite Undesirable	Highly Undesirable
Scenario 1	1	2	3	4	5	6	7	8	9
Scenario 2	1	2	3	4	5	6	7	8	9
Scenario 3	1	2	3	4	5	6	7	8	9
Scenario 4	1	2	3	4	5	6	7	8	9
Scenario 5	1	2	3	4	5	6	7	8	9

TABLE VI
Acadia National Park
Selected Double-Hurdle Tobit Coefficient Estimates from Ratings Difference Equations
(standard errors in parentheses)

Variable	*Pooled sample*	*No visitation sample*	*Visitation sample*
Intercept	-1.27118 (0.77841)	1.59510 (1.62553)	-2.42300*** (0.87069)
Annual Tax	-0.00853*** (0.00246)	-0.00845 (0.00532)	-0.00837*** (0.00276)
Loop Road Fee	-0.01509 (0.01251)	-0.01894 (0.02432)	-0.00913 (0.01452)
Parking Fee	-0.03707 (0.04914)	-0.05192 (0.09967)	-0.02177 (0.05574)
Auto recreation: large increase	-1.93798*** (0.52700)	-2.80545*** (1.07555)	-1.55816*** (0.59626)
Auto recreation: moderate increase	-1.09695** (0.52200)	-1.85200* (1.10678)	-0.63695 (0.58462)
Scenic preservation: excellent	2.24476*** (0.39046)	1.24565 (0.78816)	2.51042*** (0.45040)
Scenic preservation: high	1.19236*** (0.39622)	-0.13748 (0.88435)	1.61270*** (0.43352)
Scenic preservation: average	1.88565*** (0.38577)	1.57445* (0.81110)	1.96440*** (0.43059)
Pollution: high	-1.10199*** (0.34248)	-0.86382 (0.68287)	-1.32670*** (0.38877)
Tourism impact: large decrease	0.62238 (0.53897)	-0.51061 (1.17150)	1.08240* (0.59141)
Tourism impact: moderate decrease	1.02808* (0.52844)	1.44626 (1.10950)	0.86231 (0.58740)
Log likelihood function	-1612.0	-508.3	-1090.7
Sample size	624	192	432

*** statistically significant at the 1% level (two-tailed test)
** statistically significant at the 5% level (two-tailed test)
* statistically significant at the 10% level (two-tailed test)

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