

# KENTUCKY TRANSPORTATION CENTER

SYSTEM FOR VALUING CHANGES  
TO HISTORIC AND ENVIRONMENTAL AMENITIES





**UNIVERSITY OF KENTUCKY**

**College of Engineering**  
**Kentucky Transportation Center**

***Our Mission***

We provide services to the transportation community through research, technology transfer and education. We create and participate in partnerships to promote safe and effective transportation systems.

***We Value...***

Teamwork -- Listening and Communicating, Along with Courtesy and Respect for Others  
Honesty and Ethical Behavior  
Delivering the Highest Quality Products and Services  
Continuous Improvement in All That We Do

*For more information or a complete publication list, contact us*

**KENTUCKY TRANSPORTATION CENTER**

176 Raymond Building  
University of Kentucky  
Lexington, Kentucky 40506-0281

(859) 257-4513  
(859) 257-1815 (FAX)  
1-800-432-0719  
[www.ktc.uky.edu](http://www.ktc.uky.edu)  
[ktc@engr.uky.edu](mailto:ktc@engr.uky.edu)

*The University of Kentucky is an Equal Opportunity Organization*

*System for Valuing Changes to Environmental and  
Historic Amenities*

**Final Report  
for the  
Academy for Community & Transportation  
Innovation**

---

**Center for Business and Economic Research  
Gatton College of Business and Economics  
University of Kentucky**

**Dr. Eric C. Thompson, Director**

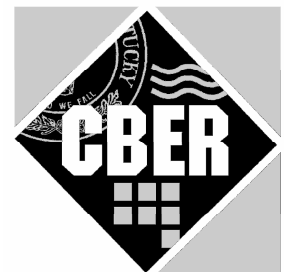
*Authors: Dr. Eric C. Thompson  
Jennifer M. Burnett  
Anna Laura Stewart*

*Special thanks to the research assistance of Nola Ogunro, Edgar Ghossoub, and John Conley.  
Also special thanks to Ralitza Shepherd for editorial and design assistance*

---

August 23, 2004

**Center for Business and Economic Research  
Gatton College of Business and Economics  
335BA Gatton Building  
University of Kentucky  
Lexington, KY 40506-0034  
(859) 257-7675 (Voice)  
(859) 257-7671 (Fax)  
cber@uky.edu  
<http://gatton.uky.edu/CBER/>**



1. Report No. <b>KTC-04-26/TA-9-00-1F</b>	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle <b>System for Valuing Changes to Historic and Environmental Amenities.</b>		5. Report Date <b>October 2004</b>	
		6. Performing Organization Code	
7. Author(s) <b>Dr. Eric C. Thompson, Jennifer Burnett, Anna Stewart</b>		8. Performing Organization Report No. <b>KTC-04-26</b>	
9. Performing Organization Name and Address <b>Center for Business and Economic Research, University of Kentucky</b>		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. <b>TA-9-00-1F</b>	
12. Sponsoring Agency Name and Address <b>Kentucky Transportation Center College of Engineering University of Kentucky Lexington, KY 40506-0281</b>		13. Type of Report and Period Covered <b>Final</b>	
		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract  <p>This report provides a model for estimating the impact of highway projects on the environment and cultural amenities. The model was developed by the University of Kentucky Center for Business and Economic Research and was supported by funding from the Academy for Community &amp; Transportation Innovation, a venture between the University of Kentucky, The University of Louisville, and the Kentucky Transportation Cabinet. This model provides a tool that transportation officials can use to examine any project's impact on historic or environmental amenities.</p> <p>The model allows transportation officials to design their analysis for a particular highway project. Officials simply select the environmental or historic amenity impacted, the size of the impact (e.g., the number of acres impacted), the setting (rural versus urban), and the model will provide an estimated value and range of values for the amenity. This flexibility and transparency also makes the model useful for transportation officials as a tool for explaining amenity impacts to communities. An extended bibliography is also provided to cover additional areas relevant to the topic but not used directly in development of the model.</p>			
17. Key Words transportation, highway projects, environmental amenities, cultural amenities, amenity valuation, historic properties		17. Distribution Statement <b>Unlimited</b>	
19. Security Classif. (of this report) <b>Unclassified</b>	20. Security Classif. (of this page) <b>Unclassified</b>	21. No. of Pages <b>67</b>	22. Price

## **Table of Contents**

---

Table of Contents.....	i
I. Introduction.....	1
II. Methodology for Estimating Values .....	2
III. Amenity Value Model.....	17
Appendix 1: Detailed Examples.....	19
Appendix 2: Sources for Amenity Value Estimates.....	35
Appendix 3: Extended Bibliography .....	40

## Index of Tables

---

### Section I

No Tables

### Section II

2.1: Wetlands .....	7
2.2: Farmland.....	8
2.3: Endangered Species .....	10
2.4: Vacant Lot.....	11
2.5: Parks .....	13
2.6: View.....	14
2.7: Historic Building.....	15

### Section III

3.1: Source Data.....	17
3.2: Pivot Table .....	18

### Appendix 1

4.1: Farmland, Amenity Name .....	19
4.2: Farmland, Show All .....	19
4.3: Farmland, Pivot.....	20
4.4: Farmland, Form.....	20
4.5: Farmland, Calculator.....	21
4.6: Wetlands, Amenity Name .....	22
4.7: Wetlands, Show All.....	22
4.8: Wetlands, Pivot A .....	22
4.9: Wetlands, Pivot B.....	22
4.10: Wetlands, Form .....	23
4.11: Wetlands, Calculator .....	24
4.12: Vacant Lot, Amenity Name .....	24
4.13: Vacant Lot, Show All .....	24
4.14: Vacant Lot, Pivot .....	25
4.15: Vacant Lot, Form .....	25
4.16: Vacant Lot, Calculator.....	26
4.17: Park, Amenity Name .....	26
4.18: Park, Show All .....	26
4.19: Park, Pivot A.....	27
4.20: Park, Pivot B .....	27
4.21: Park, Form .....	27
4.22: Park, Calculator.....	28
4.23: Habitat of Endangered Species, Amenity Name .....	29
4.24: Habitat of Endangered Species, Show All .....	29

Final Report  
*System for Valuing Changes to Environmental Amenities*

4.25: <i>Habitat of Endangered Species, Pivot</i> .....	29
4.26: <i>Habitat of Endangered Species, Form</i> .....	30
4.27: <i>Habitat of Endangered Species, Calculator</i> .....	30
4.28: <i>View, Amenity Name</i> .....	31
4.29: <i>View, Show All</i> .....	31
4.30: <i>View, Pivot</i> .....	31
4.31: <i>View, Form</i> .....	32
4.32: <i>View, Calculator</i> .....	32
4.33: <i>Historic Buildings, Amenity Name</i> .....	33
4.34: <i>Historic Buildings, Show All</i> .....	33
4.35: <i>Historic Buildings, Pivot</i> .....	33
4.36: <i>Historic Buildings, Form</i> .....	34
4.37: <i>Historic Buildings, Calculator</i> .....	34

## **Introduction**

---

The impact of highway projects on the environment or cultural amenities such as historic properties can be a significant source of concern. Yet, these impacts are not as readily modeled as other features such as project costs, impacts on traffic flows or accident rates. A major barrier is often the lack of a market price for impacts on environmental or historic amenities. The sale value of the property is often known, or at least can be determined. However, environmentally sensitive or historically important properties often have a public amenity value beyond their private purchase price.

This lack of an existing model for the evaluation of the impact of highway projects on environmental and historic amenity value provided the impetus for the development of this model. The following paper describes how this model was developed by the University of Kentucky Center for Business and Economic Research, and how to use the model. Development of the modeling system was supported by funding from the Academy for Community & Transportation Innovation, a venture between the University of Kentucky, the University of Louisville, and the Kentucky Transportation Cabinet. Part of the Academy's mission is to develop new tools through both basic and applied research to meet its goals to "ensure the compatibility, sustainability, safety, and efficiency of transportation systems." These tools should be of use to help transportation officials evaluate the impact of transportation projects on communities and to explain these impacts.

The modeling system developed through this project was designed to help the Academy meet its mission. This model provides a tool that transportation officials can use to examine any project's impact on historic or environmental amenities. Further, the model allows transportation officials to design their analysis for a particular highway project. Officials simply select the environmental or historic amenity impacted, the size of the impact (e.g., the number of acres impacted), the setting (rural versus urban), and the model will provide an estimated value and range of values for the amenity. This flexibility and transparency also makes the model useful for transportation officials as a tool for explaining amenity impacts to communities.

The remainder of the report is divided into two sections and three appendices. Section II describes the data and results and Section III describes the attributes of the modeling software. Appendix 1 provides examples of how to use the software. Appendix 2 gives full citations for the articles used to calculate the values and Appendix 3 is an extended bibliography that includes additional articles that were analyzed but not used for purposes of calculation in this study.



## II. Methodology for Estimating Values

---

The result of this study is the development of a research tool designed to help project administrators identify the economic benefit of environmental and cultural impacts of a particular highway project. Such information is a helpful addition to the traditional cost-benefit analysis of highway projects, which often does not include these factors. Amenity valuations are also useful when assessing and explaining the impact of a project on a community.

This tool allows the user to describe a certain environmental impact. For example, if a project requires building a road through a wetland, this tool can measure the amenity cost of the lost wetland, or similarly, the economic benefit of preserving or developing wetlands elsewhere. Thus, this tool can be used to measure the cost of a lost amenity, or the economic benefit of preserving or developing an amenity. The model reflects the fact that values for amenities may vary greatly depending on the specific amenity, the affected population (local residents versus statewide), and the setting (rural versus urban). Therefore, the model allows the user to obtain not just the value of interest, but also to obtain a value for a particular setting. While the model was developed for use in Kentucky, the model also could be used for projects anywhere in the country.

To identify amenity values, UK-CBER reviewed a large number of environmental and cultural amenity studies during the research project. We identified a wide variety of studies that have analyzed the value of amenities that are sometimes impacted by transportation projects including the following: Wetlands, Forests/Parks, Endangered Species, Historic Sites, and Farmland. These studies were used to calculate a range of values for each of these amenities based on the affected population and the setting. Great effort was made to determine which articles were appropriate for use. Articles that valued amenities outside of the United States were typically rejected, with some rare exceptions relating to historical and cultural amenities, as were studies that only determined the value of amenities to certain groups (such as studies that only considered the value of a national park to park visitors). In all but one amenity, Views, amenity values per acre per household were determined for each article. Per acre per household values were sometimes reported directly by the authors, but frequently needed to be calculated by the project team based on information in the article. In the case of views, values were not calculated by acre per household, however, but were calculated by multiplying the value by the number of households with an unobstructed view of the area affected by the transportation project. When articles reported an amenity value on an annual

basis, the amenity value was placed in present value terms.<sup>1</sup> Thus, the amount derived by the model should not be viewed as a cost or benefit that is incurred every year, but rather, a total project value. All values were put in terms of the most recent year (2003).

A list of articles used to calculate the amenity values can be found in Appendix 2 of this article. Appendix 3 contains an extended bibliography of articles analyzed during the course of completing this project. We were unable to include the vast majority of these articles in our calculations because of a variety of statistical and topical reasons. However, many of the articles may provide additional guidance for research in areas included in and beyond the scope of this project.

Very few studies were available in the case of cultural amenities impacted by transportation projects such as historical settlements or historic neighborhoods. The lack of information on these kinds of cultural amenities suggests a potential future area of research for the Transportation Academy. There is a need for original research to develop estimates of values.

The following section discusses the results of the research in each of these amenity groups. The research articles and the approach used to identify the values are discussed amenity by amenity. Several concepts should be understood when examining the valuation data:

*Geographic Setting* – This pertains to the location of the affected amenity. Two categories are listed. The urban category implies that the amenity is located within the limits of a town or city. Non-urban refers to amenities located in rural areas, outside of towns or cities. This distinction is important since some amenities, such as a vacant lot, could be of much greater value in an urban neighborhood than in a rural area. Finally, note that urban refers to a city or town regardless of whether it is located within a metropolitan area, as urban areas can be located in non-metropolitan regions as well. Prominent Kentucky examples include the cities of Somerset and Pikeville.

*Geographic Scope* – This pertains to the population which places a value on an amenity. Some amenities are primarily valued by the local population, where others are valued by persons throughout the state, whether or not they live in proximity to the amenity. There are three designations: local, nearby local, and statewide. The definition of statewide is evident. The local designation refers to the entire local community. It is proposed that the number of households in the

---

<sup>1</sup> The present value is calculated from an annual value by multiplying the annual value by  $1/r$ , where  $r$  is the discount rate (assumed to 7 percent). This is the formula for an infinite series with discounting.

county where the amenity is located should be used. The nearby local designation refers to amenities that are primarily of value to that subset of local residents who live nearest to the amenity.

### *Amenity Groups*

#### *A. Wetlands*

The amenity value of wetlands has been the subject of a large body of literature in economics over the last several decades. The UK-CBER research team was able to identify dozens of articles providing valuations for wetlands. These articles provide a good basis to estimate a range of appropriate values for an acre of wetlands taken by a transportation project. Articles used for the determination of the amenity values for wetlands include the following (see Appendix 2 for full citations): Beran, 1995; Blomquist and Whitehead, 1998; De Zoysa, 1995; Hanemann et al., 1991; Hoehn and Randall, 2002; Lupi et al., 1991; and Mahan et al., 2000.

A single range of values was calculated for all wetlands; we did not distinguish by “type” of wetland. Studies such as Beran et al. (1995) found very little difference in the estimated value of different classifications of wetland. For example, floodplain swamps, bottomland, hardwood forests, and pine plantations had similar values across the studies, so a single estimate range was developed for wetlands of all kinds. However, we did differentiate based on the geographic setting of the valuation. Value estimates were made for wetlands located in urban areas versus non-urban areas.

Table 2.1 below shows the range of values developed for Wetlands. The values in Table 2.1 are meant to provide a suggested range of values per use. Two concepts of a middle value are present: mean and median. High and low values are presented to give the full range. Note that the value of non-urban wetland varies between \$0.0419 and \$0.1992 per acre per household. Mean and median values are \$0.0956 and \$0.0609 per acre per household.

Amenity values for urban wetlands are restricted to nearby local residents within the urban area who may utilize the wetlands for recreation or aesthetics. Mahan et al. (2000) and Lupi et al. (1991) provide estimates for the value of an acre of the nearest wetland area to household residents (at the mean distance from the wetland). The mean value for such an urban wetland is \$51.66 per household per acre. This value should be applied to all households residing within 3,000 feet of the wetland. A statewide value was not determined for urban wetlands, nor was a local value determined for non-urban wetlands.

**Table 2.1: Wetlands**

*Amenity Values of Wetlands Per Acre Per Household*

Amenity	Geographic Setting	Geographic Scope	Mean	Median	Low	High
Wetland	Non-Urban	Statewide	\$0.0954	\$0.0609	\$0.0419	\$0.1992
Wetland	Urban	Nearby Local	\$51.661	\$51.661	\$36.667	\$66.656

Example: Wetlands

To yield the value of wetlands affected by a transportation project, simply select the appropriate geographic setting and geographic scope (Non-Urban - Statewide or Urban - Nearby Local) in which the transportation project is going to occur. Select a value type (mean, median, low, or high) as determined by the geographic designation and multiply it by the number of acres of wetlands affected and the number of households affected. The number of households will also be determined by geographic setting and scope, with statewide referring to all households in the state and nearby local defined as all households located within 3,000 feet of the wetland.

Take the example of a transportation project that would need to bear the cost of permanently protecting 10 acres of wetland to compensate for locating a new highway adjacent to an existing wetland. Additionally, assume this will occur in a non-urban region and will have no impact on the adjacent wetland. This project would essentially protect 10 acres of wetland on net. What value would that have for the state? Assuming a mean value of \$0.0954 per acre per household statewide for protecting wetlands, the typical household in the state would value protecting 10 acres at \$0.954. Using Kentucky as an example, and given that there are 1.6 million households in Kentucky, the total amenity value would be 1.6 million multiplied by \$0.954 or \$1,526,000. Thus, the transportation project would create an amenity benefit of \$1,526,000 in the case of wetland preservation. Note that this would be the full value for a one-time payment, not the value for an annual payment.

A range of values can be created by multiplying the low and high values of \$0.0419 and \$0.1992, respectively, per acre per household in the state by the relevant number of acres (10) and the number of households in the state (1.6

million). Based on the above example, this would show an amenity benefit for the project of between \$670,000 and \$3,187,200.

*B. Farmland*

The amenity value of farmland has also been the subject of a large body of literature in economics over the last several decades. The UK-CBER research team was able to identify a number of articles providing valuations for farmland. These articles provide a good basis to estimate a range of appropriate values for an acre of farmland taken or preserved by a transportation project (Beasley, 1986; Halstead, 1984; and Ready et. al., 1997; Bergstrom et al., 1985). All values were put in terms of the most recent year (2003).

A single range of values was calculated for all farmland located outside of urban areas (non-urban). Estimates were based on local valuations by residents located near the farmland to be preserved from development. Valuations should be applied only to local households (here local household is defined as county households) and not to households statewide.

Table 2.2 below shows the range of values for farmland to be developed based on the surveyed research. The values in Table 2.2 include a mean, median, low and high value, and range from a present value of \$0.0016 per household per acre to \$0.516, with a mean value of \$0.1854 per household per acre.

**Table 2.2: Farm Land**

*Amenity Value of Farm Land Per Acre Per Household*

Amenity	Geographic Setting	Geographic Scope	Mean	Median	Low	High
Farm Land	Non-Urban	Local	\$0.1854	\$0.0754	\$0.0016	\$0.5160

Example: Farmland

To yield the value of farm land affected by a transportation project, simply multiply a value type (mean, median, low, or high) by the number of acres of farm land affected and the number of households in the geographic setting and scope (non-urban, local which is defined for farmland as total households in the county). Take the example of a transportation project that would utilize 50 acres of farm land in Pulaski County, KY for highway right-of-way. What amenity value would that represent for the local area? Assuming a median value of

\$0.0754 per acre per household in the county for the lost farm land, the typical household in Pulaski County would value the loss of 50 acres at \$3.77. Given that there are approximately 25,000 households in Pulaski County, the total amenity value would be 25,000 multiplied by \$3.77 or \$94,250. Thus, the transportation project would have an amenity cost of \$94,250.

### *C. Habitat of Endangered Species*

Transportation projects occasionally pass through habitat for endangered animals. This loss of habitat has a potential amenity cost as it may diminish the potential for preservation of the species, or its emergence from endangered status. The exact amenity value of the habitat loss, however, is difficult to value, and is subject to variation by type of species. For example, the public may place a greater value on the survival of large animals such as the condor or the grey wolf than on an insect species. This section reviews estimates of valuation that the public places on the protection of habitat for various species.

Existing literature on public valuations regarding endangered species was thoroughly reviewed (Adamowicz & Condon, 1997; Berrens et al., 1996; Loomis & Ekstrand, 1997; Schkade & Payne, 1994; Reaves, et al., 1999). The review focused on those studies that produced valuations of preservation of the habitat of endangered species. Studies that estimated valuations on avoiding extinction entirely were not used since a transportation project would be unlikely to affect enough of the habitat to cause extinction. Studies that use methods to protect species other than preserving or improving habitat were not used.

As habitat for endangered species is a predominantly rural occurrence, values have only been calculated for non-urban areas. Values are also statewide in scope since households that value endangered species typically value species in multiple areas, not just local areas. There is substantial variation, however, by type of species. Values for mean, median, low and high are listed based on birds, fish, large mammals, and overall (excluding fish) in Table 2.3. It should be pointed out that while birds and large mammals have been calculated on an acre basis, river fish have been calculated on a per mile of stream basis. On a per acre basis, the mean value for the habitat of all endangered species (excluding fish) is \$0.00142 per household per acre. The range is from \$0.0000001 to \$0.00614. For river fish, where stream habitat is measured on a per mile basis, the mean value is \$0.20411 per mile.

**Table 2.3: Endangered Species**

*Amenity Value of Habitat for Endangered Species Per Household Per Acre (or Per Mile of Stream)*

Amenity	Geographic Setting	Geographic Scope	Mean	Median	Low	High
All	Non-Urban	Statewide	\$0.00284	\$0.00212	\$0.00026	\$0.00614
Birds	Non-Urban	Statewide	\$0.00284	\$0.00212	\$0.00026	\$0.00614
River Fish	Non-Urban	Statewide	\$0.20411	\$0.20411	\$0.20411	\$0.20411
Large Mammals	Non-Urban	Statewide	\$0.000004	\$0.000002	\$0.000009	\$0.000001
Large Mammals	Non-Urban	Local	\$0.000002	\$0.000002	\$0.000002	\$0.000002

Example: Endangered Species

A new highway project, which also is designed to create a recreation lake would require the construction of a bridge and dam over a stream that is a habitat for endangered fish. The fish have other habitat elsewhere in the state; so the project would not cause extinction, but would remove 3 miles of habitat. What amenity value would that lost habitat for the fish hold for households in the state? The mean value for preserving a stream habitat is \$0.20411 per household per mile. The average household would value 3 miles of stream at \$0.61233. Given 1.6 million Kentucky households, the lost habitat would be valued at \$980,000.

*D. Vacant Lot*

Transportation projects sometimes utilize vacant land that has not been developed previously (residential property, commercial property, park land, farm land or as a golf course). This land is essentially vacant. Such vacant lots often have an amenity value in an urban area both because the land can be used for recreation or can be left as a natural area with trees or grass growing. Studies

have found that nearby homeowners value these vacant lots. Though, an interesting feature of these amenities is that the amenity is quite localized, only felt by nearby homes rather than the community at large.

There are a relatively small number of articles that have estimated values for these vacant lots (Breffle et al., 1998; Smith et al., 2002). The articles have focused on urban areas since there is typically a large supply of open land in a rural area, even if that land is involved in agriculture or forestry. The geographic focus on the vacant land amenity is always urban. As mentioned above, the geographic scope is always nearby local communities since the amenity is enjoyed by households nearest to the lot rather than households throughout the local community.

The “nearby local” geographic scope implies that estimating the amenity value will require specific information about the neighborhoods near the affected vacant lots. Specifically, the transportation planners will need to determine the number of properties which are closer to the affected vacant lot than to any other vacant lot. The per household per acre valuation should be applied only to these households.

Table 2.4 below shows the range of values for urban vacant lots based on the surveyed research. The values in Table 2.4 include the mean, median, high and low value, and range from a present value of \$216.91 per household per acre to \$594.27, with a mean value of \$405.59 per household per acre.

While the amenity values for vacant lots appear relatively high compared to other amenities in this report, it should be noted that such lots are relatively small compared to rural areas and that green space in an urban area is also relatively rare, compounding the effect.

**Table 2.4: Vacant Lot**

*Amenity Value of a Vacant Lot Per Acre Per Household*

Amenity	Geographic Setting	Geographic Scope	Mean	Median	Low	High
Vacant Lot	Urban	Nearby Local	\$405.59	\$405.59	\$216.91	\$594.27

Example: Vacant Lot

To yield the value of the loss of a vacant lot, simply multiply a value type (mean, median, low or high) by the number of acres of vacant lot taken by the



project and the number of local households (defined as households that are closer to that vacant lot than any other vacant lot) near the vacant lot. Take the example of building a new on-ramp onto Route 4 (New Circle Road) in Lexington, KY. The project would take a 6-acre vacant lot. What amenity value would that represent for nearby households? Assuming a mean value of \$405.59 per acre per household for the lost land, the typical nearby household would value the loss of 6 acres at \$2,433.54. Given that there are 20 households located closer to the affected vacant lot than to any other, the total amenity value would be 20 multiplied by \$2,433.54 or \$48,700. Thus, the transportation project would have an amenity cost of \$48,700.

### *E. Parks*

Parks and wilderness areas are sometimes affected by highway development. In an urban area, the widening of a main road may require the taking of park land for right-of-way (this might even be preferable to taking homeowner property across the street). In non-urban areas, a new or widened route between two places may need to be located through a national park or wilderness area, requiring such property to be used for right-of-way.

A substantial literature has been developed to assess the value of parks located in both urban and non-urban areas. In non-urban areas, this research has typically utilized contingent value survey methods to investigate household willingness to pay to support the preservation or expansion of parkland (Correll et al.; Keith et al., 1996; Kimmel, 1985; McFadden et. al., 1994; Richer, 1995; Walsh et al., 1984; and Walsh et al., 1990). These studies have estimated the amenities for all state residents, including both households that utilize the park and those that do not. A large body of literature also exists that estimates values for park users on a per trip basis, but this research was not utilized given a desire to consider the amenity benefit for all households. Valuations for the parks located in a non -urban geographic setting are illustrated in Table 2.5. For non-urban parks, valuations are available only for a statewide geographic scope. Values range between a present value of \$0.000285 per household per acre to \$0.001157, with a mean value of \$0.000585 per household per acre.

The literature on the amenity value of urban parks (Correll, 1978; and Kimmel, 1985) has utilized hedonic regression techniques to isolate the value of a park on the value of nearby local residents. The “nearby local” geographic scope implies that estimating the amenity value will require specific information about the neighborhoods near the park/urban green space taken as part of the transportation project. Specifically, the transportation planners will need to determine the number of properties located within 3,000 feet of the park/urban

green space. The per household per acre valuation should be applied only to these households. The mean value estimate is \$45.94 per household per acre of park land for nearby local residents who reside within 3,000 feet of the park/urban green space.

**Table 2.5: Park Land**

*Amenity Value of Park Land Per Acre Per Household*

Amenity	Geographic Setting	Geographic Scope	Mean	Median	Low	High
Parks	Non-Urban	Statewide	\$0.000585	\$0.000449	\$0.000285	\$0.001157
Parks	Urban	Nearby Local	\$45.942	\$45.942	\$42.030	\$49.853

Example: Park Land

A new or expanded highway passing through a national forest could require hundreds of acres of national forest for right-of-way. What amenity value would that lost park land hold for households in the state? Take the example of a route running through a national forest that would require the taking of 500 acres of land. Assuming a mean value of \$.000585 per acre per household for the lost land, the typical household statewide would value the loss of 500 acres at \$0.2925. Given 1.6 million Kentucky households, the value of the lost park acreage would be calculated by multiplying 1.6 million by \$0.2925 for a total of \$468,000. Thus, the transportation project would have an amenity cost of \$468,000.

*F. View*

Transportation projects on occasion will impact the view of homes with an unobstructed view of undeveloped land. This section assesses the potential value of the loss of “view.” The valuation should only apply to homeowners with an unobstructed view. Analysis should not be applied to persons who travel to the area for recreation or other reasons. Thus, this analysis clearly has a nearby local geographic scope for applying amenity values. The studies also have focused on valuations of views in urban settings (Do and Sirmans, 1994; Gillard, 1981; Weicher and Zerbst, 1973; and Darling, 1973), so results only apply to an urban geographic setting.

The studies used focused on views of parks or landscapes, but avoided literature valuing the more highly priced views such as ocean views. One difficulty with calculating any loss of view amenity is to ascertain how many households are affected. On the other hand, there is no need to determine the acreage of the “view” as there is a fixed value (here determined by number of households with an unobstructed view) rather than a per acre value. Although, naturally, there will be a tendency for more houses to have their view influenced by a transportation project when the project impacts more acres.

Valuations for a view amenity in an urban geographic setting are illustrated in Table 2.6. Values range between \$7,546 per household to \$18,429, with a mean value of \$12,174 per household. These values appear to be relatively large as they are calculated on a per household, rather than, per acre, basis. The view amenity should be considered only when a loss of view has become a major concern among local residents and there is broad agreement that a valuable view has been affected.

**Table 2.6: View**

*Amenity Value of a View Per Household*

Amenity	Geographic Setting	Geographic Scope	Mean	Median	Low	High
View	Urban	Nearby Local	\$12,174	\$11,360	\$7,546	\$18,429

Example: View

A proposed bypass route would run along the edge of a town in central Kentucky, near an area where new developments have recently have been built. The road would cut through a previously unobstructed view of the first foothills of the Appalachian Mountains. Residents of the subdivision complain about the potential loss of view and that the loss of view would impact the values of the property they had recently purchased. There were 25 homes at the edge of the subdivision that had this unobstructed view. What amenity value would the view hold for these households? Assuming a mean value of \$12,174 for a view in 2003 dollars, the lost view would be valued at 25 (number of households with and unobstructed view) multiplied by \$12,174 or \$304,400.

*G. Historic Sites or Buildings*

Road construction or widening sometimes requires the taking of historic properties. The most obvious examples of this occur in the case of road widening, or upgrade. Historic buildings frequently would have been placed adjacent to the original roadway. This section considers historic buildings, whether in a rural setting, or in the “Main Street” area (in the case of widening a road in town), that would need to be taken as the road is expanded to meet modern safety standards and levels of traffic flow.

As described above, historic buildings affected by road projects can be found in both an urban and non-urban geographic setting. While these buildings could affect the property values of their immediate neighbors, we will focus on the effect on the broader community. The geographic scope of historic properties is therefore local rather than nearby local in nature.

Cultural and historic amenities have not been as much a focus in economic research as environmental amenities. While, there have been several recent studies, only one was applicable for the purposes of this model (Chambers et al., 1998). That study valued the preservation of an historic school building. The mean value to preserve the building was \$7.27. Thus, our estimate of the mean value per building per household for historic structures was \$7.27. This value must be used with some caution, obviously, given the need for more studies to identify a range of values.

**Table 2.7: Historic Property**

*Amenity Value of a Historic Property Per Household Per Preserved/Restored Building*

Amenity	Geographic Setting	Geographic Scope	Mean	Median	Low	High
Historic Building	Urban	Local	\$7.2667	\$7.2667	\$7.2667	\$7.2667
Historic Building	Non-Urban	Local	\$7.2667	\$7.2667	\$7.2667	\$7.2667

Example: Historic Property

The proposed expansion of a two-lane road to a four-lane road in London, Kentucky would require the taking of a historic building located on the edge of the existing two-lane road as it leaves town and enters the countryside. What amenity value would the taking of this building hold for households in London/Laurel County? There are 20,400 households in Laurel County. Utilizing the median value from the range, multiply \$7.27 by 20,400 households to estimate an amenity value of \$148,300.

### III. Amenity Value Model

---

A software model was developed to aid transportation planners in using the results of this study to estimate amenity values (both positive and negative) resulting from transportation projects. The software package allows the planner to select the relevant amenity, indicate the size of the affected amenity, the number of households effected, and the geographic setting of the amenity (in an urban versus non-urban area), in order to estimate the value of the amenity affected by the transportation project. Essentially, this will allow a transportation planner to run the types of simulations given in Chapter II as examples.

This chapter provides a description of the model and its capabilities. Appendix 1 provides examples of how to use the model for estimation. The model is organized as an excel workbook, or a single excel file containing multiple worksheet pages where the sections of the model are found. This design organizes data in such a way that retrieval of specific data is simplified through the use of pivot tables. Pivot tables are simply a way to extract data from an excel file.

There are several worksheet pages, including the following:

- Instructional Page - contains detailed instructions as to how to use the model as well as an interactive example.
- Source Data - this page holds all of the data used in the model. A sample piece of the source data is below <sup>3.1</sup>:

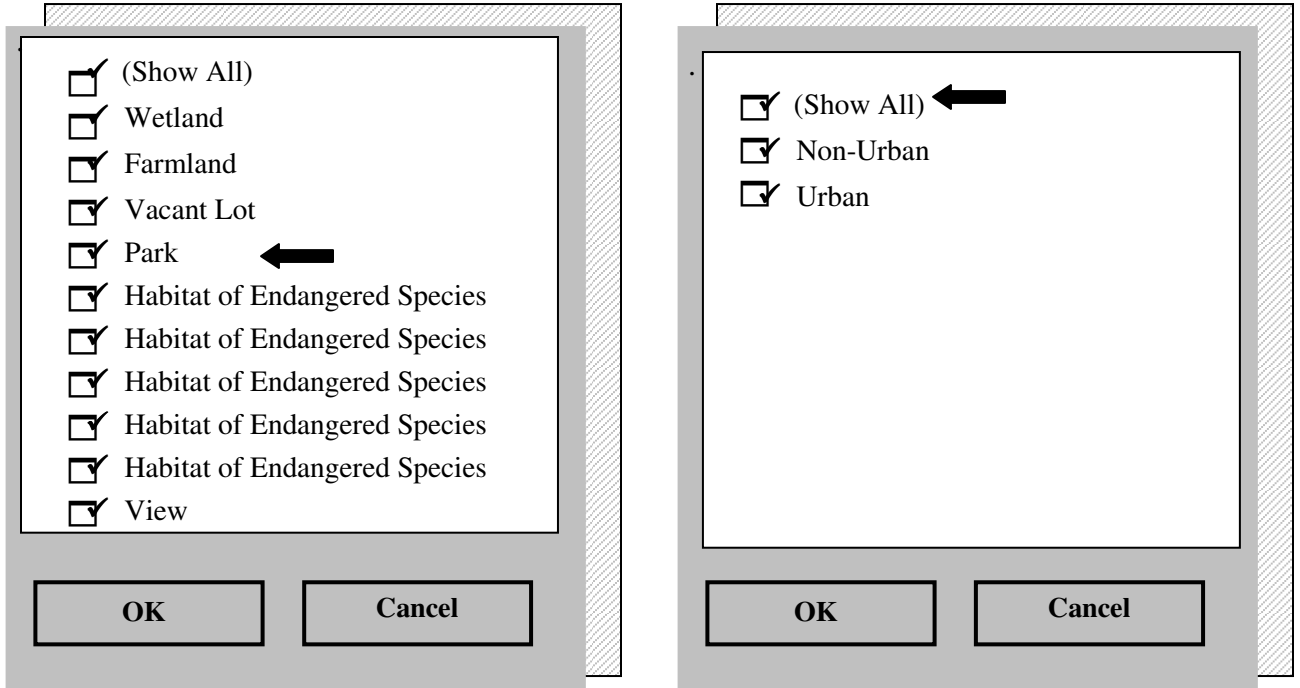
1

**Table 3.1: Source Data**

Amenity Name	Geography setting	Geographic scope	Mean value	Median value	High	Low
Wetland	Non-Urban	Statewide	0.005004544	\$0.00	0.0025	0.0106347
Wetland	Non-Urban	Local	0.003859959	\$0.00	0.001	0.0068623
Farmland	Non-Urban	Local	0.2314	\$0.17	0.0662	0.516

- Pivot Table - contains a pivot table and other calculators to retrieve data from the source data page. The pivot table contains several pull down menus to narrow down this data. The following is an example of how two of these pull down menus look:<sup>3.2</sup>

**Table 3.2: Pivot Table**



- Bibliography Page - lists all sources used in the calculations of values used in the pivot table. Also lists sources that were not used directly in calculations but could be used in further investigations of specific topics.

## Appendix 1: Detailed Examples

### *Farmland*

In order to retrieve information, go to the amenities worksheet. There are seven headings in the pivot table including: Amenity Name, Geographic Setting, Geographic Scope, Mean Value, Median Value, High Value, and Low Value. The first three headings are the only ones that need to be manipulated and the final four are output data. Going from left to right, the headings become more specific. That is, Amenity Name is a broad category which is narrowed down by Geographic Scope and Setting. Each heading has a built-in pull down menu that lists all of the possibilities for that heading.

Begin by choosing the Amenity Name heading. Pull down the category menu under Amenity Name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices.<sup>4.1</sup> Click on the box next to the show all category. A check mark should appear in all of the category boxes.<sup>4.2</sup>

**Table 4.1: Farmland, Amenity Name**

The image shows a pivot table with a dropdown menu open for the 'Amenity Name' column. The dropdown list contains the following items: 'Wetland', 'Farmland', 'Vacant Lot', 'Park', 'Habitat of Endangered', 'Habitat of Endangered', 'Habitat of Endangered', 'Habitat of Endangered', 'View', and 'Historic Buildings'. A black arrow points to the downward-pointing triangle on the right side of the 'Amenity Name' header cell.

**Table 4.2: Farmland, Show All**

The image shows a dialog box titled 'Show All' for the 'Amenity Name' dropdown. It contains a list of checkboxes, each followed by a category name. The categories are: '(Show All)', 'Wetland', 'Farmland', 'Vacant Lot', 'Park', 'Habitat of Endangered Species', 'Habitat of Endangered Species', 'Habitat of Endangered Species', 'Habitat of Endangered Species', 'Habitat of Endangered Species', and 'View'. The '(Show All)' checkbox is unchecked, while all other checkboxes are checked. A black arrow points to the '(Show All)' checkbox. At the bottom of the dialog box are two buttons: 'OK' and 'Cancel'.

We can now choose the type of amenity for which we want to find a value. In this example, we will choose wetland. All of the information available about farmland is shown. Below is an example of the type of information extracted by the pivot table.<sup>4.3</sup>



**Table 4.3: Farmland, Pivot**

Amenity Name	Geography setting	Geographic scope	Mean value	Median value	High	Low
Farmland	Non-Urban	Local	0.185447429	0.08	0.516	0.001637

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only one type of data - non-urban - and therefore can be left alone. Geographic scope also has only one category - local - and therefore this amenity has been narrowed as much as it can be.

Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: <sup>4.4</sup>

**Table 4.4: Farmland, Form**

No. of Acres:	<input style="width: 100px;" type="text" value="???"/>
Value of Acres:	<input style="width: 100px;" type="text"/>
No. of Households:	<input style="width: 100px;" type="text" value="???"/>
Total Value:	<input style="width: 100px;" type="text"/>

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity.

For example, one has 1,000 acres of farmland that is non-urban and locally valued. This is entered into the calculator. The calculator queries the pivot table and determines that the 1,000 acres of farmland is worth \$185.45 per household in the area. It is also known that there are 1,000 relevant households. This

information is put into the calculator and a total value of \$185,450.00 is determined. Below is an example of what this output would look like: <sup>4.5</sup>

**Table 4.5: Farmland, Calculator**

No. of Acres:	1,000
Value of Acres:	\$185.45
No. of Households:	1,000
Total Value:	\$185,450.00

Thus, the 1,000 acres of farmland is valued \$185,450.

### *Wetlands*

As with the farmland example, go first to the amenities worksheet. Note that there are seven headings and that the first three headings are the only ones that need to be manipulated and the final four are output data. Going from left to right, the headings become more specific. Begin by choosing the amenity name heading - wetland. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. <sup>4.6</sup> Click on the box next to the show all category. A check mark should appear in all of the category boxes. <sup>4.7</sup>

**Table 4.6: Wetlands, Amenity Name**

Amenity Name ▼
Wetland
Farmland
Vacant Lot
Park
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
View
Historic Buildings

**Table 4.7: Wetlands, Show All**

(Show All)

Wetland

Farmland

Vacant Lot

Park

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

View

We can now choose which type of amenity we want to value. In this example, we will choose wetlands. All the information available about farmland is shown. On the next page there is an example of the type of information extracted by the pivot table.<sup>4.8</sup>

**Table 4.8: Wetlands, Pivot A**

Amenity Name	Geography setting	Geographic scope	Mean value	Median value	High	Low
Wetland	Non-Urban	Statewide	0.0953794	0.060875	0.199243	0.0419404
	Urban	Nearby Local	51.66124	51.66124	66.65568	36.6668

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only two types of data - non-urban and urban and therefore must be narrowed down. To do this, choose one type of geographic setting from the pull down menu. We will choose non-urban for this example. Below is an example of the pivot table narrowed down to one row of data.<sup>4.9</sup>

**Table 4.9: Wetlands, Pivot B**

Amenity Name	Geography setting	Geographic scope	Mean value	Median value	High	Low
Wetland	Non-Urban	Statewide	0.0953794	0.060875	0.199243	0.0419404

Geographic scope also has only one category - statewide - and therefore this amenity has been narrowed as much as it can be. Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: <sup>4.10</sup>

**Table 4.10: Wetlands, Form**

No. of Acres:	???
Value of Acres:	
No. of Households:	???
Total Value:	

To determine the value of the amenity per household, enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity.

For example, one has 1,000 acres of wetland that is non-urban and valued statewide. This is entered into the calculator. The calculator queries the pivot table and determines that 1,000 acres of wetland is worth \$95.38 to a single household in the area. It is also known that there are 1,000 relevant households. This information is put into the calculator and a total value of \$95,379.44 is determined. Below is an example of what this output would look like: <sup>4.11</sup>

**Table 4.11: Wetlands, Calculator**

No. of Acres:	1,000
Value of Acres:	\$95.38
No. of Households:	1,000
Total Value:	\$95,379.44

This means that 1,000 acres of wetland is valued at \$95,379.

**Vacant Lot**

Begin by choosing the amenity name heading – Vacant Lot. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. <sup>4.12</sup> Click on the box next to the Vacant Lot Category. <sup>4.13</sup>

**Table 4.12: Vacant Lot, Amenity Name**

<b>Amenity Name</b> ▼
Wetland
Farmland
Vacant Lot
Park
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
View
Historic Buildings

**Table 4.13: Vacant Lot, Show All**

<input type="checkbox"/> (Show All)
<input type="checkbox"/> Wetland
<input checked="" type="checkbox"/> Farmland
<input checked="" type="checkbox"/> Vacant Lot
<input checked="" type="checkbox"/> Park
<input checked="" type="checkbox"/> Habitat of Endangered Species
<input checked="" type="checkbox"/> Habitat of Endangered Species
<input checked="" type="checkbox"/> Habitat of Endangered Species
<input checked="" type="checkbox"/> Habitat of Endangered Species
<input checked="" type="checkbox"/> Habitat of Endangered Species
<input checked="" type="checkbox"/> Habitat of Endangered Species
<input checked="" type="checkbox"/> View

OK Cancel

All of the information available about vacant lots is shown. Below is an example of the type of information extracted by the pivot table. <sup>4.14</sup>

**Table 4.14: Vacant Lot, Pivot**

Amenity Name	Geography setting	Geographic scope	Mean value	Median value	High	Low
Vacant Lot	Urban	Nearby Local	405.589601	405.59	216.90667	594.2727

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only one type of data - urban - and therefore can be left alone. Geographic scope also has only one category - nearby local - and therefore this amenity has been narrowed as much as it can be.

Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: <sup>4.15</sup>

**Table 4.15: Vacant Lot, Form**

No. of Acres:	<input style="width: 100px;" type="text" value="???"/>
Value of Acres:	<input style="width: 100px;" type="text"/>
No. of Households:	<input style="width: 100px;" type="text" value="???"/>
Total Value:	<input style="width: 100px;" type="text"/>

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. In the case of a vacant lot, this input will most likely be a small number as lot availability in urban areas is limited. One acre is used in this example. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity.

For example, one is valuing a 1-acre vacant lot that is urban and valued by nearby local households. This is entered into the calculator. The calculator queries the pivot table and determines that a 1-acre vacant lot is worth \$405.59 to a single household in the area. It is also known that there are 10 relevant households. This information is put into the calculator and a total value of \$4,055.90 is determined. Below is an example of what this output would look like. <sup>4.16</sup> This means that a 1-acre vacant lot is valued at \$4,055.90.

**Table 4.16: Vacant Lot, Calculator**

No. of Acres:	1
Value of Acres:	\$405.59
No. of Households:	10
Total Value:	\$4,055.90

**Park**

First go to the amenities worksheet. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. <sup>4.17</sup> Click on the box for Park for this example. <sup>4.18</sup>

**Table 4.17: Park, Amenity Name**

Amenity Name ▼
Wetland
Farmland
Vacant Lot
Park
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
View
Historic Buildings

**Table 4.18: Park, Show All**

- (Show All)
- Wetland
- Farmland
- Vacant Lot
- Park
- Habitat of Endangered Species
- Habitat of Endangered Species
- Habitat of Endangered Species
- Habitat of Endangered Species
- Habitat of Endangered Species
- View

OK

Cancel

What is shown is all the information available about farmland. Below is an example of the type of information extracted by the pivot table. <sup>4.19</sup>

**Table 4.19: Park, Pivot A**

Amenity Name	Geography setting	Geographic scope	Mean value	Median value	High	Low
Park	Non-Urban	Statewide	0.00058508	0.000	0.0011571	0.0000285
	Urban	Nearby Local	45.94168113	45.94	49.853362	42.03

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only two types of data - non-urban and urban and therefore must be narrowed down. To do this, choose one type of geographic setting from the pull down menu. We will choose non-urban for this example. Below is an example of the pivot table narrowed down to one row of data. <sup>4.20</sup>

**Table 4.20: Park, Pivot B**

Amenity Name	Geography setting	Geographic scope	Mean value	Median value	High	Low
Park	Urban	Nearby Local	45.94168113	45.94	45.853362	42.03

Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: <sup>4.21</sup>

**Table 4.21: Park, Form**

No. of Acres:	<input style="width: 100px;" type="text" value="???"/>
Value of Acres:	<input style="width: 100px;" type="text"/>
No. of Households:	<input style="width: 100px;" type="text" value="???"/>
Total Value:	<input style="width: 100px;" type="text"/>

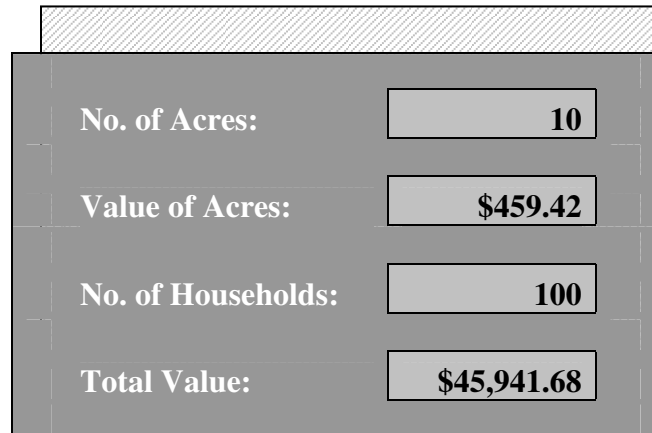
To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is



then calculated. These values are based on the pre-determined mean value of the amenity.

For example, one has 10 acres of park that is non-urban and nearby locally valued. This is entered into the calculator. The calculator queries the pivot table and determines that 10 acres of park is worth \$459.42 to a single household in the area. It is also known that there are 100 relevant households. This information is put into the calculator and a total value of \$45,941.68 is determined. Below is an example of what this output would look like: <sup>4.22</sup>

**Table 4.22: Park, Calculator**



No. of Acres:	10
Value of Acres:	\$459.42
No. of Households:	100
Total Value:	\$45,941.68

This means that 10 acres of park is valued at \$45,941.

### *Habitat of Endangered Species*

First, go to the amenities worksheet. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. <sup>4.23</sup> Click on the box for one of the endangered species for this example. <sup>4.24</sup>

**Table 4.23: Habitat of Endangered Species, Amenity Name**

Amenity Name ▼
Wetland
Farmland
Vacant Lot
Park
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
View
Historic Buildings

**Table 4.24: Habitat of Endangered Species, Show All**

(Show All)
   
 Wetland
   
 Farmland
   
 Vacant Lot
   
 Park
   
 Habitat of Endangered Species
   
 Habitat of Endangered Species
   
 Habitat of Endangered Species
   
 Habitat of Endangered Species
   
 Habitat of Endangered Species
   
 View

OK

Cancel

Notice that there are five types of habitats for endangered species. For this example we will choose “Habitat of Endangered Species - All (Birds/Mammals).” All the information available about this habitat is shown. Below is an example of the type of information extracted by the pivot table. <sup>4.25</sup>

**Table 4.25: Habitat of Endangered Species, Pivot**

Amenity Name	Geography setting	Geographic scope	Mean value	Median value	High	Low
Habitat of Endangered	Non-Urban	Statewide	.001422087	0.00	0.0061429	0.000001

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only one type of data - non-urban - and does not need to be narrowed down. Geographic scope only has one row of data as well - statewide. Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: <sup>4.26</sup>

**Table 4.26: Habitat of Endangered Species, Form**

No. of Acres:	???
Value of Acres:	
No. of Households:	???
Total Value:	

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity.

For example, one has 1,000 acres of habitat that is non-urban and valued statewide. This is entered into the calculator. The calculator queries the pivot table and determines that 1,000 acres of habitat is worth \$1.42 to a single household in the area. It is also known that there are 10,000 relevant households. This information is put into the calculator and a total value of \$14,220.87 is determined. Below is an example of what this output would look like:<sup>4.27</sup>

**Table 4.27: Habitat of Endangered Species, Calculator**

No. of Acres:	1,000
Value of Acres:	\$1.42
No. of Households:	10,000
Total Value:	\$14,220.87

This means that 1,000 acres of habitat is valued at \$14,220.

**View**

First go to the amenities worksheet. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. <sup>4.28</sup> Click on the box for View for this example. <sup>4.29</sup>

**Table 4.28: View, Amenity Name**

Amenity Name ▼
Wetland
Farmland
Vacant Lot
Park
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
View
Historic Buildings

**Table 4.29: View, Show All**

(Show All) ←

Wetland

Farmland

Vacant Lot

Park

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

View

All the information available about views is shown. Below is an example of the type of information extracted by the pivot table. <sup>4.30</sup>

**Table 4.30: View, Pivot**

Amenity Name	Geography setting	Geographic scope	Mean value	Median value	High	Low
View	Urban	Nearby Local	12,173.74	11,360.21	18,428.63	7,545.95

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only one type of data - urban - and does not need to be narrowed down. Geographic scope only has one row of data as well - nearby local. Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: <sup>4.31</sup>

**Table 4.31: View, Form**

No. of Acres:	???
Value of Acres:	
No. of Households:	???
Total Value:	

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity. In the case of views, this is not expressed in acres but in total number of views.

For example, one has a view that is urban and nearby locally valued. This is entered into the calculator. The calculator queries the pivot table and determines that the view is worth \$12,173.75 to a single household in the area. It is also known that there are 10 households with an unobstructed view. This information is put into the calculator and a total value of \$121,737.47 is determined. Below is an example of what this output would look like: <sup>4.32</sup>

**Table 4.32: View, Calculator**

No. of Acres:	1
Value of Acres:	\$12,173.75
No. of Households:	10
Total Value:	\$121,737.47

This means the view is valued at \$121,737.

**Historic Buildings**

First, go to the amenities worksheet. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. <sup>4.33</sup> Click on the box for Historic Buildings for this example. <sup>4.34</sup>

**Table 4.33: Historic Buildings, Amenity Name**

<b>Amenity Name</b> ▼
Wetland
Farmland
Vacant Lot
Park
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
Habitat of Endangered
View
Historic Buildings

**Table 4.34: Historic Buildings, Show All**

(Show All) ←

Wetland

Farmland

Vacant Lot

Park

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

Habitat of Endangered Species

View

All the information available about historic buildings is shown. Below is an example of the type of information extracted by the pivot table. <sup>4.35</sup>

**Table 4.35: Historic Buildings, Pivot**

Amenity Name	Geography setting	Geographic scope	Mean value	Median value	High	Low
Historic Buildings	Non-Urban	Local	7.2666667	7.27	7.2666667	7.2666667
	Urban	Local	7.2666667	7.27	7.2666667	7.2666667

In order to use this data we must narrow it down further wherever there is more than one row of data. In this case, although there is more than one row of data, the data is the same in both categories. Therefore, we do not have to narrow down the data any further. Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: <sup>4.36</sup>

**Table 4.36: Historic Buildings, Form**

No. of Acres:	???
Value of Acres:	
No. of Households:	???
Total Value:	

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity. In this case, we are working with number of buildings instead of acres.

For example, one has a historic building that is either non-urban or urban and locally valued. This is entered into the calculator. The calculator queries the pivot table and determines that a historic building is worth \$7.27 to a single household in the area. It is also known that there are 10,000 relevant households. This information is put into the calculator and a total value of \$72,666.67 is determined. Below is an example of what this output would look like:<sup>4.36</sup>

**Table 4.37: Historic Buildings, Calculator**

No. of Acres:	1
Value of Acres:	\$7.27
No. of Households:	10,000
Total Value:	\$72,666.67

This means that one historic building is valued at \$72,666.67.

**Appendix 1**  
**Sources for Amenity Value Estimates**

**Wetlands**

An, M. Y., "A Semiparametric Distribution for Willingness to Pay and Statistical Inference with Dichotomous Choice Contingent Valuation Data." *American Journal of Agricultural Economics* 82 (2000): 487-500.

Bateman, I. J., I. H. Langford, A. P. Jones, and G. N. Kerr, "Bound and Path Effects in Double and Triple Bounded Dichotomous Choice Contingent Valuation." *Resource and Energy Economics* 23, no.3 (2001): 191-213.

Beran, L. J., "Measuring the Economic Benefits of the Provision of Nonmarket Goods: Freshwater Wetlands in South Carolina." Dissertation, Clemson University, 1995.

Blomquist, G. C. and J. C. Whitehead, "Resource Quality Information and Validity of Willingness to Pay in Contingent Valuation." *Resource and Energy Economics* 20, no.2 (1998): 179-196.

de Zoysa, A.D.N., "A Benefit Evaluation of Programs to Enhance Groundwater Quality, Surface Water Quality and Wetland Habitat in Northwest Ohio." Dissertation, The Ohio State University, 1995.

Cooper, J. and J. Loomis, "Testing Whether Waterfowl Hunting Benefits Increase with Greater Water Deliveries to Wetlands." *Environmental and Resource Economics* 3 (1993): 545-561.

Hanemann, M., J. Loomis, and B. Kanninen, "Statistical Efficiency of Double-Bounded Dichotomous Choice Contingent Valuation." *American Journal of Agricultural Economics* 73, no. 4, (1991): 1255-1263.

Hoehn, J. P. and A. Randall, "The Effect of Resource Quality Information on Resource Injury Perceptions and Contingent Values." *Resource and Energy Economics* 24 (2002): 13-31.

Kahneman, D., and I. Ritor, "Determinants of Stated Willingness to Pay for Public Goods: A Study in the Headline Method." *Journal of Risk and Uncertainty* 9, no. 1, (1994): 5-38.



Lant, C.L., and G.A. Tobin, "The Economic Value of Riparian Corridors in Cornbelt Floodplains: A Research Framework." *Professional Geographer* 41, no. 3, (1989): 337-349.

Lupi, F, and T. Graham-Tomasi, and S.J. Taff, "A Hedonic Approach To Urban Wetland Valuation." Department of Agricultural and Applied Economics, University of Minnesota, Staff Paper Series P91-8. 1991.

MacDonald, H.F., J.C. Bergstrom, and J.E. Houston, "A Proposed Methodology for Measuring Incremental Environmental Benefits from Using Constructed Wetlands to Control Agricultural Non-point Source Pollution." *Journal of Environmental Management* 54, no.4 (1998): 259-267.

Mahan, B. L., P. Polasky, and R. M. Adams, "Valuing Urban Wetlands: A Property Price Approach." *Land Economics* 76, no.1 (2000): 100-113.

Pate, J. and J. Loomis, "The Effect of Distance on Willingness to Pay Values: a Case Study of Wetlands and Salmon in California." *Ecological Economics* 20, no. 3, (1997): 199-207.

van Kooten, G.C., and A. Schmitz, "Preserving Waterfowl Habitat on the Canadian Prairies: Economic Incentives versus Moral Suasion." *American Journal of Agricultural Economics* 74, no. 1, (1992): 79-89.

Whitehead, J.C., P.A. Groothuis, and G.C. Blomquist, "Testing for Non-Response and Sample Selection Bias in Contingent Valuation: Analysis of a Combination Phone/Mail Survey." *Economics Letters* 41, no. 2, (1993): 215-220.

Whitehead, John C., "Environmental Interest Group Behaviour and Self-Selection Bias in Contingent Valuation Mail Surveys." *Growth and Change* 22, no. 11, (1991): 10-21.

Whitehead, John C. and Glenn C. Blomquist., "Measuring Contingent Values for Wetlands: Effects of Information About Related Environmental Goods." *Water Resources Research* 27, no. 10, (1991): 2523-2531.

### **Farm Land**

Halstead, John M. "Measuring the Nonmarket Demand Value of Massachusetts Agricultural Land; A Case Study." *Journal of the Northeastern Agricultural Economics Council* 13, no.1 (1984): 12-19.

Ready, Richard C, Mark C. Berger, and Glenn C. Blomquist. "Measuring Amenity Benefits from Farmland: Hedonic Pricing vs. Contingent Valuation." *Growth and Change* 28 (Fall 1997): 438-458.

Beasley, Steven D., William G. Workman, and Nancy A. Williams. "Estimating Amenity Values of Urban Fringe Farmland: A Contingent Valuation Approach: Note." *Growth and Change* 15 (Fall 1986): 70-78.

### **Habitat of Endangered Species**

Bennett, J.W. "Using Direct Questioning to Value the Existence Benefits of Preserved Natural Areas." *Australian Journal Of Agricultural Economics* 28, no. 2,3 (1984): 136-152.

Delforce, R.J., Sinden, J.A. & Young, M.D. "Policy Preferences and Social Economic Values to Resolve Pastoralism-Tourism Conflicts." *Landscape Planning* 12 (1986): 387-401.

Echeverria, J., Hanrahan, M. and Solorzano, R. "Valuation of Non-priced Amenities Provided by the Biological Resources Within the Monteverde Cloud Forest Preserve, Costa Rica." *Ecological Economics* 13 (1995): 43-52.

Everitt, A. "A Valuation of Recreational Benefits." *New Zealand Journal of Forestry* 28, no. 2 (1983): 176-183.

Flatley, G.W. and Bennett, J.W. "Using Contingent Valuation to Determine Australian Tourists' Values for Forest Conservation in Vanuatu." *Economic Analysis and Policy* 26, no. 2 (1996): 111-127.

Garrod, G.D. & Willis, K.G. "The non-use benefits of enhancing forest biodiversity: A contingent ranking study." *Ecological Economics* 21 (1997): 45-61.

Gillespie, R. (1997) Economic Value and Regional Economic Impact of Minnamurra Rainforest Centre, Budderoo National Park, NSW National Parks and Wildlife Service.

Reaves, Dixie Watts, Randall A. Kramer, and Thomas P. Holmes. Does Question Format Matter? Valuing an Endangered Species. *Environmental and Resource Economics* 14: 365-383.

Woodfileld, A. & Cowie, D. "The Milford Track: Valuation Estimates of a Recreation Good." *Australian Journal Of Agricultural Economics* 2, no. 2 (1977): 97-110.

Willis, K.G. and Garrod, G. "An Individual Travel-Cost Method of Evaluating Forest Recreation." *Journal of Agricultural Economics* 42 (1991): 33-42.

Willis, K.G. & Garrod, G.D. "Valuing Landscape: a Contingent valuation Approach." *Journal Of Environmental Management* 37 (1993): 1-22.

Walsh, R.G., Loomis, J.B. & Gillman, R.A. "Valuing Option, Existence and Bequest Demands for Wilderness." *Land Economics* 60, no. 1 (1984): 14-29.

### **Open spaces/Vacant Land**

Breffle, W.S., E.R. Morey, and T.S. Lodder. "Using Contingent Valuation to Estimate a Neighborhood's Willingness to Pay to Preserve Undeveloped Land." *Urban Studies* 35, no. 4 (1998): 715-727.

Smith, V. Kerry, Christine Poulos, and Hyun Kim. "Treating open space as an urban amenity." *Resource and Energy Economics* 24, (2002): 107-129.

### **Parkland**

Correll, Mark R., Jane H Lillydahl, and Larry D. Singell. "The Effects of Greenbelts on Residential Property Values: Some Findings on the Political Economy of Open Space." *Land Economics* 54, no. 2, (1978): 207-217.

Keith, J.E., C. Fawson, V. Johnson, "Preservation or Use: A Contingent Valuation Study of Wilderness Designation in Utah." *Ecological Economics* 18, no. 3, (1996): 207-214.

Kimmel, Margaret M., "Parks and Property Values: An Empirical Study in Dayton and Columbus Ohio." Miami University, Institute of Environmental Science, M.S. Thesis, 1985.

McFadden, D., "Contingent Valuation and Social Choice." *American Journal of Agricultural Economics* 76, (1994): 689-708.

Richer, J. "Willingness to Pay for Desert Protection." *Contemporary Economic Policy* 13, no. 4 (1995): 93-104.

Walsh, R.G., J.B. Loomis, and R.A. Gillman. "Valuing Option, Existence, and Bequest Demands for Wilderness." *Land Economics* 60, no 1, (1984): 14-29.

Walsh, R.G., Bjonback, R.D., Aiken, R.A. & Rosenthal, D.H. "Estimating the Public Benefits of Protecting Forest Quality." *Journal of Environmental Management* 30 (1990): 175-189.

### **View**

Darling, Arthur H. "Measuring Benefits Generated By Urban Water Parks." *Land Economics* 49 (February 1973): 22-34.

Do, A. Q., and C.F. Sirmans, "Residential Property Tax Capitalization: Discount Rate Evidence from California." *National Tax Journal* 47 (June 1994): 341-348.

Gillard, Quentin, "The Effect of Environmental Amenities on House Values: The Example of a View Lot." *Professional Geographer* 32, no 2, (1981): 216-220.

Weicher, John C., and Robert H. Zerbst. "The Externalities of Neighborhood Parks: An Empirical Investigation." *Land Economics* 49 (Feb 1973): 99-105.

### **Historic Buildings**

Chambers, Catherine M., Paul E. Chambers, and John C. Whitehead (1973).

Garrod, G.D., K.G. Willis, H. Bjarnodottir, and P. Cockbain (1996). *The Non-Priced Benefits of Renovating Historic Buildings*.

## **Appendix 2: Extended Bibliography**

- Acharya G., and E. Barbier, "Using Domestic Water Analysis to Value Groundwater Recharge in the Hadejia-Jama'are Floodplain, Northern Nigeria." *American Journal of Agricultural Economics* 84, no. 2 (2002): 415-426.
- Adamowicz, W., J. Louviere, and M. Williams, "Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities." *Journal of Environmental Economics and Management* 26, no. 2 (1994): 271-292.
- Adamowicz, W., P. Boxall, M. Williams, and J. Louviere, "Stated Preference Approaches for Measuring Passive Use Values: Choice Experiments and Contingent Valuation." *American Journal of Agricultural Economics* 80 (1998): 64-75.
- Adamowicz, W.L. and B. Condon, "Socio-Economic Aspects of Marten Management." *Martes: Taxonomy, Ecology, Techniques and Management*, edited by Gilbert Proulx, Harold Bryant and Paul Woodard, 395-406. The Provincial Museum of Alberta, Edmonton, Alberta, Canada, 1997.
- Agostini, P., "Economic Analysis of Ecologically Sensitive Areas in Developing Countries." Dissertation, University of California, San Diego, 1995.
- Aiken, R., "Public Benefits of Environmental Protection in Colorado." Masters thesis, Colorado State University, 1985.
- An, M. Y., "A Semiparametric Distribution for Willingness to Pay and Statistical Inference with Dichotomous Choice Contingent Valuation Data." *American Journal of Agricultural Economics* 82 (2000): 487-500.
- Anderson, R. and M. Rockel, *Economic Valuation of Wetlands.*, Discussion Paper #065, American Petroleum Institute, Washington, D.C., 1991.
- Bann, C., "An Economic Analysis of Alternative Mangrove Management Strategies in Koh Kong Province, Cambodia." *Economy and Environment Program for Southeast Asia*, International Development Research Centre, 1997.
- Barrick, K.A. and R.I. Beazley, "Magnitude and Distribution of Option Value for the Washakie Wilderness, Northwest Wyoming, USA." *Environmental Management* 14, no. 3 (1990): 367-380.

- Bateman, I. J., I. H. Langford, A. P. Jones, and G. N. Kerr, "Bound and Path Effects in Double and Triple Bounded Dichotomous Choice Contingent Valuation." *Resource and Energy Economics* 23, no.3 (2001): 191-213.
- Bateman, I., K. Willis, and G. Garrod, "Consistency Between Contingent Valuation Estimates: A Comparison of Two Studies of UK National Parks." *Regional Studies* 28, no. 5 (1993): 457-474.
- Bateman, I.J. and I.A. Langford, "Non-users Willingness to Pay for a National Park: An Application and Critique of the Contingent Valuation Method." *Regional Studies* 31 (1997): 571-582.
- Bateman, I.J., Langford, I.H., Turner, R.K., Willis, K.G. and Garrod, G.D., "Elicitation and truncation effects in contingent valuation." *Ecological Economics* 12 (1995): 161-179.
- Beasley, Steven D., William G. Workman, and Nancy A. Williams. "Estimating Amenity Values of Urban Fringe Farmland: A Contingent Valuation Approach: Note." *Growth and Change* 15 (Fall 1986): 70-78.
- Beeusaert, D.M., "The Non-Consumptive Values of Wildlife in the Riding Mountain Area." Dissertation, The University of Manitoba, 1995.
- Bell, F.W. and V.R. Leeworthy, "Recreational Demand by Tourists for Saltwater Beach Days." *Journal of Environmental Economics and Management* 18 (1990): 189-205.
- Bell, F.W., "The Economic Valuation of Saltwater Marsh Supporting Marine Recreational Fishing in the Southeastern United States." *Ecological Economics* 21 (1997): 243-254.
- Bell, Frederick W., *Recreational Benefits for the Atchafalaya River Basin.*, Prepared for U.S. Fish and Wildlife Service, Washington, D.C., Contract Number 14-16-009-80-009, 1981, p. 228, 1981.
- Bennett, J.W. (1984). "Using Direct Questioning to Value the Existence Benefits of Preserved Natural Areas." *Australian Journal Of Agricultural Economics* 28, no. 2,3 (1984): 136-152.
- Beran, L. J., "Measuring the Economic Benefits of the Provision of Nonmarket Goods: Freshwater Wetlands in South Carolina." Dissertation, Clemson University, 1995.

Bergstrom, J.C., J.R. Stoll, J.R. Titre, and V.L. Wright, "Economic Value of Wetlands-Based Recreation." *Ecological Economics* 2 (1990): 129-147.

Berrens, R. P., A. K. Bohara, C. L. Silva, D. Brookshire, and M. McKee, "Contingent Values for New Mexico Instream Flows: With Tests of Scope, Group-Size Reminder and Temporal Reliability." *Journal of Environmental Management* 58, no. 1 (2000): 73-90.

Berrens, R.P., P. Ganderton, and C. Silva, "Valuing the Protection of Minimum Instream Flows in New Mexico." *Journal of Agricultural and Resource Economics* 21, no. 2 (1996): 294-309.

Bishop, R.C. and K.J. Boyle, *The Economic Value of Illinois Beach State Nature Preserve*, Heberlein Baumgartner Research Services, Madison, Wisconsin, 1985.

Bishop, R.C., K.J. Boyle, and M.P. Welsh, "Toward Total Economic Valuation of Great Lakes Fishery Resources." *Transactions of the American Fisheries Society* 116 (1987): 339-345.

Bishop, Richard C., Thomas A. Heberlein and Mary Jo Kealy, "Contingent Valuation of Environmental Assets: Comparisons with a Simulated Market." *Natural Resources Journal* 23, no. 3 (1983): 619-633.

Blomquist, G. C. and J. C. Whitehead, "Resource Quality Information and Validity of Willingness to Pay in Contingent Valuation." *Resource and Energy Economics* 20, no.2 (1998): 179-196.

Bockstael, N.E., W.M. Hannemann, and C.L. Kling, "Estimating the Value of Water Quality Improvements in a Recreational Demand Framework." *Water Resources Research* 23, no. 5 (1987): 951-960.

Bonnieux, F. and P. Le Goffe, "Valuing the Benefits of Landscape Restoration: a Case Study of the Cotentin in Lower-Normandy, France." *Journal of Environmental Management* 50, no.3 (1997): 321-333.

Bowker, J.M. and J.R. Stoll, "Use of Dichotomous Choice Nonmarket Methods to Value the Whooping Crane Resource." *American Agricultural Economics Association* (1988): 373-381.

Boyle, K. J. and R.C. Bishop, "Valuing Wildlife in Benefit-Cost Analyses: A Case Study Involving Endangered Species." *Water Resources Research* 23, no. 5 (1987): 943-950.

- Boyle, K.J., and R.C. Bishop, "Welfare Measurements Using Contingent Valuation: A Comparison of Techniques." *American Journal of Agricultural Economics* 70, no. 1 (1988): 20-28.
- Boyle, K.J., W.H. Desvousges, F.R. Johnson, R.W. Dunford, and S.P. Hudson, "An Investigation of Part-Whole Biases in Contingent-Valuation Studies." *Journal of Environmental Economics and Management* 27, no. 1 (1994): 64-83.
- Breaux, Andree., Stephen Farber, and John Day., "Using Natural Coastal Wetlands to Wastewater Treatment: An Economic Benefit Analysis." *Journal of Environmental Management* 44 (1995): 285-291.
- Breffle, W.S., E.R. Morey, and T.S. Lodder, "Using Contingent Valuation to Estimate a Neighborhood's Willingness to Pay to Preserve Undeveloped Land." *Urban Studies* 35, no. 4 (1998): 715-727.
- Brouwer, R., "Public Right of Access, overcrowding and the value of peace and quiet: the validity of contingent valuation as an Information tool." Centre for Social and Economic Research on the Global Environment (CSERGE) Working Paper GEC 99-05. University of East Anglia and University College London, 1999.
- Brouwer, R., I.H. Langford, I.J. Bateman, T.C. Crowards and R.K. Turner, "A Meta-Analysis of Wetland Contingent Valuation Studies." Centre for Social and Economic Research on the Global Environment, Working Paper GEC97-20, 1997.
- Burtraw, D., A. Krupnick, E. Mansur, D. Austin, and D. Farrell, "The Costs and Benefits of Reducing Acid Rain." Discussion Paper 97-31-REV, Resources for the Future, 1997.
- Cangelosi, A., R. Wiher, J. Taverna, and P. Cicero, "The Benefits of Sediment Remediation" in the Revealing the Economic Value of Protecting the Great Lakes, National Oceanic and Atmospheric Administration, and Northeast-Midwest Institute, 2001.
- Cangelosi, A., R. Wiher, J. Taverna, and P. Cicero, "The Benefits of Sediment Remediation" in the Revealing the Economic Value of Protecting the Great Lakes, National Oceanic and Atmospheric Administration, and Northeast-Midwest Institute, 2001.
- Cangelosi, A., R. Wiher, J. Taverna, and P. Cicero, "Wetlands Restoration in Saginaw Bay" in the Revealing the Economic Value of Protecting the Great Lakes,



Final Report  
*System for Valuing Changes to Environmental Amenities*

National Oceanic and Atmospheric Administration, and Northeast-Midwest Institute, 2001.

Carman, M., Lamb, G., Miller, A., Sadowske, S., and Shaffer, R., "The Oconto Waterfront: Issues and Options A Survey of Oconto Residents." National Coastal Resources Research and Development Institute, 1992.

Carson, R. T., R.C. Mitchell, W.M. Hanemann, R. J. Kopp, S. Presser and P.A. Ruud, A Contingent Valuation Study of Lost Passive Use Values Resulting From the Exxon Valdez Oil Spill. Report to the Attorney General of the State of Alaska, Reprinted by Natural Resource Damage Assessment, Inc., 1992.

Carson, R.T., N.E. Flores, K.M. Martin, and J.L. Wright, "Contingent Valuation and Revealed Preference Methodologies: Comparing the Estimates for Quasi-Public Goods." *Land Economics* 72, no. 1 (1996): 80-99.

Carson, R.T., W.M Hanemann, R.J. Kopp, J.A. Krosnick, R.C. Mitchell, S. Presser, P.A. Ruud, and V.K. Smith, Prospective Interim Lost Use Value due to DDT and PCB Contamination in the Southern California Bight., Report to the National Oceanic and Atmospheric Administration, produced by Natural Resources Damage Assessment, Inc., La Jolla, CA, 1994.

Champ, P. A., R. C. Bishop, T. C. Brown, and D. W. McCollum, "Using Donation Mechanisms to Value Nonuse Benefits from Public Goods." *Journal of Environmental Economics and Management* 33, no. 2 (1997): 151-162.

Christiansen, G., Economic Value of Recreational Use: Hartley Historic Site, Economics and Regulatory Reform Policy Unit NSW National Parks and Wildlife Service, 1997.

Chuenpagdee, R., "Damage Schedules for Thai Coastal Areas: An Alternative Approach to Assessing Environmental Values." Economy and Environment Program for Southeast Asia, International Development Research Centre, 1998.

Clark, D.E. and J.R. Kahn, "The Two-Stage Hedonic Wage Approach: A Methodology for the Valuation of Environmental Amenities." *Journal of Environmental Economics and Management* 16 (1989): 106-120.

Condon, Barbra, The Economic Valuation of Nontimber Resources in Newfoundland: A CVM Approach, MSc. Thesis. Department of Rural Economy. University of Alberta, 1993.

Cooper, J. and J. Loomis, "Testing Whether Waterfowl Hunting Benefits Increase with Greater Water Deliveries to Wetlands." *Environmental and Resource Economics* 3 (1993): 545-561.

Cooper, J. and J. Loomis., "Sensitivity of Willingness-to-Pay Estimates to Bid Design in Dichotomous Choice Contingent Valuation Models." *Land Economics* 68, no. 2 (1992): 211-224.

Correll, Mark R., Jane H Lillydahl, and Larry D. Singell, "The Effects of Greenbelts on Residential Property Values: Some Findings on the Political Economy of Open Space." *Land Economics* 54, no. 2 (1978): 207-217.

Costanza, R., R. d'Arge, R. de Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R.V. O'Neill, J. Paruelo, R.G. Raskin, P. Sutton, and M. van den Belt, "The Value of the World's Ecosystem Services and Natural Capital." *Nature* 387 (1997): 253-260.

Costanza, Robert, Stephen C. Farber and Judith Maxwell, "Valuation and Management of Wetland Ecosystems." *Ecological Economics* 1 (1989): 335-361.

Creel, Michael and John Loomis, "Recreation Value of Water to Wetlands in the San Joaquin Valley: Linked Multinomial Logit and Count Data Trip Frequency Models." *Water Resources Research* 28, no. 10 (1992): 2597-2606.

Dalecki, G.M., J.C. Whitehead, and G.C. Blomquist, "Sample Non-response Bias and Aggregate Benefits in Contingent Valuation: an Examination of Early, Late and Non-respondents." *Journal of Environmental Management* 38 (1993): 133-143.

Danielson, L.E. and J.A. Leitch, "Private vs Public Economics of Prairie Wetland Allocation." *Journal of Environmental Economics and Management* 13, no. 1 (1986): 81-92.

Darling, Arthur H. "Measuring Benefits Generated By Urban Water Parks." *Land Economics* 49 (February 1973): 22-34.

Darwin, R. F. and R. S. J. Tol, "Estimates of the Economic Effects of Sea Level Rise." *Environmental and Resource Economics* 19 (2001): 113-129.

de Groot, A.W.M and J.W. Velthuisen, "Natural Arguments for Policy Makers: a Case Study of a Dutch National Park." Paper presented at the 9.th annual conference of the European Association of Environmental and Resource Economists, Oslo, June 25-27, 1999.

de Zoysa, A.D.N., "A Benefit Evaluation of Programs to Enhance Groundwater Quality, Surface Water Quality and Wetland Habitat in Northwest Ohio." Dissertation, The Ohio State University, 1995.

Degenhardt, S., and Gronemann, S., "The Willingness to Pay for Nature Conservation by Holiday Visitors to GoehrenDie" (Zahlungsbereitschaft von Urlaubsgaesten fuer den Naturschutz). Peter Land GmbH, Frankfurt am Main , 1998.

Delforce, R.J., Sinden, J.A. & Young, M.D. "Policy Preferences and Social Economic Values to Resolve Pastoralism-Tourism Conflicts." *Landscape Planning* 12 (1986): 387-401.

Do, A. Q., and C.F. Sirmans. "Residential Property Tax Capitalization: Discount Rate Evidence from California." *National Tax Journal* 47 (June 1994): 341-348.

Duffield, J. and C. Neher, "Montana Waterfowl Hunting, A Contingent Valuation Assessment of Economic Benefits to Hunters." Montana Department of Fish, Wildlife and Parks, 1991.

Echeverria, J., Hanrahan, M. and Solorzano, R. "Valuation of Non-priced Amenities Provided by the Biological Resources Within the Monteverde Cloud Forest Preserve, Costa Rica." *Ecological Economics* 13 (1995): 43-52.

[http://www.sciencedirect.com/science?\\_ob=MIimg&\\_imagekey=B6VDY-3Y5FD33-G-3&\\_cdi=5995&\\_orig=browse&\\_coverDate=04%2F30%2F1995&\\_sk=999869998&\\_view=c&\\_wchp=dGLbVtb-zSkWW&\\_acct=C000001898&\\_version=1&\\_userid=16764&\\_md5=efc7510b52727f25008c4d7d434d3097&\\_ie=f.pdf](http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6VDY-3Y5FD33-G-3&_cdi=5995&_orig=browse&_coverDate=04%2F30%2F1995&_sk=999869998&_view=c&_wchp=dGLbVtb-zSkWW&_acct=C000001898&_version=1&_userid=16764&_md5=efc7510b52727f25008c4d7d434d3097&_ie=f.pdf)

Economic Analysis Inc., and Applied Science Associates Inc., "Measuring Damages to Coastal and Marine Natural Resources: Concepts and Data Relevant for CERCLA Type A Damage Assessments." U.S. Department of the Interior, Washington, D.C., 1987.

ECOTEC Research and Consulting, "A Cost Benefit Analysis of Reduced Acid Deposition: UK Natural and Semi-Natural Aquatic Ecosystems: a Contingent Valuation Study of Aquatic Ecosystems." ECOTEC Research and Consulting, Birmingham, U.K. and the U.K. Department of Environment Food and Rural Affairs, London, U.K., 1993.

Edwards, S.F. and F.J. Gable, "Estimating the Value of Beach Recreation from Property Values: An Exploration with Comparisons to Nourishment Costs." *Ocean and Shoreline Management* 15 (1991): 37-55.

Englin, J. and J.S. Shonkwiler, "Estimating Social Welfare Using Count Data Models: An Application to Long-Run Recreation Demand Under Conditions of Endogenous Stratification and Truncation." *The Review of Economics and Statistics* 77, no. 1 (1994): 104-112.

Englin, J. and R. Mendelsohn, "A Hedonic Travel Cost Analysis for Valuation of Multiple Components of Site Quality: The Recreation Value of Forest Management." *Journal of Environmental Economics and Management* 21, no. 3 (1991): 275-290.

**Abstract:**

[http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6WJ6-4CYH0NV-35&\\_user=16764&\\_handle=B-WA-A-A-Y-MsSAYVW-UUW-AUEVEUEYZU-AUEWVEUZZU-CZDADVWAV-Y-U&\\_fmt=summary&\\_coverDate=11%2F30%2F1991&\\_rdoc=5&\\_orig=browse&\\_srch=%23toc%236870%231991%23999789996%23512728!&\\_cdi=6870&\\_view=c&\\_acct=C000001898&\\_version=1&\\_urlVersion=0&\\_userid=16764&\\_md5=011a92763c38d1c9f9690d97274a59e5](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WJ6-4CYH0NV-35&_user=16764&_handle=B-WA-A-A-Y-MsSAYVW-UUW-AUEVEUEYZU-AUEWVEUZZU-CZDADVWAV-Y-U&_fmt=summary&_coverDate=11%2F30%2F1991&_rdoc=5&_orig=browse&_srch=%23toc%236870%231991%23999789996%23512728!&_cdi=6870&_view=c&_acct=C000001898&_version=1&_urlVersion=0&_userid=16764&_md5=011a92763c38d1c9f9690d97274a59e5)

ERM Economics and Willis, K. and G. Garrod, "Economic Appraisal of the Environmental Costs and Benefits of Potential Solutions to Alleviate Low Flows in Rivers: Phase 2 Study." ERM Economics, London, and CREAM, University of Newcastle, 1997.

Everitt, A. "A Valuation of Recreational Benefits." *New Zealand Journal of Forestry* 28, no.2 (1983): 176-183.

Fankhauser, S., "The Economic Costs of CO2 Concentration Doubling" in the *Valuing Climate Change*, edited by Samuel Fankhauser, London, UK: Earthscan Publications Limited, 1995.

Farber, S., "The Economic Cost of Residual Environmental Risk: A Case Study of Louisiana." *Journal of Environmental Management* 36 (1992): 1-16.

Farber, S., "The Value of Coastal Wetlands for Protection of Property Against Hurricane Wind Damage." *Journal of Environmental Economics and Management* 14, no. 1 (1987): 143-151.

Ferguson, A., G. Holman, and R. Kristritz, "Wetlands are not Wastelands: Application of Wetland Evaluation Methods to the Cowichan Estuary, British Columbia." Sustainable Development Branch, Canadian Wildlife Service and Wildlife Habitat Canada, 1989.

Fix, P.J., The Economic Benefits of Mountain Biking: Applying the TCM and CVM at Moab, Utah, Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, Colorado, 1996.

Flatley, G.W. and Bennett, J.W. "Using Contingent Valuation to Determine Australian Tourists' Values for Forest Conservation in Vanuatu." *Economic Analysis and Policy* 26, no. 2 (1996): 111-127.

Fletcher, D.M., An Investigation into the Comparability of Hypothetical and Actual Markets for an Environmental Public Good, Dissertation, University of Tennessee, Knoxville, 1995.

Foster, V., Bateman, I.J. and Harley, D., "Real and hypothetical willingness to pay for environmental preservation: a non-experimental comparison." *Journal of Agricultural Economics* 48, no. 2 (1997): 123-138.

Frederick, S. and B. Fischhoff, "Magnitude Insensitivity in Elicited Valuations: Examining Conventional Explanations." Department of Social and Decision Sciences, Carnegie Mellon University, 1997.

G.C., and A. Schmitz, "Preserving Waterfowl Habitat on the Canadian Prairies: Economic Incentives versus Moral Suasion." *American Journal of Agricultural Economics* 74, no. 1 (1992): 79-89.

Garrod, G.D. & Willis, K.G. "The non-use benefits of enhancing forest biodiversity: A contingent ranking study." *Ecological Economics* 21 (1997): 45-61.

[http://www.sciencedirect.com/science?\\_ob=MIimg&\\_imagekey=B6VDY-3SWJMGS-4-2&\\_cdi=5995&\\_orig=browse&\\_coverDate=04%2F30%2F1997&\\_sk=999789998&\\_view=c&\\_wchp=dGLbVtz-zSkWW&\\_acct=C000001898&\\_version=1&\\_userid=16764&\\_md5=63f93dbcb3a8b564db60a4add858b445&\\_ie=f.pdf](http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6VDY-3SWJMGS-4-2&_cdi=5995&_orig=browse&_coverDate=04%2F30%2F1997&_sk=999789998&_view=c&_wchp=dGLbVtz-zSkWW&_acct=C000001898&_version=1&_userid=16764&_md5=63f93dbcb3a8b564db60a4add858b445&_ie=f.pdf)

Garrod, G. and K. Willis, "Valuing Goods' Characteristics: An Application of the Hedonic Price Method to Environmental Attributes." *Journal of Environmental Management* 34, no. 1 (1992): 59-76.

- Garrod, G.D., K.G. Willis, H. Bjarnodottir, and P. Cockbain (1996). The Non-Priced Benefits of Renovating Historic Buildings.
- Garrod, G., N. Powe and K. Willis, "Hardham Artificial Recharge Environmental Valuation." Report to Southern Water, Centre for Research in Environmental Appraisal and Management (CREAM), 2000.
- Gillespie, R., "Economic Value and Regional Economic Impact of Minnamurra Rainforest Centre, Budderoo National Park." NSW National Parks and Wildlife Service, 1997.
- Gillard, Quentin. "The Effect of Environmental Amenities on House Values: The Example of a View Lot." *Professional Geographer* 32, no 2 (1981): 216-220.
- Giraud, K. L., J. B. Loomis, and R. L. Johnson, "Internal and External Scope in Willingness-to-Pay Estimates for Threatened and Endangered Wildlife." *Journal of Environmental Management* 56, no.3 (1999): 221-229.
- Goodwin, B.K., L.A. Offenbach, T.T. Cable, and P.S. Cook, "Discrete/Continuous Contingent Valuation of Private Hunting Access in Kansas." *Journal of Environmental Management* 39, no. 1 (1993): 1-12.
- Green, D., K. E. Jacowitz, D. Kahneman, and D. McFadden, "Referendum Contingent Valuation, Anchoring, and Willingness to Pay for Public Goods." *Resource and Energy Economics* 20, no. 2 85-116, 1998.
- Greenley, D.A., R.G. Walsh, and R.A. Young, "Option Value: Empirical Evidence from a Case Study of Recreation and Water Quality." *The Quarterly Journal of Economics* 96, no. 4 (1981): 657-674.
- Gren, I, K.-H. Groth and M Sylven, "Economic Values of Danube Floodplains." *Journal of Environmental Management* 45 (1995): 333-345.
- Gren, I.M., "The Value of Investing in Wetlands for Nitrogen Abatement." *European Review of Agricultural Economics* 22 (1995): 157-172.
- Hageman, Ronda, "Valuing Marine Mammal Populations: Benefit Valuations in a Multi-species Ecosystem." National Marine Fisheries Service, Southwest Fisheries Center, La Jolla, California (1985): 88.
- Hagen, Daniel A., James W. Vincent, and Patrick G. Wells, "Benefits of Preserving Old-Growth Forests and the Spotted Owl." *Contemporary Policy Issues*. 10 (1992): 13-26.

Halstead, John M., "Measuring the Nonmarket Demand Value of Massachusetts Agricultural Land; A Case Study." *Journal of the Northeastern Agricultural Economics Council* 13, no. 1 (1984): 12-19.

Halstead, John M. and Laura A. Gilbert, "Effects of Additional Information on Willingness to Pay Values: How Much is Too Much?" Paper presented at the Northeastern Agricultural and Resource Economics Association Meeting. Newark, DE, June 27-29, 1994.

Halstead, J.M., A.E. Luloff and T.H. Stevens, "Protest Bidders in Contingent Valuation." *Northeastern Journal, Agricultural and Resource Economics* 21, no. 2, Oct. 1992.

Halstead, J.M., Lindsay, B.E. and Brown, C.M. "Use of the Tobit Model in Contingent Valuation: Experimental Evidence from the Pemigewasset Wilderness Area." *Journal of Environmental Management* 33 (1991): 79-89.

Hanemann, M., J. Loomis, and B. Kanninen, "Statistical Efficiency of Double-Bounded Dichotomous Choice Contingent Valuation." *American Journal of Agricultural Economics* 73, no. 4 (1991): 1255-1263.

Hanley, N. and S. Craig, "The Economic Value of Wilderness Areas: An Application to the Krutilla-Fisher Model to Scotland's 'Flow Country'." in *Environmental Policy and the Economy*, edited by Frank Dietz, Frederick van der Ploeg, and Jan van der Straaten, Amsterdam: Elsevier Science Publishers B.V. 1991.

Hausman, J.A., G.K. Leonard, and D. McFadden, "A Utility-Consistent, Combined Discrete Choice and Count Data Model: Assessing Recreational Use Losses Due to Natural Resource Damage." *Journal of Public Economics* 56, no. 1 (1995): 1-30.

Hay, M., "Net Economic Recreation Values for Deer, Elk, and Waterfowl Hunting and Bass Fishing." U.S. Dept. of the Interior Fish and Wildlife Service (1988): 19.

Hearne, R.R., and Z.M. Salinas, "The Use of Choice Experiments in the Analysis of Tourist Preferences for Ecotourism Development in Costa Rica." *Journal of Environmental Management* 65 (2002): 153-163.

- Heberlein, T.A. and R.C. Bishop, "Assessing the Validity of Contingent Valuation: Three Field Experiments." *The Science of the Total Environment* 56 (1986): 99-107.
- Hoehn, J. P. and A. Randall, "The Effect of Resource Quality Information on Resource Injury Perceptions and Contingent Values." *Resource and Energy Economics* 24 (2002): 13-31.
- Hoehn, J.P., and J.B. Loomis, "Substitution Effects in the Valuation of Multiple Environmental Programs." *Journal of Environmental Economics and Management* 25, no. 1 (1993): 56-75.
- Holmes, T.P. and R.A. Kramer, "An Independent Sample Test of Yea-Saying and Staring Point Bias in Dichotomous-Choice Contingent Valuation." *Journal of Environmental Economics* 29, no.1 (1995): 121-132.
- Horton, B., G. Colarullo, I. Bateman and C. Peres, "Evaluating Non-Users willingness to pay for the implementation of a proposed National parks program in Amazonia: a UK/Italian contingent valuation study." CSERGE Working Paper ECM 02-01, 2002.
- Hovde, Brett and Jay A. Leitch, "Valuing Prairie Potholes: Five Case Studies." Agricultural Economics Report No. 319. Department of Agricultural Economics, Agricultural Experiment Station, North Dakota State University, Fargo, North Dakota, 58105. United States. , 1994.
- Huang, J-C., T. C. Haab, and J. C. Whitehead, "Willingness to Pay for Quality Improvements: Should Revealed and Stated Preference Data Be Combined." *Journal of Environmental Economics and Management* 34, no.3 (1997): 240-255.
- Hundloe, T.J., McDonald, G.T. & Blamey, R.K., "Socio-Economic Analysis Of Non-Extractive Resource Use In The Great Sandy Region." Institute of Applied Environmental Research, Griffith University, 1990.
- Imber, D., Stevenson, G. & Wilks, L., "A Contingent Valuation Survey Of The Kakadu Conservation Zone." RAC Research Paper No.3, AGPS, Canberra, 1991.
- Isangkura, A., "Environmental Valuation: An Entrance Fee System for National Parks in Thailand." Economy and Environment Program for Southeast Asia, International Development Research Centre, 1998.



J.C., P.A. Groothuis, and G.C. Blomquist, "Testing for Non-Response and Sample Selection Bias in Contingent Valuation: Analysis of a Combination Phone/Mail Survey." *Economics Letters* 41, no. 2 (1993): 215-220.

Jerrett, M.L., "Green Cost, Red Ink: An Environmental Accounting of the Defensive Expenditures Made by Municipal Governments in Ontario." Dissertation, University of Toronto, 1996.

John C. and Glenn C. Blomquist, "Measuring Contingent Values for Wetlands: Effects of Information About Related Environmental Goods." *Water Resources Research* 27, no. 10 (1991): 2523-2531.

John C., "Environmental Interest Group Behaviour and Self-Selection Bias in Contingent Valuation Mail Surveys." *Growth and Change* 22, no. 11 (1991): 10-21.

John C., "Measuring Use Value From Recreation Participation." *Southern Journal of Agricultural Economics* 24, no. 2 (1992): 113-119.

Johnson, Craig W., and Raymond L. Linder, "An Economic Valuation of South Dakota Wetlands as a Recreation Resource for Resident Hunters." *Landscape Journal* 5, no. 1 (1986): 33-38.

Johnston, R. J., S. K. Swallow, and T. F. Weaver, Estimating Willingness to Pay and Resource Tradeoffs with Different Payment Mechanisms: An Evaluation of a Funding Guarantee for Watershed.

K. G., G.D. Garrod, J.F. Benson and M. Carter, "Benefits and Costs of the Wildlife Enhancement Scheme: A Case Study of the Pevensy Levels." *Journal of Environmental Planning and Management* 39, no. 3, 1996.

Kahneman, D., and I. Ritor, "Determinants of Stated Willingness to Pay for Public Goods: A Study in the Headline Method." *Journal of Risk and Uncertainty* 9, no. 1 (1994): 5-38.

Kealy, M.J. and R.W. Turner, "A Test of The Equality of Closed-Ended and Open-Ended Contingent Valuations." *American Journal of Agricultural Economics* 75 (1993): 321-331.

Keith, J.E., C. Fawson, V. Johnson, "Preservation or Use: A Contingent Valuation Study of Wilderness Designation in Utah." *Ecological Economics* 18, no. 3 (1996): 207-214.

[http://www.sciencedirect.com/science?\\_ob=MIimg&\\_imagekey=B6VDY-3VWK7PW-3-1&\\_cdi=5995&\\_orig=browse&\\_coverDate=09%2F30%2F1996&\\_sk=999819996&view=c&wchp=dGLbVzb-zSkWb&\\_acct=C000001898&\\_version=1&\\_userid=16764&md5=0e6678dfceb25d23d7ef47327838f0da&ie=f.pdf](http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6VDY-3VWK7PW-3-1&_cdi=5995&_orig=browse&_coverDate=09%2F30%2F1996&_sk=999819996&view=c&wchp=dGLbVzb-zSkWb&_acct=C000001898&_version=1&_userid=16764&md5=0e6678dfceb25d23d7ef47327838f0da&ie=f.pdf)

Kim, K.T., "An Assessment of the Economic Effects of Shoreline Erosion Control in the Lake Erie Zone's Residential Housing Market." Dissertation, The Ohio State University, 1992.

Kimmel, Margaret M., "Parks and Property Values: An Empirical Study in Dayton and Columbus Ohio." Miami University, Institute of Environmental Science, M.S. Thesis, 1985.

Klein, R.J.T and I.J. Bateman, "The Recreational Value of Cley Marshes Nature Reserve: An Argument Against Managed Retreat?" *Water and Environmental Management* 12, no.4 (1998): 280-85.

Kosz, M., "Valuing Riverside Wetlands: The Case of the 'Donau-Auen' National Park." *Ecological Economics* 16 (1996): 109-127.

Kreutwiser, R., "The Economic Significance of the Long Point Marsh, Lake Erie, as a Recreational Resource." *Journal of Great Lakes Research* 7, no.2 (1981): 105-110.

Langford, I.H., I.J. Bateman, and H.D. Langford, "A Multilevel Modelling Approach to Triple-Bounded Dichotomous Choice Contingent Valuation." *Environmental and Resource Economics* 7, no. 3 (1996): 197-211.

Lant, C.L. and R.S. Roberts, "Greenbelts in the Cornbelt: Riparian wetlands, Intrinsic Values, and Market Failure." *Environment and Planning A* 22 (1990): 1375-1388.

Lant, C.L., and G.A. Tobin, "The Economic Value of Riparian Corridors in Cornbelt Floodplains: A Research Framework." *Professional Geographer* 41, no. 3 (1989): 337-349.

Lant, Christopher L., Steven E. Kraft, and Keith R. Gillman., "Enrollment of Filter Strips and Recharge Areas in the CRP and USDA Easement Programs." *Journal of Soil and Water Conservation* 50, no. 1 (1995): 193-200.

Leon, Carmelo J., "Double Bounded survival Values for Preserving the Landscape of Natural Parks." *Journal of Environmental Management* 46 (1996): 103-118.

Lindberg, Kreg., Rebecca L. Johnson, and Robert P. Berrens., "Contingent Valuation of Rural Tourism Development With Tests of Scope and Mode Stability." *Journal of Agricultural and Resource Economics* 22, no. 1, (1997): 44-60.

Loewen, K.G. and S.N. Kulshreshtha, Economic Aspects of Wilderness Valuation and Recreation Uses by Aboriginal Households: A Case Study of Prince Albert, Department of Agricultural Economics, University of Saskatchewan, Report # 95-04 , 1995.

Loomis, H., P. Kent, L. Strange, K. Fausch, and A. Covich, "Measuring the Total Economic Value of Restoring EcoSystem Services in an Impaired River Basin: Results from a Contingent Valuation Survey." *Ecological Economics* 33 (2000): 103-117.

Loomis, J. and E. Ekstrand, "Economic Benefits of Critical Habitat for the Mexican Spotted Owl: A Scope Test Using a Multiple-Bounded Contingent Valuation Survey." *Journal of Agricultural and Resource Economics* 22, no. 2 (1997): 356-366.

Loomis, J. and J. Crespi, Estimated Effects of Climate Change on Selected Outdoor Recreation Activities in the United States in the The Impact of Climate Change on the United States Economy, edited by Robert Mendelsohn and James E. Neumann, United Kingdom: Cambridge University Press, 1999.

Loomis, J. B., "Vertically Summing Public Good Demand Curves: An Empirical Comparison of Economic Versus Political Jurisdictions." *Land Economics* 76, no. 2 (2000): 312-321.

Loomis, J., M. Lockwood, and T. DeLacy, "Some Empirical Evidence on Embedding Effects in Contingent Valuation of Forest Protection." *Journal of Environmental Economics and Management* 24, no.1 (1993): 45-55.

Loomis, J.B. and D.S. White, "Economic Benefits of Rare and Endangered Species: Summary and Meta-analysis." *Ecological Economics* 18 (1986): 197-206.

Loomis, J.B., "Bioeconomic Approach to Estimating the Economic Effects of Watershed Disturbance on Recreational and Commercial Fisheries." *Journal of Soil and Water Conservation* 44, no. 1 (1989): 83-87.

Final Report  
*System for Valuing Changes to Environmental Amenities*

Loomis, J.B., A. González-Cabán, and R. Gregory, "A Contingent Valuation Study of the Value of Reducing Fire Hazards to Old-Growth Forests in the Pacific Northwest." Forest Service Research Paper PSW-RP-229-Web, Pacific Southwest Research Station, United States Department of Agriculture, July 1996.

<http://www.fs.fed.us/psw/publications/documents/rp-229/rp-229-cover.pdf>

Luger, Michael I., "The Economic Value of the Coastal Zone." *Journal of Environmental Systems* 21, no. 4 (1991): 279-301.

Luken, R.A., F.R. Johnson, and V. Kibler, "Benefits and Costs of Pulp and Paper Effluent Controls Under the Clean Water Act." *Water Resources Research* 28, no.3 (1992): 665-674.

Lupi, F, and T. Graham-Tomasi, and S.J. Taff, "A Hedonic Approach To Urban Wetland Valuation." Department of Agricultural and Applied Economics, University of Minnesota, Staff Paper Series P91-8. 1991.

Lutz, J., J. Englin, J.S. Shonkwiler, "On the Aggregate Value of Recreational Activities A Nested Price Index Approach Using Poisson Demand Systems." *Environmental and Resource Economics* 15, (2000): 217-226.

M.J., E.Kovacs, S. Kerekes and M. Nagy, "Loss of Value of Szigetkoz due to Gabeikovo-Nagymaros Barage System Development: Application of Benefit Transfer in Hungary." Working Paper submitted to the Organization for Economic Co-operation and Development (OECD), Working Group on Economic Aspects of Biodiversity, 2001.

MacDonald, H.F., J.C. Bergstrom, and J.E. Houston, "A Proposed Methodology for Measuring Incremental Environmental Benefits from Using Constructed Wetlands to Control Agricultural Non-point Source Pollution." *Journal of Environmental Management* 54, no.4 (1998): 259-267.

Mackenzie, J., "A Comparison of Contingent Preference Models." *American Journal of Agricultural Economics* 75, no. 3 (1993): 593-603.

MacMillan, D., N. Hanley and S. Buckland, "A Contingent Valuation Study of Uncertain Environmental Gains." *Scottish Journal of Political Economy* 43, no. 5 (1996): 519-533.

Macnab, B.J. and L.M. Brusnyk, "A Socioeconomic Assessment of the Buck For Wildlife Program." Fish and Wildlife Services, Alberta Department of Environmental Protection, 1993.

- Mahan, B. L., P. Polasky, and R. M. Adams, "Valuing Urban Wetlands: A Property Price Approach." *Land Economics* 76, no.1 (2000): 100-113.
- Mannesto, Gregory and John B. Loomis., "Evaluation of Mail and In-person Contingent Value Surveys: Results of a Study of Recreational Boaters." *Journal of Environmental Management* 32 (1991): 177-190.
- Manoka, B., "Existence Value: A Re-appraisal and Cross-Cultural Comparison." Economy an Environment Program for Southeast Asia (EEPSEA) Research Report No. 2001-RR1, International Development Research Centre , 2001.
- Mansfield, C.A., "Despairing Over Disparities: An Empirical Analysis of the Difference Between Willingness to Pay and Willingness to Accept." Dissertation, University of Maryland, 1994.
- Martin, Larry R.G., "Economic Impact Analysis of a Sport Fishery on Lake Ontario: An Appraisal of Method." *Transactions of the American Fisheries Society* 116 (1987): 461-468.
- May, J.A., C.T. Bastian, D.T. Taylor, and G.D. Whipple, An Estimation of Benefits Associated With the Wyoming State Snowmobile Trails Program, Paper presented at the Western Agricultural Economics Association Annual meeting. Reno/Sparks, Nevada 1997.
- McCollum, D.W., A.H. Gilbert, and G.L. Peterson, "The Net Economic Value of Day Use Cross Country Skiing in Vermont: A Dichotomous Choice Contingent Valuation Approach." *Journal of Leisure Research* 22, no. 4 (1990): 341-352.
- McConnell, K.E., "Congestion and Willingness to Pay: A Study of Beach Use." *Land Economics* 53, no. 2 (1977): 185-195.
- McFadden, D., "Contingent Valuation and Social Choice." *American Journal of Agricultural Economics* 76 (1994): 689-708.
- McNaughton, R.B., "Economic Benefits of Sport Fishing and Hunting Near Irrigation Developments in Southern Alberta." *Canadian Water Resources Journal* 20, no. 3 (1995): 161-170.
- Mendelsohn, R. and M. Markowski, "The Impact of Climate Change on Outdoor Recreation" in *The Impact of Climate Change on the United States Economy*, edited by Robert Mendelsohn and James E. Neumann, United Kingdom: Cambridge University Press, 1999.

Mendelsohn, R., J. Hof, G. Peterson, and R. Johnson, "Measuring Recreation Values with Multiple Destination Trips." *American Journal of Agricultural Economics* 74, no. 4 (1992): 926-933.

Mercer, E., R. Kramer and N. Sharma, "Rain Forest Tourism- Estimating the Benefits of Tourism Development in a New National Park in Madagascar." *Journal of Forest Economics* 1, no. 2 (1995):239-269.

Miliadou, D., The Economic Valuation of Wetlands, Master of Science thesis in Ecological Economics, University of Edinburgh, 1997.

Montgomery, C. A., R. A. Pollak, K. Freemark, D. White, "Pricing Biodiversity." *Journal of Environmental Economics and Management* 38, no.1 (1999): 1-19.

Morrison M., J. Bennett, R. Blamey, and J. Louviere, "Choice Modeling and Tests of Benefit Transfer." *American Journal of Agricultural Economics* 84, no.1 (2002): 161-170.

Muller, R.A., "The Value of Water in Canada." *Canadian Water Resources Journal* 10, no.4 (1985): 12-20.

Niklitschek, M. and J. Leon, "Combining Intended Demand and Yes/No Responses in the Estimation of Contingent Valuation Models." *Journal of Environmental Economics and Management* 31 (1996): 387-402.

Nunes, P.A.L.D., J.C.J.M. van den Bergh, "Economic Valuation of Biodiversity: Sense or Nonsense." *Ecological Economics* 39, no. 2 (2001): 203-222.

Parks, P.A. and R.A. Kramer, "A Policy Simulation of the Wetlands Reserve Program." *Journal of Environmental Economics and Management* 28 (1995): 223-240.

Pate, J. and J. Loomis, "The Effect of Distance on Willingness to Pay Values: a Case Study of Wetlands and Salmon in California." *Ecological Economics* 20, no. 3 (1997): 199-207.

Payne, J.W., D.A Schkade, W.H. Desvousges, C. Aultman, "Valuation of Multiple Environmental Programs." *Journal of Risk and Uncertainty* 21, no. 1 (2000): 95-115.

Peirson, G., D. Tingley, J. Spurgeon and A. Radford, "Economic Evaluation of Inland Fisheries in England and Wales." *Fisheries Management and Ecology* 8 (2001): 415-424.

Peterson, G. L. and T. C. Brown, "Economic Valuation by the Method of Paired Comparison, with Emphasis on Evaluation of the Transitivity Axiom." *Land Economics* 74, no. 2 (1998): 240-261.

Phaneuf, D. J., C. L. Kling, and J. A. Herriges, "Valuing Water Quality Improvements Using Revealed Preference Methods When Corner Solutions are Present." *American Journal of Agricultural Economics* 80, no.5 (1998): 1025-1031.

Poor, J., "The Value of Additional Central Flyway Wetlands in Nebraska's Rainwater Basin Wetland Region." Paper presented at the Western Agricultural Economics Association Annual Meeting. Reno/Sparks, NV. , 1997.

Pope III, C. A. and J.W. Jones, "Value of Wilderness Designation in Utah." *Journal of Environmental Management* (1990).

Pouta, E., M. Rekola, C.Z. Li, J. Kuuluvainen, O. Tahvonen, "Using Choice Experiments to Value Natura 2000 Nature Conservation Programs in Finland." Department of Economics, University of Dalarna, Sweden, 2001.

Prince, R. and E. Ahmed, "Estimating Individual Recreation Benefits Under Congestion and Uncertainty." *Journal of Leisure Research* 21, no. 1 (1989): 61-76.

R.E. and R.C. Bishop, "Assessing Natural Resource Damages Using Environmental Annuities." *Ecological Economics* 11, no. 1 (1994): 35-41.

Ralston, S.N., The Direct and Indirect Estimation of Recreational Benefits for Reelfoot Lake, Dissertation, University of Tennessee, 1988.

Ready, Richard C, Mark C. Berger, and Glenn C. Blomquist. "Measuring Amenity Benefits from Farmland: Hedonic Pricing vs. Contingent Valuation." *Growth and Change* 28 (Fall 1997): 438-458.

Reaves, D. W., R. Kramer, and T. P. Holmes, "Does Question Format Matter? Valuing an Endangered Species." *Environmental and Resource Economics* 14 (1999): 365-383.

Richards, M.T. and T.C. Brown, Economic Value of Campground Visits In Arizona, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado 80526 , 1992.

Richer, Jerrell., "Willingness to Pay for Desert Protection." *Contemporary Economic Policy* 13 (1995): 93-104.

Riddel, M., "A Dynamic Approach to Estimating Hedonic Prices for Environmental Goods: An Application to Open Space Purchase." *Land Economics* 77, no.4 (2001): 494-512.

RIVM, EFTEC, NTUA and IIASA in association with TME and TNO, "Technical Report on Biodiversity." RIVM report 481505019, 2000.

Roberts, L.A. and J.A. Leitch, "Economic Valuation of Some Wetland Outputs of Mud Lake, Minnesota-South Dakota." Agricultural Economics Report No. 381, Department of Agricultural Economics, North Dakota Agricultural Experiment Station, North Dakota State University, 1997.

Rockel, M.L. and M.J. Kealy, "The Value of Nonconsumptive Wildlife Recreation in the United States." *Land Economics* 67, no. 4 (1991): 422-434.

Rogers, M.F. and J.A. Sindin, "Safe Minimum Standard for Environmental Choices: Old-growth forest in New South Wales." *Journal of Environmental Management* (1994).

Rosenberger, R. S. and R. G. Walsh, "Nonmarket Value of Western Valley Ranchland using Contingent Valuation." *Journal of Agricultural and Resource Economics* 22, no.2 (1997): 296-309.

Rowe, R.D., W.D. Shaw, and W. Schulze, "Nestucca Oil Spill." *Natural Resource Damages*, edited by K. Ward and J. Duffield., New York: Wiley and Sons, 1992.

Rubin, J. M., Cheney-Steen, W. A. Ahrens, "The Measurement of Non-Market Benefits: The Northern Spotted Owl and Recreational Delights." Conference Proceedings of the American Agricultural Economics Association (AAEA), 1987.

S. Fankhauser, "The Costs of Adaptation: The Case of Sea Level Rise." *Valuing Climate Change*, edited by Samuel Fankhauser, London, UK: Earthscan Publications Limited, 1995.

Samples, Karl C., John A. Dixon and Marcia M. Gowen, "Information Disclosure and Endangered Species Valuation." *Land Economics* 62, no. 3 (1986): 306-312.

Sanders, L.D., R.G. Walsh, and J.R. McKean, "Comparable Estimates of the Recreation Value of Rivers." *Water Resources Research* 27, no.7 (1991): 1387-1394.



- Sathirathai, S., "Economic Valuation of Mangroves and the Roles of Local Communities in the Conservation of Natural Resources: Case Study of Surat Thani, South of Thailand." Economy and Environment Program for Southeast Asia, International Development Research Centre, 1998.
- Schaefers, J.E., GIS Display of the Consumer Surplus for Trail Use: A Decision Making Tool, Colorado State University, Fort Collins, Colorado, 1994.
- Scherrer S., "Evaluation économique des aménités récréatives d'une zone humide intérieure : le cas du lac du Der." Working paper, Department of economic studies and environmental valuation, French Ministry of Environment, 2003.
- Schkade, D.A., and J.W. Payne, "How People Respond to Contingent Valuation Questions: A Verbal Protocol Analysis of Willingness to Pay for an Environmental Regulation." *Journal of Environmental Economics and Management* 26, no. 1 (1994): 88-109.
- Scott, R.D., "An Hedonic Model of Preservation Value Components: A Contingent Valuation Study of the Black Canyon of the Upper Snake River." Dissertation, Washington State University, 1992.
- Seenprachwong, U., "An Economic Analysis of Coral Reefs in the Andaman Sea of Thailand." Economy and Environment Program for Southeast Asia, International Development Research Centre , 2001.
- Sheppard, R., G. Kerr, R. Cullen, and T. Ferguson., "Contingent Valuation of Improved Water Quality in the Lower Waimakariri River." Agribusiness And Economics Research Unit, Lincoln University, Canterbury New Zealand, Research Report No. 221, ISSN 1170-7682, 1993.
- Shrestha R. K. and J. B. Loomis, "Testing a Meta-analysis Model for Benefit Transfer in International Outdoor Recreation." *Ecological Economics* 39, no.1 (2001): 67-83.
- Shyamsundar, P. and R.A. Kramer, "Tropical Forest Protection: An Empirical Analysis of the Costs Borne by Local People." *Journal of Environmental Economics and Management* 31 (1996): 129-144.
- Signorello, G., "Valuing Bird Watching in a Mediterranean Wetland." Environmental Resource Valuation: Applications of the Contingent Valuation Method in Italy. Bishop, R., and Romano, D. (eds) Kluwer Academic Publishers, Dordrecht, the Netherlands, 1999.

Silberman, J. and M. Klock, "The Recreation Benefits of Beach Renourishment." *Ocean and Shoreline Management* 11, no. 1 (1988): 73-90.

Smith, V.K., and L.L. Osborne, "Do Contingent Valuation Estimates Pass a "Scope" Test? A Meta-analysis." *Journal of Environmental Economics and Management* 31, no. 3 (1996): 287-301.

Sorg, C.F. and J.B. Loomis, "Empirical Estimates of Amenity Forest Values: A Comparative Review." Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, 80526, 1984.

Spaninks, F. and P. van Beukering, "Economic Valuation of Mangrove Ecosystems: Potential and Limitations." Collaborative Research in the Economics of Environment and Development (CREED) Working Paper Series No. 14, International Institute for Environment and Development , 1997.

Stevens, T.H., J. Echeverria, R.J. Glass, T. Hager, and T.A. More, "Measuring the Existence Value of Wildlife: What Do CVM Estimates Really Show?" *Land Economics* 67, No. 4, (1991): 390-400.

Stokoe, P., J. Roots, and B. Walters, "Application of Wetland Evaluation Methodologies to the Minudie Dykelands, Nova Scotia." Sustainable Development Branch, Canadian Wildlife Service, Environment Canada, and Wildlife Habitat Canada, 1989.

Stoll, J.R. and L.A. Johnson, "Concepts of Value, Nonmarket Valuation, and the Case of the Whooping Crane." Transactions of the 49th North American Wildlife and Natural Resources Conference, (1984): 382-393.

Streever, W.J., M. Callaghan-Perry, A. Searles, T. Stevens, and P. Svoboda, "Public Attitudes and Values for Wetland Conservation in New South Wales, Australia." *Journal of Environmental Management* 54, no.1 (1998): 1-14.

Svedsater, H., "Contingent Valuation of Global Environmental Resources: Test of Perfect and Regular Embedding." *Journal of Economic Psychology* 21 (2000) 605-623.

Swanson, C.S. and J.B. Loomis, "Roles of Nonmarket Economic Values in Benefit-Cost Analysis of Public Forest Management." United States Department of Agriculture, Forest Service, Pacific Northwest Research Station, 1996.

Tobias, D. & Mendelsohn, R. (1991). Valuing Ecotourism in a Tropical Rain-Forest Reserve. *Ambio* 20(2): 91-93.

UK Department for Transport, Local Government and Regions (DTLR), "The Environmental Costs and Benefits of Supply of Aggregates" (Phase 2), UK Department for Transport, Local Government and Regions (DTLR) <http://www.planning.dtlr.gov.uk/ecb/index.htm> , 1999.

Ulph, A.M. & Reynolds, I.K. (1981). AN ECONOMIC EVALUATION OF NATIONAL PARKS. Centre for Resource and Environmental Studies, Australian National University, Canberra.

van Kooten, G.C., and A. Schmitz, "Preserving Waterfowl Habitat on the Canadian Prairies: Economic Incentives versus Moral Suasion." *American Journal of Agricultural Economics* 74, no. 1 (1992) 79-89.

W. and P. Roy, "Social and Private Returns from Wetland Preservation." Paper published by the American Water Resources Association, International and Transboundary Water Resources Issues, 1990.

Walsh, R.G and J.R. McKean, "Option and Anticipatory Values of U.S. Wilderness." *Placing Money Values on the Environment: Theory and Practice of the Contingent Valuation Method*, edited by K.G. Willis and I. Bateman, NY: John Wiley and Sons, 1993.

Walsh, R.G. and J.B. Loomis, "The Contribution of Recreation to National Economic Development." President's Commission on American Outdoors, U.S. government, 1997.

Walsh, R.G., D.M. Johnson, and J.R. McKean, "Nonmarket Values from Two Decades of Research on Recreation Demand." Greenwich, Connecticut: JAI Press Inc., 1990.

Walsh, R.G., J.B. Loomis, and R.A. Gillman, "Valuing Option, Existence, and Bequest Demands for Wilderness." *Land Economics* 60, no. 1, (1984): 14-29.

Walsh, R.G., Bjonback, R.D., Aiken, R.A. & Rosenthal, D.H. Estimating the Public Benefits of Protecting Forest Quality. *Journal of Environmental Management* 30 (1990): 175-189.

Weicher, John C., and Robert H. Zerbst. The Externalities of Neighborhood Parks: An Empirical Investigation, *Land Economics* 49 (February 1973): 99-105.

Welle, P.G., "Potential Economic Impacts of Acid Deposition: A Contingent Valuation Study of Minnesota." Dissertation, University of Wisconsin-Madison, 1986.

Welsh, Michael P., Richard C. Bishop, Marcia L. Phillips and Robert M. Baumgartner, GCES Non-use Value Study: Final Report., Hagler Bailly Consulting, Madison, WI, final report prepared for Glen Canyon Environmental Studies Non-use Value Committee, 1995.

Whitehead, J.C., "Ex Ante Willingness to Pay with Supply and Demand Uncertainty: Implications for Valuing a Sea Turtle Protection Program." *Applied Economics* 24, (1992): 981-988.

Whitehead, J.C., "Total Economic Values for Coastal and Marine Wildlife: Specification, Validity, and Valuation Issues." *Marine Resource Economics* 8, no. 2 (1993): 119-132.

Whitehead, J.C., "Environmental Interest Group Behaviour and Self-Selection Bias in Contingent Valuation Mail Surveys." *Growth and Change* 22, no. 11, (1991): 10-21.

Whitehead, J.C., and P.A. Groothuis, "Economic Benefits of Improved Water Quality: A Case of North Carolina's Tar-Pamlico River." *Rivers* 3, no.3, (1992): 170-178.

Whitehead, J.C., P.A. Groothuis, and G.C. Blomquist, "Testing for Non-Response and Sample Selection Bias in Contingent Valuation: Analysis of a Combination Phone/Mail Survey." *Economics Letters* 41, no. 2, (1993): 215-220.

Whitehead, J.C. and Glenn C. Blomquist., "Measuring Contingent Values for Wetlands: Effects of Information About Related Environmental Goods." *Water Resources Research* 27, no. 10, (1991): 2523-2531.

Willis, K.G. and Garrod, G.D., "Valuing Landscape: a Contingent Valuation Approach." *Journal of Environmental Management* 37 (1993): 1-22.

**Abstract:**

[http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6WJ7-45P12MK-1Y&\\_user=16764&\\_handle=B-WA-A-A-Z-MsSAYZA-UUA-AUEVYAYCDZ-AUEWBEEBDZ-CZCUAYADA-Z-U&\\_fmt=summary&\\_coverDate=01%2F31%2F1993&\\_rdoc=1&\\_orig=browse&\\_srch=%23toc%236871%231993%23999629998%23310334!&\\_cdi=6871&view=c&\\_ac](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WJ7-45P12MK-1Y&_user=16764&_handle=B-WA-A-A-Z-MsSAYZA-UUA-AUEVYAYCDZ-AUEWBEEBDZ-CZCUAYADA-Z-U&_fmt=summary&_coverDate=01%2F31%2F1993&_rdoc=1&_orig=browse&_srch=%23toc%236871%231993%23999629998%23310334!&_cdi=6871&view=c&_ac)

[ct=C000001898&\\_version=1&\\_urlVersion=0&\\_userid=16764&md5=1507df95d25849bd117764d8206fff41](http://www.kentucky.edu/~econres/ct=C000001898&_version=1&_urlVersion=0&_userid=16764&md5=1507df95d25849bd117764d8206fff41)

Willis, K.G. and Garrod, G. "An Individual Travel-Cost Method of Evaluating Forest Recreation." *Journal of Agricultural Economics* 42 (1991): 33-42.

Willis, K.G., G.D. Garrod, and C.M. Saunders., "Benefits of Environmentally Sensitive Area Policy in England: A Contingent Valuation Assessment." *Journal of Environmental Management* 44 (1995): 105-125.

Wilman, E.A., Benefits to Deer Hunters from Forest Management Practices Which Provide Deer Habitat, *Resources for the Future* (1984).

Woodfield, A. & Cowie, D. (1977). "The Milford Track: Valuation Estimates of a Recreation Good." *Australian Journal Of Agricultural Economics* 2, no.2 (1977): 97-110.

Yen, S.T., P.C. Boxall, and W.L. Adamowicz, "An Econometric Analysis of Donations for Environmental Conservation in Canada." *Journal of Agricultural and Resource Economics* 22, no. 2 (1997): 246-263.

Young, J.S., D.M. Donnelly, C.F. Sorg, J.B. Loomis, and L.J. Nelson, "Net Economic Value of Upland Game Hunting in Idaho." Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado 80526, 1987.