

UNIVERSITY OF WAIKATO

**Hamilton
New Zealand**

Recreation Benefits of U.S. Parks

Pamela Kaval

Department of Economics

Working Paper in Economics 12/07

June 2007

Pamela Kaval

Economics Department
University of Waikato
Private Bag 3105
Hamilton, New Zealand

Tel: +64 (7) 838 4045
Fax: +64 (7) 838 4331
Email: pkaval@mngt.waikato.ac.nz
pam98k@yahoo.com

Abstract

Over 90 percent of people living in the United States participate in some type of outdoor recreation, from walking the dog to rock climbing. These activities increase a person's well-being and are examples of recreation benefits. These benefits can be measured by using a variety of available techniques to calculate consumer surplus values.

Consumer surplus values for recreation in U.S. parks were collated from an extensive literature review. Studies conducted between 1967 and 2003 yielded over 1,200 observations of non-market benefits. From this meta-analysis, it was determined that an average day of recreation in U.S. parks provide people with a non-market benefit of \$60.50/day (2006 US\$). With an estimated 924 million visitor days, the benefit of outdoor recreation on federal park lands during 2006 was estimated at \$54.7 billion dollars. This analysis did not include state, county, and city parks, and hence the total benefit of outdoor recreation in all U.S. parks would be significantly higher.

Keywords

outdoor recreation
consumer surplus
non-market benefits
United States Parks

JEL Classification

Q26

Acknowledgements

The author would like to thank all people and organizations involved in the five stages of data collection. This includes Cindy Sorg, John Loomis, Richard Walsh, Donna Johnson, John McKean, Doug MacNair, Ram Shrestha, and Randall Rosenberger, the U.S. Forest Service, and Bruce Peacock of the National Park Service. The author would also like to thank Thomas Wilding for his extensive editing assistance.

INTRODUCTION

The term *park* is used here to mean a piece of public land maintained in a natural state. This is a generic term, but parks are not generic places. Parks vary widely in size, features, and management style. Size can range from a few feet to millions of acres. Yellowstone National Park, for example, covers 2.2 million acres and extends into three states (Wyoming, Montana, and Idaho). Tongass National Forest in Alaska covers 17 million acres. City parks, on the other hand, are typically less than 50 acres, the smallest being Mills End in Oregon at only two feet across. Features at parks also vary widely. People might visit Yellowstone National Park to see Old Faithful, a geyser that erupts with regularity and to view wildlife such as bison, elk and wolves. Other parks are limited to a picnic table and a small grassy area. In addition to size and feature variation, management style variation also ranges broadly, from national parks where commercial logging is not permitted to Bureau of Land Management areas that allow mineral exploration.

No matter what size, features, or management styles, most parks offer the visitor a chance to participate in an outdoor recreation activity. In many of the smaller parks, people participate in relaxing, picnicking and dog walking. At the larger parks, other activities come into play such as boating, backpacking and rock climbing. Participating in recreation activities provides the visitor with an increase in their well-being. An increase in well-being is a non-market benefit that could come in the form of an increase in health and fitness levels or a lowered stress level.

Over 90% of people living in the U.S. participate in some form of outdoor recreation, with traditional park activities still among the most popular (walking, family gatherings, picnicking, and wildlife viewing). The fastest growing include birdwatching, backpacking, off-road vehicle driving, camping, and skiing (U.S. Army Corps of Engineers, 1990; USFS, 1996; FWS, 2003; Stynes-NPS, 2006; BLM, 2007). Since many people do not pay a fee to participate in these activities, a way to calculate non-market benefits was needed.

Methods for calculating non-market benefits of recreation in U.S. Parks have evolved over the last sixty years (Clark 1915a, Clark 1915b, Trice and Wood 1958, Pearce and Turner 1990, Freeman 2003, Champ et al. 2003, Carson 2000). One common way to measure the benefit is to calculate the consumer surplus value. Consumer surplus values are the residual benefits people experience over and above any amount paid to participate in the activity. As can be expected, most of the time people do not pay anything to participate in a recreation activity on public land.

Consumer surplus benefits can be determined using non-market valuation techniques. Two widely used and accepted techniques are the contingent valuation method and the travel cost method (Pearce and Turner 1990, Freeman 2003, Champ et al. 2003, Carson 2000). The contingent valuation method is based on the stated preference of a respondent when presented with a hypothetical situation (Pearce and Turner 1990, Freeman 2003, Champ et al. 2003, Carson 2000). For example, a park might want to know if a person would pay to climb at an area where they currently do not pay. This fee they are asked to pay would go directly to hiring a full time park ranger to assist with climbing accidents.

Alternatively, the travel cost method is a revealed-preference method in which a person is asked to supply information about costs they incur on a trip. Using the climbing example again, visitors might be asked to report fuel costs and campsite fees they paid for the purpose of climbing at this site. Non-market benefits of environmental amenities are then estimated using the cost of travel as a reflection of value to the person. This method is based on the assumption that to obtain non-market goods, consumers must incur costs (Pearce and Turner 1990, Freeman 2003, Champ et al. 2003, Carson 2000).

Consumer surplus non-market benefits have been calculated for outdoor recreation activities since the 1960's. Various people, including the author, have collated these benefit values into a central database for outdoor recreation. The purpose of this study was to determine benefit values for recreation in U.S. parks based on this national dataset.

DATA COLLECTION

Data were collected from journals, extension bulletins, books, reports, and directly from authors over a period of twenty years.¹ Variables collected include consumer surplus non-market recreation benefits, type of recreational activity, location, survey method used, and the year data was collected. A database was created to store this information, providing a flexible platform for subsequent analysis. For a full list of variables collected or to get a copy of the database for a benefit transfer study, please contact the author or refer to Kaval and Loomis, 2003 (available online).

The resulting data set includes 1229 observations and spans 36 years (1968-2003), twenty-five types of activities, and 106 locations. All non-market benefit data were converted to 2006 U.S. dollars per person per day for comparison purposes. It is believed that this collection of data encompasses most of the outdoor recreation benefit studies conducted to date for U.S. parks.

Recreational activities in the studies took place primarily in national parks, national forests, state parks and state forests. However, many studies did not specify a park type or included several park types such as city and regional parks. These studies were simply categorized as "not specified."

For location comparisons, studies were grouped into six regions: North-East, South-East, Intermountain, Pacific Coast, Alaska, and a category called 'Multiple Area' studies in which a study was conducted in several regions. Regions correlate with U.S. Forest Service Area Designations (USFS, 2006) and a breakdown by state is given in Table 1.

¹ Data collection began in 1983 with Cindy Sorg and John Loomis. There were four subsequent significant additions to the dataset following this initial research: 1988 (Richard Walsh, Donna Johnson, and John McKean), 1993 (Doug MacNair), 2001 (Randall Rosenberger and Ram Shrestha), and in 2003 (Pamela Kaval) (Kaval and Loomis, 2003; MacNair, 1993; Rosenberger and Loomis, 2000; Shrestha and Loomis, 2003; Sorg and Loomis, 1984; Walsh et al., 1992).

Table 1. Non-market benefit studies were divided into five geographical regions, with component states listed. Studies that covered more than one region were assigned to a sixth category termed ‘Multiple Area Studies’.

North-East Region	South-East Region	Intermountain Region	Pacific Coast Region	Alaska Region
Minnesota	Texas	Montana	Washington	Alaska
Iowa	Oklahoma	North Dakota	Oregon	
Missouri	Arkansas	Wyoming	California	
Wisconsin	Louisiana	South Dakota	Hawaii	
Illinois	Mississippi	Nebraska		
Michigan	Tennessee	Colorado		
Indiana	Kentucky	Kansas		
Ohio	Virginia	Arizona		
West Virginia	North Carolina	New Mexico		
Pennsylvania	South Carolina	Idaho		
New York	Georgia	Utah		
Vermont	Florida	Nevada		
New Hampshire	Alabama			
Maine				
Massachusetts				
Rhode Island				
Connecticut				
New Jersey				
Delaware				
Maryland				
Washington DC				

A visitor recreation day is defined here as a 12-hour visit to a park. If one person went to Yellowstone and hiked for 12 hours, this would be considered one visitor recreation day. But if three people went to Yellowstone and one hiked, one canoed, and one swam, each for 4 hours, this would also be one visitor recreation day. This unit of recreation is important for measuring the non-market benefits of outdoor recreation.

RESULTS: NON-MARKET BENEFITS OF RECREATION

In 1990, the U.S. Army Corps of Engineers reported 402 million visitor recreation days on federal lands. Federal lands included land within the jurisdiction of the U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, and National Park Service. It did not include state parks, county parks, or city parks. More recent reports (1996-2006) have also estimated the number of visitor recreation days for individual categories of federal lands (Table 2). If it is assumed that visitation rates increased linearly over time, then a total number of recreation days can be estimated for federal lands in 2006 (Table 2). Using these calculations, it is found that visitor recreation days increased from 402 million in 1990 to 924 million in 2006.

Table 2: Numbers of Visitor Recreation Days on Federal Lands in Millions.

Interpolated data are given based on the original survey data in bold.

<u>Agency</u>	<u>Year</u>				
	<u>1990</u>	<u>1996</u>	<u>2003</u>	<u>2005</u>	<u>2006</u>
Bureau of Land Management (BLM)	38	49	62	68	70
U.S. Forest Service (USFS)	242	341	457	506	523
National Park Service (NPS)	115	174	243	273	283
U.S. Fish and Wildlife Service (USFWS)	7	22	39	46	49
Total Federal	402	586	801	894	924

*Note: A visitor recreation day is calculated as recreating on a public land for a 12 hour period.

(U.S. Army Corps of Engineers 1990, USFS 1996, USFWS 2003, Stynes-NPS 2006, BLM 2007)

Of the 1,229 observations collected in the recreation benefit database, the average non-market benefit of recreation was found to be \$60.50/person/day in 2006 US\$. Multiplying this value by the number of visitor days produces a net benefit from recreation in federal parks of approximately \$54,692,000,000 (2006 US\$).

This \$54.7 billion represents an average benefit across a range of activities and locations. Our understanding of these non-market recreation benefits can be increased by comparing different activities and park types. Of the twenty-five different activities assessed, benefits ranged considerably, from \$6 to \$174/person/day (2006 US\$). With such wide ranging benefits, the activities were divided into three groups – high value (>\$100/person/day), moderate value (\$35 to \$100/person/day) and low value (< \$35/person/day). High value recreation activities include mountain biking, canoeing, kayaking, and rafting, backpacking, birdwatching, and rockclimbing. Visiting environmental education centers produced the lowest value, with most other activities exceeding \$20/person/day. Overall, it is seen that benefits of recreational activities in parks differ significantly by the activity type. However, all activities that were studied realized a positive benefit (Figure 1).

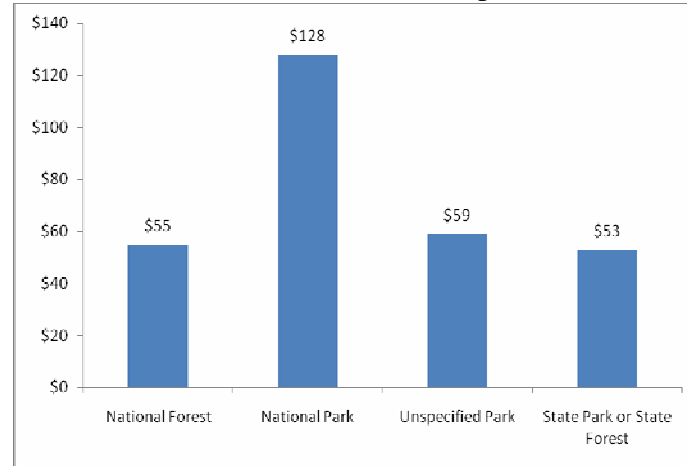
Figure 1. Average Non-Market Recreation Benefit/Person/Day by Activity
 (2006 U.S. Consumer Surplus) separated by high benefit (over \$100/day), moderate benefit (\$35-\$100/day) and lower benefit (under \$35/day) activities.



Benefits were then analyzed by park type. Park types include national parks, national forests, state parks and state forests, and those studies that either included multiple park types or did not specify. Results were similar for national forests (\$55/person/day), state parks and state forests (\$53/person/day) and those areas that were not specified (\$59/person/day) (Figure 2). National parks stand out, however, with a recreation benefit at least twice as high as the other areas (\$128/person/day).

In most instances, people have to pay to enter a national park, while most access is free to a national forest, state park, state forest, county park or city park. There are many likely reasons for the higher recreation benefit in national parks; perhaps perceived value is in part a direct consequence of having to pay to enter the park.

**Figure 2. Average Non-Market Recreation Benefit/Person/Day by Park Type
(2006 U.S. Consumer Surplus \$)**



DISCUSSION AND CONCLUSIONS

The purpose of this study was to determine the recreation benefits of U.S. Parks. To accomplish this goal, available literature from 1967 through 2003 was collated and analyzed. Results show that a person experiences a non-market benefit of \$60.50 for each twelve hour recreation day at a U.S. park (2006 US\$). With an estimated 924 million visitor recreation days at U.S. federal parks in 2006, this yields an overall non-market benefit of \$54.7 billion (2006 US\$).

A positive benefit was realized for all outdoor recreation categories, with birdwatching and mountain biking among the most highly valued. It is encouraging that birdwatching has a high value, because it is an activity that people of all ages and abilities can participate in. It can be accomplished while walking on a trail or driving around in a tour bus. Mountain biking, on the other hand, is not for everyone. Mountain bikers favor certain trails such as the Slickrock Trail in Moab, Utah. The long distance traveled to reach these trails produces a high perceived value. Interestingly, activities such as visiting environmental education centers are not as highly valued. Regardless, overall consumer surplus non-market benefits show all outdoor activities to have a positive consumer surplus value.

Comparing data by park type revealed that activities in national parks yielded twice the benefit, on average, compared to activities in other park types. This may reflect a perception that national park designation is correlated with a higher quality than an area that is not (Weiler and Seidl, 2004; Vaske et al., 1980) or simply that paying a dollar fee gives a sense of greater value. Non-market benefits could also be related to sightings of rare or endangered species. National parks are havens for endangered species, especially those that are unwanted outside of the park. Some ranchers believe that bison will transmit the disease brucellosis to their cattle herds, if allowed to establish outside Yellowstone National Park, and wolves are perceived as a direct threat to cattle and sheep. The experience of recreational activities, such as cross-country skiing or canoeing, is more memorable when endangered wildlife such as grizzly bears or wolves are seen or heard.

The combined studies show a significant positive non-market benefit of outdoor recreational activities in U.S. parks in excess of \$54.7 billion annually. People may not be paying directly to participate in these recreational activities, but still enjoy a substantial benefit in terms of well-being. In this way, providing access to public parks increases the welfare of United States citizens, in turn yielding an increase in the welfare of the country. These results demonstrate the tremendous value of parks in the United States and the benefits of managing them for outdoor recreation.

REFERENCES (EXCLUDING DATABASE REFERENCES)

- Bureau of Land Management (BLM). (2007). *Estimated Recreation Use of Public Lands*. Public Lands Statistics Report. Volume 191. 269 pages.
- Carson, R. (2000). *Contingent Valuation: A User's Guide*. Environmental Science and Technology, 34(8), 1413-1418.
- Champ, P.A., Boyle, K.J., & Brown, T.C., editors. (2003). *A Primer on Non-market Valuation*. Kluwer Academic Publishers, the Netherlands. 576 pps.
- Clark, J.M. (1915a). The Concept of Value. *The Quarterly Journal of Economics*, 29(4), 663-673.
- Clark, J.M. (1915b). The Concept of Value: A Rejoinder. *The Quarterly Journal of Economics*, 29(4), 709-723.
- Fish and Wildlife Service (FWS). (2003). *Refuge Management Information System*. FY 2003 Public Use Summary.
- Freeman, A.M. (2003). *The Measurement of Environmental and Resource Values*. Washington DC: Resources for the Future. 491 p.
- Kaval, P., & Loomis, J. August (2003). *Updated Outdoor Recreation Use Values with Emphasis on National Park Recreation*. A Report Prepared for the National Park Service. <http://www.mngt.waikato.ac.nz/departments/staff/pkaval/Kaval&LoomisNPSReport10-03.pdf>
- MacNair, D. (1993). *1993 RPA Recreation Values Database*. Resource Planning Act Program. USDA Forest Service. Washington, DC.
- Pearce, D.W., and R.K. Turner. (1990). *Economics of Natural Resources and the Environment*. Essex: Pearson Education Limited. 378p.
- Rosenberger, R.S., & Loomis, J.B. (2000). Using meta-analysis for benefit transfer: In-sample convergent validity tests of an outdoor recreation database. *Water Resources Research*, 36(4), 1097-1107.

- Shrestha, R.K., & Loomis, J.B. (2003). Meta-Analytic Benefit Transfer of Outdoor Recreation Economic Values: Testing out-Of-Sample Convergent Validity. *Environmental and Resource Economics*, 25, 79-100.
- Sorg, C.F., & Loomis, J.B. (1984). Empirical estimates of amenity forest values: A comparative review. General Technical Report. RM-107. Rocky Mountain Forest and Range Experiment Station. Forest Service. USDA.
- Stynes, Daniel J. (2006). *NPS System Report 2005*. National Park Spending and Payroll Impacts, Fiscal Year 2005.
- Trice, A.H., & Wood, S.E. (1958). Measurement of Recreation Benefits. *Land Economics*, 34(3), 195-207.
- U.S. Army Corps of Engineers. (1990). *Recreation Task Force – Final Report*. Headquarters, U.S. Army Corps of Engineers. Washington, D.C.
- U.S. Forest Service (USFS). (1996). *National Forest Recreation Use, 1924-1996*.
- U.S. Forest Service (USFS). (2006). *USDA Forest Service*. <http://www.fs.fed.us>.
- Vaske, J.J., Donnelly, M.P., & Heberlein, T.A. (1980). Perceptions of Crowding and Resource Quality by Early and More Recent Visitors. *Leisure Sciences*, 3(4), 367-381.
- Walsh, R.G., Johnson, D.M., & McKean, J.R. (1992). Benefit Transfer of Outdoor Recreation Demand Studies: 1968-1988. *Water Resources Research*, 28(3), 707-713.
- Weiler, S., & Seidl, A. (2004). What's In a Name? Extracting Econometric Drivers to Assess the Impact of National Park Designation. *Journal of Regional Science*, 44(2), 245-262.

DATABASE REFERENCE LIST

- Adams, R.M., Bergland, O., Musser, W.N., Johnson, S.L., & Musser, L.M. (1989). User fees and equity issues in public hunting expenditures: The case of ring-necked pheasant in Oregon. *Land Economics*, 65,376-385.
- Baker, J.C. (1996). *A nested Poisson approach to ecosystem valuation: An application to backcountry hiking in California*. Reno, NV: University of Nevada, Reno. Pp26.
- Balkan, E., & Kahn, J.R. (1988). The value of changes in deer hunting quality: A travel cost approach. *Applied Economics*, 20,533-539.
- Barrick, K. (1986). *Option value in relation to distance effects and selected user characteristics for the Washakie Wilderness, northeast Wyoming*. In R.C. Lucas [comp.], Proceedings -- National Wilderness Research Conference: Current Research. Ogden, UT: USDA Forest Service, Intermountain Research Station, General Technical Report INT-212. Pp 411-422.
- Bayless, D.S., Bergstrom, J.C., Messonnier, M.L., & Cordell, H.K. (1994). Assessing the Demand for Designated Wildlife Viewing Sites. *Journal of Hospitality and Leisure Marketing*, 2(3), 75-93.
- Bell, F.W., & Leeworthy, V.R. (1986). *An Economic Analysis of the Importance of Saltwater Beaches in Florida*. Report #82. Tallahassee, FL: Department of Economics, Florida State University.
- Bergstrom, J.C., Bowker, J.M., Cordell, H.K., Bhat, G., English, D.B.K., Teasley, R.J., & Villegas, P. (1996). *Ecoregional estimates of the net economic values of outdoor recreational activities in the United States: Individual model results*. Final Report submitted to Resource Program and Assessment Staff, USDA Forest Service, Washington, DC. Athens, GA: Outdoor Recreation and Wilderness Assessment Group SE-4901, USDA Forest Service, and Department of Agricultural and Applied Economics, Univ. of Georgia. Pp 68.
- Bergstrom, J.C., & Cordell, H.K. (1991). An analysis of the demand for and value of outdoor recreation in the United States. *Journal of Leisure Research*, 23, 67-86.
- Bergstrom, J.C., Stoll, J.R., Titre, J.P., & Wright, V.L. (1990). Economic value of wetlands-based recreation. *Ecological Economics*, 2,129-147.
- Betz, C.J., Bergstrom, J.C., & Bowker, J.M. (2003). A Contingent Trip Model for Estimating Rail-Trail Demand. *Journal of Environmental Planning and Management*, 46(1), 79-96.
- Bhat, G., Bergstrom, J., Teasley, R.J., Bowker, J.M., & Cordell, H.K. (1998). An Ecoregional Approach to the Economic Valuation of Land and Water Based Recreation in the United States. *Environmental Management*, 22(1), 69-77.
- Bishop, R.C., Brown, C.A., Welsh, M.P., & Boyle, K.J. (1989). *Grand Canyon recreation and Glen Canyon Dam operations: An economic evaluation*. In K.J. Boyle and T. Heekin, Western Regional Research Project W-133, Benefits and Costs in Natural Resource Planning, Interim Report 2. Orono, ME: Department of Agricultural and Resource Economics, University of Maine. Pp 407-435.
- Bishop, R., Heberlein, T., & Kealy, M.J. (1983). Contingent valuation of environmental assets: Comparisons with a simulated market. *Natural Resources Journal*, 23,619-633.
- Bishop, R., Heberlein, T., Welsh, M., & Baumgartner, R. (1984). *Does contingent valuation work? Results of the Sandhill experiment*. Paper presented at the joint meetings of AERA and AAEA.
- Bouwes, N., & Schneider, R. (1979). Procedures in estimating benefits of water quality change. *American Journal of Agricultural Economics*, 61,535-539.
- Bowes, M., & Krutilla, J. (1989). *Multiple-use management: The economics of public forestlands*. Washington, DC: Resources for the Future. Pp 177-247.
- Bowes, M.D., & Loomis, J.B. (1980). A note on the use of travel cost models with unequal zonal populations. *Land Economics*, 56,465-470.

- Bowker, J.M., & English, D.B.K. (2002). *Mountain Biking at Tsali: An Assessment of Users, Preferences, Conflicts, and Management Alternatives*. Preliminary USDA Forest Service Report: www.srs.fs.fed.us/trends/tsali.html
- Bowker, J.M., English, D.B.K., & Donovan, J.A. (1996). Toward a Value for Guided Rafting on Southern Rivers. *Journal of Agricultural and Applied Economics*, 28(2), 423-432.
- Bowker, J.M., & Leeworthy, V.R. (1998). Accounting for Ethnicity in Recreation Demand: A Flexible Count Data Approach. *Journal of Leisure Research*, 30(1), 64-78.
- Bowker, J.M., Miles, M.P., & Randall, E.J. (1997). *A Demand Analysis of Off-Road Motorized Recreation*. Paper presented at the Association of Marketing Theory and Practice Annual Meeting entitled "Expanding Marketing Horizons into the 21st Century" at Jekyll Island, SC.
- Boyle, K.J., Phillips, M.L., Reiling, S.D., & Demirelli, L.K. (1988). *Economic values and economic impacts associated with consumptive uses of Maine's fish and wildlife resources*. Orono, ME: Department of Agricultural and Resource Economics, University of Maine.
- Boyle, K.J., Reiling, S.D., & Phillips, M.L. (1990). Species substitution and question sequencing in contingent valuation surveys evaluating the hunting of several types of wildlife. *Leisure Science*, 12, 103-118.
- Boyle, K., Reiling, S., Teisl, M., & Phillips, M. (1990). *A study of the impact of game and nongame species on Maine's economy*. Orono, ME: Department of Agricultural and Resource Economics, University of Maine.
- Boyle, K.J., Roach, B., & Waddington, D.G. (1998). *1996 Net Economic Values for Bass, Trout and Walleye Fishing, Deer, Elk and Moose Hunting, and Wildlife Watching: Addendum to the 1996 National Survey of Fishing, Hunting and Wildlife Associated Recreation*. Report 96-2. U.S. Fish and Wildlife Service.
- Boyle, K., Welsh, M., & Bishop, R. (1988). *Analyzing the effects of Glen Canyon Dam releases on Colorado river recreation using scenarios of unexperienced flow conditions*. In J.B. Loomis (comp.), *Western Regional Research Publication W-133, Benefits and Costs in Natural Resources Planning, Interim Report*. Davis, CA: University of California, Davis. Pp 111-130.
- Brooks, R. (1988). *The net economic value of deer hunting in Montana*. Helena, MT: Montana Department of Fish, Wildlife, and Parks.
- Brown, G., & Hammack, J. (1972). *A preliminary investigation of the economics of migratory waterfowl*. In J.V. Krutilla (ed.), *Natural Environments: Studies in Theoretical and Applied Analysis*. Baltimore, MD: Johns Hopkins University Press. Pp 171-204.
- Brown, G., & Hay, M. (1987). *Net economic recreation values for deer and waterfowl hunting and trout fishing*. Washington, DC: USDI Fish and Wildlife Service, Division of Policy and Directive Management. Working paper No. 23.
- Brown, G., & Plummer, M. (1979). *Recreation valuation: An economic analysis of nontimber uses of forestland in the Pacific Northwest*. Pullman, WA: Forest Policy Project, Washington State University.
- Brown, T., Daniel, T., Richards, M., & King, D. (1989). Recreation participation and the validity of photo-based preference judgments. *Journal of Leisure Research*, 21, 40-60.
- Brown, W., Larson, D.M., Johnston, R.S., & Wahle, R.J. (1979). *Improved economic evaluation of commercially and sport caught salmon and steelhead of the Columbia River*. Corvallis, OR: Oregon State University.
- Casey, J.F., Vukina, T., & Danielson, L.E. (1995). The economic value of hiking: Further considerations of opportunity cost of time in recreational demand models. *Journal of Agricultural and Applied Economics*, 27, 658-668.
- Cavlovic, T. (2000). *Valuing the Loss in Access: An Institutional and Welfare Analysis of Rock Climbing on U.S. Public Lands*. Ph.D. Dissertation, University of New Mexico: Albuquerque, NM.

- Cesar, H., van Beukering, P., Pintz, S., & Dierking, J. (2002). *Economic Valuation of the Coral Reefs of Hawaii. Hawaii Coral Reef Initiative Research Program*. University of Hawaii.
- Chakraborty, K., & Keith, J.E. (2000). Estimating the Recreation Demand and Economic Value of Mountain Biking in Moab, Utah: An Application of Count Data Models. *Journal of Environmental Planning and Management*, 43(4), 461-469.
- Chicetti, C.J., Fisher, A.C., & Smith, V.K. (1976). An econometric evaluation of a generalized consumer surplus measure: The Mineral King controversy. *Econometrica*, 44, 1259-1275.
- Connelly, N., & Brown, T. (1988). *Estimates of nonconsumptive wildlife use on Forest Service and BLM lands*. Ithaca, NY: USDA Forest Service and Cornell University.
- Connelly, N., & Brown, T. (1991). Net economic value of the freshwater recreational fisheries of New York. *Transactions of the American Fisheries Society*, 120,770-775.
- Cooper, J., & Loomis, J. (1991). *Economic value of wildlife resources in the San Joaquin Valley: Hunting and viewing values*. In A. Dinar and D. Zilberman (eds.), *The Economic and Management of Water and Drainage in Agriculture*. Boston, MA: Kluwer Academic Publishers. Pp 447-463.
- Cooper, J., & Loomis, J. (1993). Testing whether waterfowl hunting benefits increase with greater water deliveries to wetlands. *Environment and Resource Economics*, 3,545-561.
- Cordell, H.K., & Bergstrom, J. (1992). Comparison of recreation use values among alternative reservoir water level management scenarios. *Water Resources Research*, 29,247-258.
- Cory, D.C., & Martin, W.E. (1985). Valuing wildlife for efficient multiple use: Elk vs. cattle. *Western Journal of Agricultural Economics*, 10,282-293.
- Coupal, R.H., Bastian, C., May, J., & Taylor, D.T. (2001). The Economic Benefits of Snowmobiling to Wyoming Residents: A Travel Cost Approach with Market Segmentation. *Journal of Leisure Research*, 33(4), 492-510.
- Crandall, K.B. (1991). *Measuring the economic benefits of riparian areas*. Master's Thesis, University of Arizona.
- Creel, M.D., & Loomis, J.B. (1990). Theoretical and empirical advantages of truncated count data estimators for analysis of deer hunting in California. *American Journal of Agricultural Economics*, 72,434-441.
- Daniels, S. (1987). Marginal cost pricing and efficient provision of public recreation. *Journal of Leisure Research*, 19, 22-34.
- Daubert, J.T., & Young, R.A. (1981). Recreational demands for maintaining instream flows: A contingent valuation approach. *American Journal of Agricultural Economics*, 63,666-676.
- Donnelly, D., Loomis, J., Sorg, C., & Nelson, L. (1983). *Net economic value of recreational steelhead fishing in Idaho*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Resource Bulletin RM-9.
- Donnelly, D., & Nelson, L. (1983). *Net economic value of deer hunting in Idaho*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Resource Bulletin RM-13.
- Douglas, A.J. & Taylor, J.G. (1998). Riverine based eco-tourism: Trinity River non market benefits estimates. *International Journal of Sustainable Development and World Ecology*, 5,136-148.
- Downing, M. & Roberts, R.K. (1991). Estimating Visitor Use-Value of Arboreta: The Case of the University of Tennessee Arboretum. *Journal of Environmental Horticulture*, 9(4), 207-210.
- Duffield, J. (1984). *Travel cost and contingent valuation: A comparative analysis*. In V.K. Smith and A.D. Witte (eds.), *Advances in Applied Micro-Economics*, Vol. 3. Greenwich, CT: JAI Press. Pp 67-87.
- Duffield, J. (1988). *The net economic value of elk hunting in Montana*. Helena, MT: Report for Montana Department of Fish, Wildlife, and Parks.

- Duffield, J., Loomis, J., Brooks, R., & Holliman, J. (1987). *The net economic value of fishing in Montana*. Helena, MT: Report for Montana Department of Fish, Wildlife, and Parks.
- Duffield, J., & Neher, C. (1990). *A contingent valuation assessment of Montana deer hunting: Attitudes and economic benefits*. Helena, MT: Report for Montana Department of Fish, Wildlife, and Parks.
- Duffield, J., & Neher, C. (1991). *Montana waterfowl hunting: A contingent valuation assessment of economic benefits and hunter attitudes*. Helena, MT: Report for Montana Department of Fish, Wildlife, and Parks.
- Duffield, J., Neher, C., & Brown, T. (1992). Recreation benefits of instream flow: Application to Montana's Big Hole and Bitterroot Rivers. *Water Resources Research*, 28, 2169-2181.
- Dwyer, J., Peterson, G., & Darragh, A. (1983). Estimating value of urban forests using the travel cost method. *Journal of Arboriculture*, 9,182-185.
- Ekstrand, E.R. (1994). *Economic benefits of resources used for rock climbing at Eldorado Canyon State Park, Colorado*. Ph.D. Dissertation, Colorado State University.
- Englin, J., & Mendelsohn, R. (1991). 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*, 21,275-290.
- Englin, J., & Shonkwiler, J.S. (1995). Estimating social welfare using count data models: An application to long-run recreation demand under conditions of endogenous stratification. *The Review of Economics and Statistics*, 77,104-112.
- English, D.B.K., & Bowker, J.M. (1996). Sensitivity of Whitewater Rafting Consumers Surplus to Pecuniary Travel Cost. *Journal of Environmental Management*, 47,79-91.
- Eubanks, T.L., Ditton, R.B., & Stoll, J.R. (1998). *Platte River Nature Recreation Study: The Economic Impact of Wildlife Watching on the Platte River in Nebraska*. Prepared for the U.S. Environmental Protection Agency Region VII.
- Eubanks, T., & Stoll, J.R. (1999). *Avitourism in Texas: Two Studies of Birders in Texas and their Potential Support for the Proposed World Birding Center*. www.fermatainc.com/basic/eco_avitourism.html
- Fadali, E., & Shaw, W.D. (1998). Can recreation values for a lake constitute a market for banked agricultural water? *Contemporary Economic Policy*, 16,433-441.
- Farber, S. (1988). The Value of Coastal Wetlands for Recreation: An Application of Travel cost and Contingent Valuation Methodologies. *Journal of Environmental Management*, 26,299-312.
- Farber, S., & Rambaldi, A. (1993). Willingness to pay for air quality: The case of outdoor exercise. *Contemporary Policy Issues*, 11,19-30.
- Feltus, D.G., & Langenau, E.E. (1984). Optimization of firearm deer hunting and timber values in northern lower Michigan. *Wildlife Society Bulletin* 12,612.
- Fermata, Inc. (2000). *Wildlife Associated Recreation on the New Jersey Delaware Bayshore*. Delaware Horseshoe Crab and Shorebird Survey.
- Findeis, J.L., & Michalson, E.L. (1984). *The demand for and value of outdoor recreation in the Targhee National Forest, Idaho*. Moscow, ID: University of Idaho, Agricultural Experiment Station, Bulletin No. 627.
- Fisher, W. (1982). *Travel cost and contingent value estimates explored*. Paper presented at the Eastern Economic Association Meeting.
- Fix, P., & Loomis, J. (1998). Comparing the economic value of mountain biking estimated using revealed and stated preference. *Journal of Environmental Planning and Management*, 41,227-236.
- Gericke, K.L. (1993). *Multiple destination trips and the economic valuation of outdoor recreation sites*. Ph.D. Thesis, Virginia Polytechnic Institute and State University.

- Garrett, J., Pon, G., & Arosteguy, D. (1970). *Economics of big game resource use in Nevada*. Reno, NV: University of Nevada, Reno, Agricultural Experiment Station.
- Gibbs, K. (1974). Evaluation of outdoor recreational resources: A note. *Land Economics*, 50,309-311.
- Gibbs, K., Queirolo, L., & Lomnicki, C. (1979). *The valuation of outdoor recreation in a multiple-use forest*. Corvallis, OR: Forest Research Laboratory, Oregon State University.
- Gilbert, A.H., McCollum, D.W., & Peterson, G.L. (1988). *A comparison of valuation models using cross-country skiing data from Colorado and Vermont*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station Draft Paper.
- Glass, R., & More, T. (1992). Equity preferences in the allocation of goose hunting opportunities. *Journal of Environmental Management*, 35,271-279.
- Goodwin, B.K., Offenbach, L.A., Cable, T.T., & Cook, P.S. (1993). Discrete/continuous contingent valuation of private hunting access in Kansas. *Journal of Environmental Management*, 39,1-12.
- Grijalva, T.C., Berrens, R.P., Bohara, A.K., Jakus, P.M., & Shaw, W.D. (2002). Valuing the Loss of Rock Climbing Access in Wilderness Areas: A National-Level, Random-Utility Model. *Land Economics*, 78(1),103-120.
- Grubb, H., & Goodwin, J. (1968). *Economic evaluation of water oriented recreation in the preliminary Texas water plan*. Dallas, TX: Texas Water Development Board.
- Halstead, J., Lindsay, B.E., & Brown, C.M. (1991). Use of tobit model in contingent valuation: Experimental evidence from Pemigewasset wilderness area. *Journal of Environmental Management*, 33,79-89.
- Hammer, M.Z. (2001). *Applying the TCM with Secondary Data to White Water Boating in Grand Canyon National Park*. Masters Thesis: Colorado State University, Fort Collins, CO.
- Hansen, C. (1977). *A report on the value of wildlife*. Ogden, UT: USDA Forest Service, Intermountain Region, Miscellaneous Publication No. 1365.
- Hansen, W., Mills, A., Stoll, J., Freeman, R., & Hankamer, C. (1990). *A case study application of the contingent valuation method for estimating urban recreation and benefits*. U.S. Army Corp of Engineers, IWR Report 90-R-11.
- Hanson, L., Feather, P., & Shank, D. (1999). Valuation of Agriculture's Multi-Site Environmental Impacts: An Application to Pheasant Hunting. *Agricultural and Resource Economics Review*, 199-207.
- Harpman, D., Sparling, E., & Waddle, T. (1993). A methodology for quantifying and valuing the impacts of flow changes on a fishery. *Water Resources Research*, 29,575-582.
- Haspel, A., Johnson, F.R. (1982). Multiple destination trip bias in recreation benefit estimation. *Land Economics*, 58,364-372.
- Hausman, J.A., Leonard, G.K., & McFadden, D. (1995). A utility-consistent, combined discrete choice and count data model assessing recreational use losses due to natural resource damage. *Journal of Public Economics*, 56,1-30.
- Hay, J.M. (1988). *Net economic values of non-consumptive wildlife-related recreation*. Washington, DC: USDI, Fish and Wildlife Service. Report 85-2.
- Hellerstein, D.M. (1991). Using count data models in travel cost analysis with aggregate data. *American Journal of Agricultural Economics*, 73,861-867.
- Henderson, M.M., Criddle, K.R., & Lee, S.T. (1999). The Economic Value of Alaska's Copper River Personal Use and Subsistence Fisheries. *Alaska Fishery Research Bulletin*. 6(2).
- Hilger, J. (1998). *A Bivariate Compound Poisson Application: The Welfare Effects of Forest Fire on Wilderness Day Hikers*. Masters Thesis: University of Nevada, Reno, NV.
- Hushak, L.J., Kelch, D.O., & Glenn, S.J. (1999). The Economic value of the Lorain County, Ohio, Artificial Reef. *American Fisheries Society Symposium*, 22,348-362.

- Hushak, L., Winslow, J., & Dutta, N. (1984). *Economic value Lake Erie sport fishing to private-boat anglers*. Ohio State University.
- Hushak, L., Winslow, J., & Dutta, N. (1988). Economic value of Great Lakes sportfishing: The case of private-boat fishing in Ohio's Lake Erie. *Transactions of the American Fisheries Society*, 117,363-373.
- Johnson, D.M., & Walsh, R.G. (1987). *Economic benefits and costs of the fish stocking program at Blue Mesa Reservoir, Colorado*. Fort Collins, CO: Colorado Water Resources Research Institute, Colorado State University, Technical Report No. 49.
- Kalter, R., & Gosse, L. (1969). *Outdoor recreation in New York states: Projections of demand, economic value, and pricing effects for the period 1970-1985*. Ithaca, NY: Cornell University, Special Cornell Series No. 5.
- Kealy, M.J., & Bishop, R. (1986). Theoretical and empirical specifications issues in travel cost demand studies. *American Journal of Agricultural Economics*, 68,660-667.
- Keith, J.E. (1980). *Snowmobiling and cross-country skiing conflicts in Utah: Some initial research results*. Proceedings of the North American Symposium on Dispersed Winter Recreation. St. Paul, MN: University of Minnesota. Pp 57-63.
- Keith, J., Halverson, P., & Fumworth, L. (1982). *Valuation of a free flowing river: The Salt River, Arizona*. Tucson, AZ: Utah State University of Arizona.
- King, D., & Hof, J. (1985). Experimental commodity definition in recreation travel cost models. *Forest Science*, 31,519-529.
- King, D.A., Brown, T.C., Daniel, T., Richards, M.T., & Stewart, W.P. (1988). *Personal Communication between D.A. King and R.G. Walsh*. University of Arizona, Tucson.
- Klemperer, D.W., Verbyla, P.S., & Jouner, L.D. (1984). *Valuing white-water river recreation by the travel cost method*. National River Recreation Symposium, Baton Rouge, LA. Pp 709-719.
- Kline, J.D., & Swallow, S.K. (1998). The Demand for Local Access to Coastal Recreation in Southern New England. *Coastal Management*, 26,177-190.
- Knetsch, J., Brown, R., & Hansen, W. (1976). *Estimating expected use and value of recreation sites*. In C. Gearing, W. Swart, and T. Var (eds.), *Planning for Tourism Development: Quantitative Approaches*. New York, NY: Proeger.
- Leeworthy, V.R., & Wiley, P.C. (1991). *Recreational Use Value for Island Beach State Park*. Strategic Environmental Assessments Division of the Office of Ocean Resource Conservation and Assessment: Rockville, MD.
- Leggett, C.G., Kleckner, N.S., Boyle, K.J., Duffield, J.W., & Mitchell, R.C. (2003). *Social Desirability Bias in Contingent Valuation Surveys Administered Through In-Person Interviews*. Forthcoming, November 2003 in *Land Economics*.
- Leuschner, W.A., Cook, P.S., Roggenbuck, J.W., & Oderwald, R.G. (1987). A comparative analysis for wilderness user fee policy. *Journal of Leisure Research*, 19,101-114.
- Leuschner, W., & Young, R. (1978). Estimating the southern pine beetle's impact on reservoir campsites. *Forest Science*, 24,527-537.
- Loomis, J. (1979). *Estimation of recreational benefits from Grand Gulch primitive area*. Moab, UT: USDI, Bureau of Land Management.
- Loomis, J. (1982). Use of travel cost models for evaluation lottery rationed recreation: Application to big game hunting. *Journal of Leisure Research*, 14,117-124.
- Loomis, J., & Caughlan, L. (2003). *Economic Analysis of Alternative Bison and Elk Management Practices on the National Elk Refuge and Grand Teton National Park: A Comparison of Visitor and Household Responses*. Draft Report. Full Report forthcoming from U.S.G.S. Biological Resources Division, Fort Collins, CO

- Loomis, J., & Cooper, J. (1988). *The economic value of antelope hunting in Montana*. Montana Department of Fish, Wildlife, and Parks.
- Loomis, J., Cooper, J., & Allen, S. (1988). *The Montana elk hunting experience: A contingent valuation assessment of economic benefits to hunter*. Helena, MT: Montana Department of Fish, Wildlife, and Parks.
- Loomis, J., Creel, M., & Cooper, J. (1989). *Economic benefits of deer in California: Hunting and viewing values*. Davis, CA: College of Agricultural and Environmental Sciences, University of California.
- Loomis, J., Donnelly, D., Sorg, C., & Oldenburg, L. (1985). *Net economic value of hunting unique species in Idaho: Bighorn sheep, mountain goat, moose, and antelope*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-10.
- Loomis, J., & Feldman, M. (1995). An economic approach to giving "equal consideration" to environmental values in FERC hydropower relicensing. *Rivers*, 5,96-108.
- Loomis, J., Updike, D., & Unkel, W. (1989). Consumption and nonconsumption values of a game animal: The case of California deer. *Transactions of the North American Wildlife and Natural Resource Conference*, 54,640-650.
- Loomis, J., Yorizane, S., & Larson, D. (2000). Testing Significance of Multi-Destination and Multi-Purpose Trip Effects in a Travel Cost Method Demand Model for Whale Watching Trips. *Agricultural and Resource Economics Review*, 29(2),183-191.
- Lutz, J., Englin, J., & Shonkwiler, J.C. (2000). On the Aggregate Value of Recreational Activities. *Environmental and Resource Economics*, 15,217-226.
- Markstrom, D., & Rosenthal, D. (1987). Demand and value of firewood permits as determined by the travel cost method. *Western Journal of Applied Forestry*, 2,48-50.
- Martin, W., Bollman, F., & Gum, R. (1982). Economic value of Lake Mead fishing. *Fisheries*, 7, 20-24.
- Martin, W., Gum, R., & Smith, A. (1974). *The demand for and value of hunting, fishing, and general rural outdoor recreation in Arizona*. Tucson, AZ: Agricultural Experiment Station, University of Arizona.
- May, J.A. (1997). *Measuring consumer surplus of Wyoming snowmobilers using the travel cost method*. Master's thesis. University of Wyoming.
- McCollum, D.W., Bishop, R.C., & Welsh, M.P. (1988). *A probabilistic travel cost model*. Madison, WI: Department of Agricultural Economics, University of Wisconsin.
- McCollum, D., Gilbert, A., & Peterson, G. (1990). The net economic value of day use cross country skiing in Vermont: A dichotomous choice contingent valuation approach. *Journal of Leisure Research*, 22,341-352.
- McCollum, D.W., Haeefe, M.A., & Miller, S.M. (1998). *Attributes and the Value of a Recreation Experience: A Preliminary Analysis of Wildlife Viewing in Denali National Park*. In: Jakus, Paul M. Comp. Benefits and costs of resource policies affecting public and private land: eleventh interim report. Western Regional Research Publication W-133. Knoxville, TN: University of Tennessee, Department of Agricultural Economics and Rural Sociology: 179-200.
- McCollum, D.W., & Miller, S.M. (1994). *Alaska voter, Alaska hunters and Alaska non-resident hunters: Their wildlife related trip characteristics and economics*. Anchorage, AK: Alaska Department of Fish and Game.
- McCollum, D.W., Peterson, G.L., Arnold, J.R., Markstrom, D.C., & Hellerstein, D.M. (1990). *The net economic value of recreation on the national forests: Twelve types of primary activity trips across nine Forest Service regions*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Research Paper RM-89.

- McConnell, K. (1979). Values of marine recreational fishing: Measurement and impact of management. *American Journal of Agricultural Economics*, 61,921-925.
- McKean, J.R., & Taylor, R.G. (2000). *Outdoor Recreation Use and Value: Snake River Basin of Central Idaho*. Idaho Experiment Station Bulletin: Moscow, ID.
- Mendelsohn, R. (1987). Measuring the value of recreation in the White Mountains. *Appalachia*, 46,73-84.
- Menz, F., & Wilton, D. (1983)a. Alternative ways to measure recreation values by the travel cost method. *American Journal of Agricultural Economics* 65,,332-336.
- Menz, F., & Wilton, D. (1983)b. An economic study of the muskellunge fishery in New York. *New York Fish and Game Journal*, 30.
- Michaelson, E. (1977). *An attempt to quantify the esthetics of wild and scenic rivers in Idaho*. St. Paul, MN: USDA Forest Service, North Central Forest Experiment Station, General Technical Report NC-28. pp 320-328.
- Michaelson, E., & Gilmour, C. (1978). *Estimating the demand for outdoor recreation in the Sawtooth Valley, Idaho*. Moscow, ID: Agricultural Experiment Station, University of Idaho, Research Bulletin No. 107.
- Miller, J., & Hay, M. (1984). Estimating substate values for fishing and hunting. *Transactions of the North American Wildlife and Natural Resources Conference*, 49,345-355.
- Moncur, J.E. (1975). Estimating the value of alternative outdoor recreation facilities within a small area. *Journal of Leisure Research*, 7,301-311.
- Morey, E. (1985). Characteristics, consumer surplus, and new activities. *Journal of Public Economics*, 26,221-236.
- Morey, E., Buchanan, T., & Waldman, D.M. (1999). *Estimating the Benefits and Costs to Mountain Bikers of Changes in Trail Characteristics, Access Fees, and Site Closures: Choice Experiments and Benefits Transfer*. University of Colorado: Boulder, CO.
- Morey, E., Rowe, R., & Watson, M. (1991). *An extended discrete-choice model of Atlantic salmon fishing: With theoretical and empirical comparisons to standard travel-cost models*. Boulder, CO: Department of Economics, University of Colorado.
- Mullen, J., & Menz, F. (1985). The effect of acidification damages on the economic value of the Adirondack fishing to New York anglers. *American Journal of Agricultural Economics*, 67,112-119.
- Palm, R., & Malvestuto, S. (1983). Relationships between economic benefit and sport-fishing effort on West Point reservoir, Alabama-Georgia. *Transactions of the American Fisheries Society*, 112,71-78.
- Park, T., Loomis, J., & Creel, M. (1991). Confidence intervals for evaluating benefits estimates from dichotomous choice contingent valuation studies. *Land Economics*, 67,64-73.
- Parsons, G., & Boyle, K. (2003). *Padre Island National Seashore Visitor Day Values*. Foster Wheeler Environmental Corporation Report. Lakewood, CO.
- Peterson, G.L., & Arnold, J.R. (1987). The economic benefits of mountain running the Pike's Peak marathon. *Journal of Leisure Research*, 19,84-100.
- Peterson, G.L., Walsh, R.G., & McKean, J.R. (1988). *The discriminatory impact of recreation price*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Unpublished paper.
- Prince, R. (1988). *Estimating recreation benefits under congestion, uncertainty, and disequilibrium*. Harrisonburg, VA: Department of Economics, James Madison University.
- Ribaudo, M., & Epp, D. (1984). The importance of sample discrimination in using the travel cost method to estimate the benefits of improved water quality. *Land Economics*, 60,397-403.

- Richards, M., & Brown, T. (1992). *Economic value of campground visits in Arizona*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Research Paper RM-305.
- Richards, M., Wood, D.B., & Coyler, D. (1985). *Sport fishing at Lees Ferry, Arizona: User differences and economic values*. Flagstaff, AZ: Northern Arizona University.
- Richardson, R.B. (2002). *Estimating the economic effects of climate change on nature based tourism: a comparison of revealed and stated preference methods*. Ph.D. Dissertation. Colorado State University, Natural Resource Economics Department, Fort Collins, CO.
- Richer, J.R., & Christensen, N.A. (1999). Appropriate Fees for Wilderness Day Use: Pricing Decisions for Recreation on Public Land. *Journal of Leisure Research*, 31(3),269-280.
- Roach, B., Boyle, K., Bergstrom, J., & Reiling, S. (1999). The Effect of Instream Flows on Whitewater Visitation and Consumer Surplus: A Contingent Valuation Application to the Dead River, Maine. *Rivers*, 7(1),11-20.
- Roberts, K., Thompson, M., & Pawlyk, P. (1985). Contingent valuation of recreational diving at petroleum rigs, Gulf of Mexico. *Transactions of the American Fisheries Society*, 114,214-219.
- Rosenthal, D. (1987). The necessity for substitute prices in recreation demand analysis. *American Journal of Agricultural Economics*, 69,828-837.
- Rosenthal, D.H., & Cordell, H.K. (1984). *Pricing river recreation: Some issues and concerns*. National River and Recreation Symposium, Baton Rouge, LA: School of Landscape Architecture, Louisiana State University. Pp 272-284.
- Rosenthal, D., & Walsh, R. (1986). Hiking values and the recreation opportunity spectrum. *Forest Science*, 32,405-415.
- Rowe, R., Morey, E., Ross, A., & Shaw, W.D. (1985). *Valuing marine recreational fishing on the Pacific coast*. Washington, DC: USDC National Marine Fisheries Service, Report LJ-85-18C.
- Samples, K., & Bishop, R. (1985). Estimating the value of variations in anglers' success rates: An application of the multiple-site travel cost method. *Marine Resource Economics*, 21,55-74.
- Sanders, L., Walsh, R., & McKean, J. (1991). Comparable estimates of the recreational value of rivers. *Water Resources Research*, 27,1387-1394.
- Shafer, E.L., Carlline, R., Guldin, R.W., & Cordell, H.K. (1993). Economic Amenity Values of Wildlife: Six Case Studies in Pennsylvania. *Environmental Management*, 17(5),669-682.
- Shafer, E., & Wang, M. (1989). *Economic amenity values of fish and wildlife resources*. State College, PA: Penn State University.
- Shaw, W. D., & Jakus, P. (1996). *Travel cost models of the demand for rock climbing*. Paper presented at the Western Regional Research Publication W-133, Benefits and Costs in Natural Resources Planning.
- Siderelis, C. (2001). Incidental Trips and Aquarium Benefits. *Leisure Sciences*, 2(3),193-199.
- Siderelis, C., Brothers, G., & Rea, P. (1995). A boating choice model for the valuation of lake access. *Journal of Leisure Research*, 27,264-282.
- Siderelis, C., & Moore, R. (1995). Outdoor recreation net benefits of rail-trails. *Journal of Leisure Research*, 27,344-359.
- Silberman, J., & Klock, M. (1989). The behavior of respondents in contingent valuation: Evidence on starting bids. *Journal of Behavioral Economics*, 18,51-60.
- Smith, V.K., & Kopp, R. (1980). A regional recreation demand and benefits model. *Land Economics*, 56,64-72.
- SMS Research. (1983). *Experimental valuation of recreational fishing in Hawaii*. Washington, DC: USDC National Marine Fisheries Service, Report H-83-11C.

- Sohngen, B., Lichtkoppler, F., & Bielen, M. (1999). *The Value of Day Trips to Lake Erie Beaches*. Publication OHSU-TB-039. Ohio Sea Grant College Program.
- Sorg, C., Loomis, C., Donnelly, D., Peterson, G., & Nelson, L. (1985). *Net economic value of cold and warm water fishing in Idaho*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Resource Bulletin RM-11.
- Sorg, C., & Nelson, L. (1986). *Net economic value of elk hunting in Idaho*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Resource Bulletin RM-12.
- Stoll, J., & Johnson, L.A. (1984). Concepts of value, nonmarket valuation and the case of the whooping crane. *Transactions of the North American Wildlife and Natural Resources Conference*, 49,382-393.
- Strong, E. (1983). A note on the functional form of travel cost models with zones of unequal populations. *Land Economics*, 59,342-349.
- Sublette, W., & Martin, W. (1975). *Outdoor recreation in the Salt-Verde Basin of central Arizona: Demand and value*. Tucson, AZ: Agricultural Experiment Station, University of Arizona.
- Sutherland, R. (1982). The sensitivity of travel cost estimates of recreation demand to the functional form and definition of origin zones. *Western Journal of Agricultural Economics*, 7,87-98.
- Teasley, R.J., & Bergstrom, J.C. (1992). *Estimating revenue-capture potential with public area recreation*. Athens, GA: University of Georgia.
- Upneja, A., Shafer, E.L., Seo, W., & Yoon, J. (2001). Economic Benefits of Sport Fishing and Angler Wildlife Watching in Pennsylvania. *Journal of Travel Research*, 40, 68-78.
- Vaughan, W., & Russell, C. (1982). Valuing a fishing day: An application of a systematic varying parameter model. *Land Economics*, 58,450-463.
- Waddington, D.G., Boyle, K.J., & Cooper, J. (1991). *1991 Net economic values for bass and trout fishing, deer hunting, and wildlife watching*. Washington, DC: USFWS Division of Federal Aid.
- Wade, W., McCollister, G.M., McCann, R.J., & Jones, G.M. (1988). *Estimating recreation benefits for instream and diverted users of waterfowls of the Sacramento-San Joaquin rivers watershed*. Paper presented at the Western Regional Research Publication W-133, Benefits and Costs in Natural Resources Planning, Monterey, CA.
- Walsh, R.G., Aukeman, R., & Milton, R. (1980). *Measuring benefits and the economic value of water in recreation on high country reservoirs*. Fort Collins, CO: Colorado Water Resources Research Institute, Colorado State University.
- Walsh, R.G., & Davitt, G.J. (1983). A demand function for length of stay on ski trips to Aspen. *Journal of Travel Research*, 22,23-29.
- Walsh, R.G., Ericson, R., Arosteguy, D., & Hansen, M. (1980). *An empirical application of a model for estimating the recreation value of instream flow*. Fort Collins, CO: Colorado Water Resources Research Institute, Colorado State University.
- Walsh, R.G., & Gilliam, L. (1982). Benefits of wilderness expansion with excess demand for Indian Peaks. *Western Journal of Agricultural Economics*, 7,1-12.
- Walsh, R.G., Gillman, R., & Loomis, J. (1981). *Wilderness resource economic: Recreation use and preservation values*. Fort Collins, CO: Department of Economics, Colorado State University.
- Walsh, R.G., Loomis, J.B., & Gillman, R.S. (1984). Valuing option, existence, and bequest demand for wilderness. *Land Economics*, 60,14-29.
- Walsh, R.G., Miller, N., & Gilliam, L. (1983). Congestion and willingness to pay for expansion of skiing capacity. *Land Economics*, 59,195-210.
- Walsh, R.G., & Olienyk, J.P. (1981). *Recreation demand effects of mountain pine beetle damage to the quality of forest recreation resources in the Colorado Front Range*. Fort Collins, CO: Department of Economics, Colorado State University.

- Walsh, R.G., Radulaski, O., & Lee, L. (1984). *Value of hiking and cross-country skiing in roaded and nonroaded areas of a national forest*. In F. Kaiser, D. Schweitzer, & P. Brown (eds.), *Economic Value Analysis of Multiple-Use Forestry*. Pp 176-187.
- Walsh, R.G., Sanders, L.D., & Loomis, J.B. (1985). *Wild and scenic river economics: Recreation use and preservation values*. Fort Collins, CO: Department of Agricultural and Resource Economics, Colorado State University.
- Walsh, R.G., Sanders, L.D., & McKean, J.R. (1987). *The value of travel time as a negative function of distance*. Fort Collins, CO: Department of Agricultural and Resource Economics, Colorado State University.
- Walsh, R.G., Ward, F.A., & Olienyk, J.P. (1989). Recreation demand for trees in National Forests. *Journal of Environmental Management*, 28,255-268.
- Ward, F. (1982). *The demand for and value of recreational use of water in southeastern New Mexico, 1978-79*. Los Cruces, NM: Agricultural Experiment Station, New Mexico State University, Research Report No. 465.
- Weithman, S., & Haas, M. (1982). Socioeconomic value of the trout fishery in Lake Tanneycomo, Missouri. *Transactions of the American Fisheries Society*, 111,223-230.
- Wellman, K.F., & Noble, B. (1997). *Selected Recreational Values of the Corpus Christi Bay National Estuary Program Study Area*. Publication CCBNEP-18. Corpus Christi, TX.
- Whitehead, J.C., & Sharratt, J. (2002). *The Recreation Benefits of the Pamlico Sound: A Comparison of Models*. Personal.ecu.edu/whiteheadj/data/pam/pamrec.htm
- Wilman, E. (1984). Benefits to deer hunters from forest management practices which provide deer habitat. *Transactions of the North American Wildlife and Natural Resources Conference*, 49,334-344.
- Young, J., Donnelly, D., Sorg, C., Loomis, J., & Nelson, L. (1987). *Net economic value of upland game hunting in Idaho*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Resource Bulletin RM-15.
- Zawacki, W.T., Marsinko, A., & Bowker, J.M. (2000). A Travel Cost Analysis of Nonconsumptive Wildlife-Associated Recreation in the United States. *Forest Science*, 46(4),496-506.
- Ziemer, R., Musser, W., & Hill, C. (1980). Recreation demand equations: Functional form and consumer surplus. *American Journal of Agricultural Economics*, 62,136-141.