Travel Cost Literature

Adamowicz,-Wiktor-L.; Fletcher,-Jerald-J.; Graham-Tomasi,-Theodore. "Functional Form and the Statistical Properties of Welfare Measures." American-Journal-of-Agricultural-Economics; 71(2), May 1989, pages 414-21.

This paper uses Monte Carlo analysis to compare the variance of consumer's surplus for several functional forms for demand. Although the semilog and linear forms fit the data well by statistical criteria, the coefficients of variation for consumer's surplus generated by these forms were substantially larger than for the double-log and linear-log forms. While this paper is framed in the travel cost approach to recreational demand, there are implications for the choice of functional form whenever the measure of interest is a nonlinear transformation of the estimated parameters.

Adamowicz, Wiktor; Sarah Jennings; Alison Coyne. 1990. "A Sequential Choice Model of Recreation Behavior." Western Journal of Agricultural Economics, Volume: 15, Issue: 1, Pages: 91-99. **Keywords**: benefit estimation, demand theory, discrete choice, recreation demand, travel cost models.

This paper develops a model in which the choice of a discrete number of sequentially chosen trips to a given site is specified as a function of site-specific variables and variables realized on previous trips. This model specifies discrete, nonnegative integer values for the number of trips and allows intraseasonal effects to determine the probability of taking each additional trip.

Adamowicz, Wiktor. 1994. "Habit Formation and Variety Seeking in a Discrete Choice Model of Recreation Demand." Journal of Agricultural and Resource Economics, Volume: 19, Issue: 1, Pages: 19-31. **Keywords**: Travel Cost Method, Habit Formation, Recreation Demand, Variety Seeking, Welfare Measures.

This paper uses a rational dynamic model to incorporate previous experience with a recreation site in a model of the choice of a site. The data used in this study were obtained from a survey of recreational anglers in Alberta, Canada in 1990.

Adamowicz, Wiktor; J. Louviere; M. Williams. 1994. "Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities." Journal of Environmental Economics and Management, Volume: 26, Pages: 271-292. **Keywords**: conjoint

This technical paper combines stated preference data with observed (revealed preference) data from the same individuals to characterize recreationist choice of sites in the Highwood and Little Bow rivers in southwestern Alberta, Canada.

Agnello,-Richard-J.; Han,-Yunqi. "Substitute Site Measures in a Varying Parameter Model with Application to Recreational Fishing." Marine-Resource-Economics; 8(1), Spring 1993, pages 65-77.

This paper employs a varying parameter travel cost model to determine the economic valuation of fishing trips and catch for a sample of Long Island anglers. Substitution measures in the model are characterized in terms of the number and the quality of proximate alternative sites. This treatment of substitution as a site rather than an individual characteristic helps to define a site's uniqueness and in addition provides a feasible means of capturing substitution effects when measures of substitution at an individual level are not available. Per trip consumer surplus and changes in consumer surplus due to catch changes are computed and distinguished by controls for the availability and quality of substitute sites. Consumer surplus and the valuation of changes in catch are found to be substantially lower when controlling for substitution effects which in agreement with most previous studies.

Bell,-Frederick-W.; Leeworthy,-Vernon-R. "Recreational Demand by Tourists for Saltwater Beach Days." Journal-of-Environmental-Economics-and-Management; 18(3), May 1990, pages 189-205.

This analysis deals with tourists that come from significant distances to use principally beach resources. As Smith and Kipp (1980) have argued, those that use the conventional travel cost methods (TCM) do not recognize its potential spatial limitations. One day trips as used by the TCM are certainly inapplicable to those coming from significant distances, such as tourists to Florida. The empirical data are consistent with the thesis that annual consumer demand by individual tourists for Florida beach days is positively related to travel cost per trip and inversely related to on-site cost per day. There are compelling reasons for treating recreational decision-making for what we call tourists differently than for residents or those traveling relatively short distances. Employing the on-site cost demand curve for tourists using Florida's beaches, we find the daily consumer surplus to be nearly $34.00.

Bowker,-J.-M.; English,-Donald-B.-K.; Donovan,-Jason-A. "Toward a Value for Guided Rafting on Southern Rivers." Journal-of-Agricultural-and-Applied-Economics; 28(2), December 1996, pages 423-32.

This study examines per trip consumer surplus associated with guided whitewater rafting on two southern rivers. First, household recreation demand functions are estimated based on the individual travel cost model using truncated count data regression methods and alternative price specifications. Findings show mean per trip consumer surplus point estimates between $89 and $286, depending on modeling assumptions and river quality. Magnitudes of these surpluses are very dependent on assumptions about the opportunity cost of time.

Boxall,-Peter-C.; Adamowicz,-Wiktor-L.; Tomasi,-Theodore. "A Nonparametric Test of the Traditional Travel Cost Model." Canadian-Journal-of-Agricultural-Economics; 44(2), July 1996, pages 183-93.

Boxall,-Peter-C. "The Economic Value of Lottery-Rationed Recreational Hunting." Canadian-Journal-of-Agricultural-Economics; 43(1), March 1995, pages 119-31.

Lottery-rationed permit systems are used to allocate hunting opportunities where demand

for permits exceeds the ability of the animal populations to sustain hunting harvest levels. Attempts to estimate the values of lottery-rationed hunting use a zonal travel cost model where applications per capita formed the dependent variable and expected travel costs represent the price variable. This paper reexamines this analysis using a discrete choice travel cost model which incorporates the expectation of receiving a permit. This model is developed for lottery-rationed antelope hunting in Alberta. Choice in the lottery-rational hunting context involves selecting one site from a set defined through management regulations. The discrete choice travel cost model is proposed as superior to the early models because it better represents this behavioral process.

Brown, Gardner, Jr. and Robert Mendelsohn (1984). "The Hedonic Travel Cost Method." The Review of Economics and Statistics, 66:427-433.

The hedonic travel cost method is a technique that reveals how much users are willing to pay for the individual characteristics of outdoor recreation sites. The prices of recreation attributes are estimated by regressing travel costs on the bundles of characteristics associated with each of several potential destination sites. The demand for site characteristics on site quality is then revealed by comparing the site selection of users facing different attribute prices. The technique is applied to value steelhead fish density in Washington State streams.

Caulkins,-Peter-P.; Bishop,-Richard-C.; Bouwes,-Nicolaas-W. "Omitted Cross-Price Variable Biases in the Linear Travel Cost Model: Correcting Common Misperceptions." Land-Economics; 61(2), May 1985, pages 182-87.

Caulkins, Peter P.; Richard C. Bishop; Nicolaas W. Bouwes. 1986. "The Travel Cost Model for Lake Recreation: A Comparison of Two Methods for Incorporating Site Quality and Substitution Effects." American Agriculture Economics Association, issue: May 1986, Pages: 291-297. **Keywords**: multinomial logit model, traditional travel cost model, substitution effects, water quality improvement.

Dobbs,-Ian-M. "Individual Travel Cost Method: Estimation and Benefit Assessment with a Discrete and Possibly Grouped Dependent Variable." American-Journal-of-Agricultural-Economics; 75(1), February 1993, pages 84-94.

The trip/visit variable in the individual travel cost method is often regarded as discrete. Furthermore, it is often reported in surveys as a grouped variable (the number of visits reported falling into one of several classes). This paper develops a travel cost model that takes account of discreteness and grouping in both demand and benefit estimation. A case study and associated simulations are then reported, which indicate the potential extent of bias that may arise from ignoring discreteness/grouping in demand and benefit estimation. The information loss involved in varying the size of visit classes is also examined.

Englin,-Jeffrey; Lambert,-David; Shaw,-W.-Douglass. "A Structural Equations Approach to Modeling Consumptive Recreation Demand." Journal-of-Environmental-Economics-and-Management; 33(1), May 1997, pages 33-43.

In this analysis we develop a two equation structural model of a count travel cost model of recreational angling demand and angling success. By modeling the two equations jointly we avoid the difficulties associated with the usual approach which estimates the demand for recreational fishing sites assuming the existence of an exogenous measure of fishing quality. Our analysis explicitly develops the joint log likelihood function that combines the two processes. We estimate our model using full information maximum likelihood methods. (c) 1997 Academic Press

English,-Jeffrey; Shonkwiler,-J.-S. "Modeling Recreation Demand in the Presence of Unobservable Travel Costs: Toward a Travel Price Model." Journal-of-Environmental-Economics-and-Management; 29(3), Part 1 Nov. 1995, pages 368-77.

An important issue in the application of travel cost models is the construction of a travel cost variable. This paper develops an econometric approach that views travel costs as an unobserved latent variable. The latent variable approach utilizes indicators to capture the role of individual travel costs in recreational demand models. The latent variables approach has at least two advantages over conventional approaches. One, the indicators can include both traditional components such as time and distance and non-traditional components such as the scenic beauty. Second, the estimation procedure results in each indicator being valued in dollar terms. (c) 1995 Academic Press, Inc.

English,-Jeffrey; Mendelsohn,-Robert. "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(3), November 1991, pages 275-90.

One benefit of managing forests is that one can alter the qualities of sites. The value of changing site qualities, however, is generally not known. This paper develops a formal hedonic travel cost model which can be used to estimate the value of both marginal and non-marginal changes to sites. The approach accommodates multiple simultaneous changes in site characteristics. Estimating this model using a set of permits from wilderness areas leads to revealed preference estimates of the recreational value of clear-cuts, old-growth, and nine other wilderness attributes.

Englin, Jeffrey; J.S. Shonkwiler. 1994. "A Latent Variables Approach to the Travel Cost Model." Department of Agricultural Economics, University of Nevada, August 1994. **Keywords**: travel costs, latent variables.

Fletcher, Jerald J.; Adamowicz, Wictor L.; Graham-Tomasi, Theodore. 1990. "The Travel Cost Model of Recreation Demand: Theoretical and Empirical Issues." Leisure Sciences, Volume: 12, Pages: 119-147. **Keywords**: travel cost model, recreation demand, separability in recreation demand.

This technical article provides an overview of selected theoretical and empirical issues in the economics literature ont he travel cost model of recreation demand. Issues are identified and

some solutions are discussed. Research results from related disciplines that may have applications to travel cost models are also discussed.

Grover,-Stephen-E. "Modelling Recreation Demand: An Empirical Analysis Using the Nested Logit Travel Cost Model." University of Wisconsin, Ph.D. 1996

Hausman, Jerry A.; Gregory K. Leonard; Daniel McFadden. 1993. "A Utility-Consistent, Combined Discrete Choice and Count Data Model: Assessing Recreational Use Losses Due to Natural Resource Damage." Journal of Public Economics, Volume: 56, Pages: 1-30. **Keywords**: travel cost model, welfare analysis, Exxon Valdez, recreational fishing

Hellerstein,-Daniel-M.. "Using Count Data Models in Travel Cost Analysis with Aggregate Data." American-Journal-of-Agricultural-Economics; 73(3), August 1991, pages 860-67.

In order to control for censoring and the integer nature of trip demand, the use of count data models in travel cost analysis is attractive. Two such models, the Poisson and negative binomial, are discussed. Robust estimation techniques that loosen potentially stringent distributional assumptions are also reviewed. For illustrative purposes, several count data models are used to estimate a county-level travel cost model using permit data from the Boundary Waters Canoe Area.

Hellerstein, Daniel; Robert Mendelsohn. 1993. "A Theoretical Foundation for Count Data Models." American Journal of Agricultural Economics, Volume: 75, Issue: 3, Pages: 605-611. **Keywords**: count data models, travel cost.

The paper develops a theoretical foundation for using count data models in travel cost analysis: a restricted choice model and a repeated discrete model. Both models lead to identical welfare measures.

Kealy, Mary Jo and Richard C. Bishop (1986). "Theoretical and Empirical Specifications Issues in Travel cost Demand Studies." American Journal of Agricultural Economics, 69(3):660-667.

A travel cost demand model is derived from a utility function that postulates that individuals choose the optimal total number of site recreation days given by the product of the number of length of their recreation trips. By relaxing the assumption that on-site time is constant across recreationists, the applicability of the travel cost method is extended. The model is estimated using a maximum likelihood procedure appropriate for the truncated sample data that is characteristic of most user specific recreation data. Failure to do so would result in overestimating the value of Great Lakes fishing by 3.5 times.

Layman,-R.-Craig; Boyce,-John-R.; Criddle,-Keith-R. "Economic Valuation of the Chinook Salmon Sport Fishery of the Gulkana River, Alaska, under Current and Alternate Management Plans." Land-Economics; 72(1), February 1996, pages 113-28.

This paper extends the standard travel cost method to develop estimates of the economic value of recreational chinook salmon fishing on the Gulkana River, Alaska, under existing and hypothetical fishery management conditions. Respondents were asked to state how the number of trips that they took to the study area would change if alternative fishery management practices were imposed. Three hypothetical management conditions were considered: a doubled 1992 sport fish harvest, a doubled daily bag limit, and a season bag limit of five. Each of the hypothetical fishery management conditions provides increased economic returns to anglers.

McConnell, K. E. 1992. "Model Building and Judgment: Implications for Benefit Transfers with Travel Cost Models." Water Resources Research, Volume: 28, Issue: 3, Pages: 695-700.

Part of the special issue on benefit transfer applications.

McKean,-John-R.; Walsh,-Richard-G.; Johnson,-Donn-M. "Closely Related Good Prices in the Travel Cost Model." American-Journal-of-Agricultural-Economics; 78(3), August 1996, pages 640-46.

This travel cost demand study included prices for closely related goods such as money and time costs of on-site time, on-site purchases, and other trip activities. A disequilibrium labor market model was estimated. The sample was mainly composed of persons who did not substitute earned income for leisure time. The few persons who had the capability to substitute time for money were excluded from the sample. Consumer surplus was estimated to be $69.00 per trip using the expanded model. A model using only the conventional travel cost variables resulted in estimated surplus per trip of $45.00.

McKean,-John-R.; Revier,-Charles-F. "Omitted Cross-Price Variable Biases in the Linear Travel Cost Model: Correcting Common Misperceptions: An Extension." Land-Economics; 66(4), November 1990, pages 430-36.

This paper extends the work by P. P. Caulkins, R. C. Bishop, and N. W. Bouwes (1985) on the bias in site value measurement crated when alternative site prices are omitted from the travel cost demand specification. Caulkins, Bishop, and Bouwes's analysis does not treat the issue of bias in the intercept since they adopt R. L. Gum and W. E. Martin's (1975) procedure that discards the intercept estimate. The procedure limits the applicability of Caulkins, Bishop, and Bouwes's findings. This paper reexamines bias in both the intercept and demand slope estimates. It is shown that both average and variance of price must be known in order to determine the direction and amount of bias in consumer surplus.

Milon, J.W. (1991). "Measuring the Economic Value of Anglers' Kept and Release Catches." North American Journal of Fisheries Management, 11:185-189.

Economic measures of the value of recreational catch typically have been based on the aggregate number of fish caught per unit effort. Fishery management councils, however, regulate recreational catch through bag limits and size restrictions that influence the composition of kept and released fish in the catch, not just the number of fish caught. Statistical tests for pooled site

travel cost demand models for anglers of king mackerel (Scomberomorus cavalia) in the Gulf of Mexico region showed that indicators of kept and released catches outperformed an aggregate indicator. Accounting for the composition of catch had a significant effect on economic measures of the gains and losses from catch regulations and suggested that aggregate indicators may give misleading estimates of the change in economic value due to regulations. Economic studies of the value of recreational catch in other fisheries should give more consideration to the effects of regulations on the composition of kept and released catches and to the social factors that influence the keep or release decision.

To test the results of this methodological approach, a data set should be created based on a theoretical model of recreational fisherman behavior when exploiting a common property resource. Impose management regulations such as size and bag limits for a fishing trip. Estimate the model and compare the estimated parameters to the known or true parameters for management implications (consumer surplus). Modify the model with a catch and keep constraint, if known and estimated parameters differ and compare to the Milon elasticity results that seem counter intuitive on page 187.

Morey, Edward R.; Robert D. Rowe; Michael Watson. 1993. "A Repeated Nested-Logit Model of Atlantic Salmon Fishing." American Journal of Agricultural Economics, Volume: 75, Issue: 3, Pages: 579-592. **Keywords**: Atlantic salmon fishing, nested-logit, travel cost model.

Participation and site choice for Atlantic salmon fishing are modeled in the context of a repeated three-level nested-logit model. For comparison, six other travel-cost models are estimated. These include restrictive cases of the nested-logit model, a partial demand model, and two single-site demand models.

Offenbach,-Lisa-A.; Goodwin,-Barry-K. "A Travel-Cost Analysis of the Demand for Hunting Trips in Kansas." Review-of-Agricultural-Economics; 16(1), January 1994, pages 55-61.

The travel-cost method is used to evaluate the demand for hunting trips in Kansas. In contrast to earlier studies, time spent on-site for other recreational activities is explicitly included in the empirical analysis. The demand for hunting trips falls as cost rises. The hunter's age, investment in hunting equipment, and site quality characteristics significantly influence demand. Conversely, time-on-site for non-hunting activities and length of stay do not significantly influence the demand for hunting trips. These results lend support to other analyses which have implicitly assumed that lengths of stay and time spent in secondary recreational activities are not relevant to recreational demand estimation. The estimates suggest that Kansas hunters realize benefits of about $170 per hunting trip.

Parsons, George R.; Michael S. Needelman. 1992. "Site Aggregation in a Random Utility Model of Recreation." Land Economics, Volume: 68, Issue: 4, Pages: 418-433. **Keywords**: Travel Cost Method.

Often, due to data or computational constraints, the analyst must use aggregated alternatives to estimate a random utility model. These aggregates are defined by averaging

characteristics of alternatives over prespecified groups. The paper demonstrates that unless some very restrictive conditions hold, the use of aggregated alternatives will lead to biased results. A data set of recreational fishing in Wisconsin is used to examine the biases in aggregation.

Peters, T.; W. L. Adamowicz; P. C. Boxall. 1995. "Influence of Choice Set Considerations in Modeling the Benefits from Improved Water Quality." Water Resources Research, Volume: 31, Issue: 7, Pages: 1781-1787. **Keywords**: Travel Cost Method.

Phillips,-Richard-A.; Silberman,-Jonathan-I. "Forecasting Recreation Demand: An Application of the Travel Cost Model." Review-of-Regional-Studies; 15(1), Winter 1985, pages 20-25.

Randall, Alan (1994). "A Difficulty with the Travel Cost Method." Land Economics, 70(1): 88-96.

Instead of observable prices of recreational visits, travel cost method (TCM) researchers are obliged to substitute researcher assigned visitation cost estimates. I argue that visitation costs are inherently subjective, but are ordinally measurable so long as the cost increases with distance traveled. It follows that traditional TCM yields only ordinally measurable welfare estimates. The household production function formulation of TCM "resolves" this problem only by imposing severe and untestable analytical restrictions. TCM cannot serve as a stand-alone technique for estimating recreation benefits; rather it must be calibrated using information generated with fundamentally different methods.

Rosenthal,-Donald-H. "The Necessity for Substitute Prices in Recreation Demand Analyses." American-Journal-of-Agricultural-Economics; 69(4), November 1987, pages 828-37.

Omitting substitute prices from a travel cost model is shown to cause a significant bias in consumer surplus estimates. Three sets of travel cost models are developed from a comm on database representing 60,000 day users of U.S. Army Corps of Engin eer reservoirs in Kansas and Missouri. The first set of models omitte d substitute prices; the latter two sets included them. An analysis o f variance test showed that consumer surplus estimates from the first set of models were significantly higher than the other two (F E 26.2 with 2, 20 degrees of freedom). The theoretical and practical implic ations of these findings are discussed.

Samples, Karl C. and Richard C. Bishop (1985). "Estimating the Value of Variations in Anglers' Success Rates: An Application of the Multiple-Site Travel Cost Method." Marine Resource Economics, 2(1):55-74.

An estimation method is presented to measure sport fishermen's valuation of exogenous changes in fishing quality (catch rates). A theoretical model is initially presented to show how variations in prevailing catch rates influence an angler's valuation of recreational fishing. A two-stage estimation approach is suggested that capitalizes on the notion that angler consumer surplus is sensitive to changes in success rates. The procedure entails first estimating sportfishing values at qualitatively different fishing sites using a multiple-site travel cost approach. Afterward, the sensitivity of estimated values to different success rate levels is measured using a separate

regression procedure. An empirical application of this two-stage method to Lake Michigan sportfishing is given. It is estimated that for Lake Michigan anglers who fish for trout and salmon, a 10% increase in success rates will increase average trip values by $0.30.

Smith,-V.-Kerry; Desvousges,-William-H "The Generalized Travel Cost Model and Water Quality Benefits: A Reconsideration." Markandya,-Anil; Richardson,-Julie, eds. Environmental economics: A reader.. New York: St. Martin's Press, 1992, pages 184-93. Previously published: [1985].

Smith,-V.-Kerry; Palmquist,-Raymond-B.; Jakus,-Paul. "Combining Farrell Frontier and Hedonic Travel Cost Models for Valuing Estuarine Quality." Review-of-Economics-and-Statistics; 73(4), November 1991, pages 694-99.

This paper extends the Brown-Mendelsohn hedonic travel cost model by estimating the travel cost function for each recreationist as a technically efficient frontier. It also constrains the marginal prices for desirable characteristics to be nonnegative. The model is used to value improvements in the quality of sport fishing in the Albemarle-Pamlico Estuary in North Carolina. The application compares the performance of the frontier hedonic travel cost with ordinary least squares estimates, and finds the former to be free of problems identified in the literature and to provide more plausible and robust benefit estimates for quality improvements.

Smith,-V.-Kerry; Kaoru,-Yoshiaki. "The Hedonic Travel Cost Model: A View from the Trenches." Land-Economics; 63(2), May 1987, pages 179-92.

Concern over the theoretical framework underlying the hedonic travel cost (HTC) model's implicit prices (as well as the process of estimating these prices) and the definitions of the quanti ties of site characteristics "consumed" by recreationists motivated this analysis. This evaluation of the HTC model considers the implic ation of the definitions of price and quantity measures for both the estimated demands for the characteristics of recreation sites and for the benefit measures based on them. The authors' results contrast wi th all the published applications of the HTC model. They indicate tha t application of the model should not be regarded as a routine implem entation of a hedonic price function.

Smith,-V.-Kerry. "Taking Stock of Progress with Travel Cost Recreation Demand Methods: Theory and Implementation." Marine-Resource-Economics; 6(4), 1989, pages 279-310.

This article summarizes the conceptual development and empirical implementation of the travel cost recreation demand model by (1) describing its theoretical underpinnings, (2) outlining how theory must be adapted for the needs imposed by available data, (3) explaining issues to be considered in the future. Applications of the travel cost model have evolved from studies conducted at an aggregate level with origin zone data to an almost exclusive focus on micro data concentrating on individuals' recreational choices. These applications have broad implications. They are among the most detailed and extensive illustrations of models for corner solution and discrete choice problems in microeconomics. Equally important, they explore the theoretical and practical implications of the household production framework. Finally, they also provide

examples of how a commodity's quality can be considered as an argument in describing individuals' consumption choices.

Smith, V. Kerry (1988). "Selection and Recreational Demand." American Journal of Agricultural Economics, 70(1):29-36.

This article compares five methods for estimating travel cost recreation demand models with micro data. The models are distinguished by their treatment of selection effects that arise with on-site surveys. The comparison considers adjusting for selection effects in a variety of ways, including single and double selection rule models. Both parameter and consumer surplus estimates were evaluated. The findings indicate that the treatment of selection effects alone was not important for this case. However, the choice of an estimator did lead to large variations in per trip consumer surplus estimates.

Smith,-V.-Kerry; Desvousges,-William-H. "The Generalized Travel Cost Model and Water Quality Benefits: A Reconsideration." Southern-Economic-Journal; 52(2), October 1985, pages 371-81.

Smith,-V.-Kerry. "Congestion, Travel Cost Recreational Demand Models, and Benefit Evaluation [Estimating the Benefits of Recreation under Conditions of Congestion]." Journal-of-Environmental-Economics-and-Management; 8(1), March 1981, pages 92-96.

Smith,-V.-Kerry; Kopp,-Raymond-J. "The Spatial Limits of the Travel Cost Recreational Demand Model." Land-Economics; 56(1), Feb. 1980, pages 64-72.

Train, Kenneth E. 1997. "Recreation Demand with Taste Differences Over People." Land Economics, Volume: 74, Issue: 2. **Keywords**: Valuation Economics, Recreation, Travel Cost.

Wade, William W. ; George M. McCollister; Richard J. McCann; Grace M. Johns. 1989. "Recreation Benefits for California Reservoirs: Multisite Facilities-Augmented Gravity Travel Cost Model." Spectrum Economics, Inc. April 1, 1989.

Stynes, Daniels J.; George L. Peterson; Donald H. Rosenthal. 1986. "Log Transformation Bias in Estimating Travel Cost Models." Land Economics, Volume: 62, Issue: 1, Pages: 94-103.

Wade, William W.; George M. Mccollister; Richard J. McCann; Grace M. Johns. 1989. "Recreational Benefits for California Reservoirs LA Multisites Facilities-Augmented Gravity Travel Cost Model." Spectrum Economics, Inc., April 1, 1989.

Ward,-Frank-A.; Loomis,-John-B. "The Travel Cost Demand Model as an Environmental Policy Assessment Tool: A Review of Literature." Western-Journal-of-Agricultural-Economics; 11(2), December 1986, pages 164-78.

Watson, David O. ; Wiktor L. Adamowicz; Peter C. Boxall. 1994. "An Economic Analysis of Recreational Fishing and Environmental Quality Changes in the Upper Oldman River Basin." Canadian Water Resources Journal, Volume: 19, Issue: 3, Pages: 213- 225. **Keywords**: Travel Cost.

A discrete choice travel cost model, based on data collected from a survey of recreational anglers, was used to estimate changes in recreational fishing benefits at sites in the Uppper Oldman River of Alberta resulting from the construction of a dam.

Willis,-K.-G. "The Recreational Value of the Forestry Commission Estate in Great Britain: A Clawson-Snetsch Travel Cost Analysis." Scottish-Journal-of-Political-Economy; 38(1), February 1991, pages 58-75.

Open-access recreation benefits of forests are shown to be much larger than previously thought by the National Audit Office. Forecasts were classified by tree and recreational characteristics into different classes, and a random sample of visitors interviewed at sites within each cluster. A zonal travel cost model was used to estimate demand for forest recreation. Consumer surplus per visit varied significantly by type of forest, as did total visitor numbers. The effect of the inclusion of consumer surplus from recreation on the internal rate of return of timber production is variable. It is negligible for many areas of forestry.

Wilman,-Elizabeth-A. "A Simple Repackaging Model of Recreational Choices." American-Journal-of-Agricultural-Economics; 69(3), August 1987, pages 603-12.

The traditional travel-cost model uses trips (or visits) as its measure of quantity and travel cost per trip (or visit) as its price. However, because many estimated demand curves do not hold visit length constant, they cannot be used to value increments of use. The simple repackaging model of J. Muellbauer (1974), and F. M. Fisher and K. Shell (1971) is used to derive demand curves exhibiting constant visit length from demand curves exhibiting variable visit length. The former allow the marginal quantity valuations that are necessary for management decisions involving capacity or use.

Wilman,-Elizabeth-A.; Pauls,-Richard-J. "Sensitivity of Consumers' Surplus Estimates to Variation in the Parameters of the Travel Cost Model." Canadian-Journal-of-Agricultural-Economics; 35(1), March 1987, pages 197-212.

Yen, S.T.; W. L. Adamowicz. 1994. "Participation, Trip Frequency and Site Choice. A Multinomial-Poisson Hurdle Model of Recreation Demand." Canadian Journal of Agricultural Economics, volume: 42, Pages: 65-76.