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## Volume 15

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SOUTHEASTERN RECREATION
RESEARCH

Papers published in this proceedings received limited editing to ensure a consistent format. Authors are responsible for the content and accuracy of their individual papers.

December 1994

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# Proceedings

# 1993 Southeastern Recreation Research Conference Volume 15

February 10-12, 1993
Helen, Georgia

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## FOREWORD

The 1993 Southeastern Recreation Research (SERR) Conference was held in Unicoi State Park, Helen, Georgia, February 10-12, 1993. Nearly 100 individuals from academic institutions, recreation resource management agencies and other governmental agencies participated. As always, the purpose of the SERR Conference was:

1. To provide a forum to exchange information between researchers, managers, and students about outdoor recreation research and/or management techniques in the Southeastern United States.

2. Present recent recreational research results.

3. Discuss new directions and trends in recreational research and management.

A total of 16 research papers were presented during the Conference. Nine of those were submitted for publication in this Proceedings. Based on decisions by the SERR Steering Committee, papers published in the Proceedings must be reviewed prior to acceptance. Papers deemed by reviewers to meet the standards of professional quality were to be considered for status as refereed proceedings. Other papers worthy of note as good research, but not prepared for review, based on the author's choice, were considered as contributed papers. This Proceedings contains seven refereed and two contributed papers.

All papers submitted for publication were given a blind review by at least two other professionals. Authors were then given the reviewer comments with the opportunity to make changes and improvements as needed. All the papers in this volume were revised in some manner as a result of the review process. Thus, this Proceedings should be considered as having substantial scholarly merit. Each author is to be commended for his/her dedication and perseverance.

The 1993 Steering Committee and the Editor wish to thank the USDA Forest Service, Southeastern Forest Experiment Station, for sponsorship of this Conference and publication of these Proceedings.

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# Ethnic Differences in Outdoor Participation Patterns Among Older Adults

Michael Brown

## INTRODUCTION

Demographers have indicated that society is becoming older. Americans have an increased life span of nearly twenty-two years since 1900 (Alexander 1973). Bammel and Bammel (1982) stated that while life expectancy has been increasing, the birthrate has been declining, thereby causing the elderly to represent an increasing percentage of the population. In 1987 26 million people in the U.S. were over the age of sixty-five (Green 1987). This represented 11.6 percent of the population. Estimations suggest that by the year 2050, there will be over 50 million people age sixty-five or older which will account for 21.7 percent of the population (Green 1987; Winklevoss and Powell 1984). Researchers have projected an even more striking increase in the number of minority elderly. Specifically black elderly population, aged 65 to 74, is projected to increase by 14.9 percent while those over 75 years of age are projected to increase by 27.7 percent by the year 2000 (U.S. Census Bureau 1988). Hence, the elderly minority population is projected to be one of the swiftest growing segments of the population. Furthermore, such growth will have ramifications for the recreation and leisure profession. To program effectively, recreation professionals must continue to identify the leisure participation patterns for various groups, among them older blacks. While the leisure patterns of older adults have been studied extensively, little systematic investigation of the leisure patterns of older blacks has been undertaken.

## REVIEW OF LITERATURE AND PROBLEM STATEMENT

A review of the literature revealed that the majority of the studies that attempted to identify racial/ethnic differences in leisure activity patterns were conducted in the late 1970's and 1980's. For this reason, the review of the literature is antiquated.

Stamps and Stamps (1985) have stated that little seems to be known about black lifestyles generally, and leisure behavior specifically. The President's Commission on Americans Outdoors (1986) concluded that various sub populations need to be studied, among them older adults and minorities. Generally, the research involving nationwide samples has not reported findings for sub-groups such as older blacks (President's Commission 1986).

Extensive research has focused on the relationship of social class and leisure (Burdge 1969; Clarke 1956; Gottlieb 1957; Havighurst and Feigenbaum 1959; Noe 1974; White 1975), whereas fewer studies have looked at the leisure activities of black Americans (Blackwell 1975; Craig 1972; Frazier 1962; Kronus 1971; Willie 1974) or compared blacks and whites (Cheek and others 1976; Edwards 1981; Kelly 1980; Meeker and others 1973; Washburne 1978). This lack of research examining the correlations among race, social class, and leisure activity exists even though the general assumption is that class is more important than race in determining life-styles (Stamps and Stamps 1985).

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Although few studies have focused on the elderly, racial/ethnic differences in leisure patterns have been explored. For example, in one study of adults over 18 years of age few differences between blacks and whites in leisure participation were demonstrated when respondents were matched on selected social variables (Cheek and others 1976). Cheek and others (1976) suggested that new and different leisure programs may not be necessary for blacks, because similarities, rather then disparities, existed concerning the activities of whites and blacks. They further suggested that programs for urban residents be developed.

Edwards (1981) examined a low income, urban sample and found differences in leisure participation based upon race. However, due to sample limitations the results could not be generalized to other soci-economic levels. Kelly (1980) analyzed demographics including age, sex and race in relation to outdoor recreation. Race was found to be a significant predictor with fewer blacks undertaking activities such as: camping, skiing, and snowmobiling.

Stamps and Stamps (1985) examined the relationship of race and class to participation in leisure activities. Blacks and whites of similar social classes were compared on 22 activities. Contrary to what was expected, race appeared to be more significant than class in determining leisure participation. This was primarily true for middle-class respondents.

Washburne (1978) investigated two contrasting theories on black underparticipation in wildland recreation: (1) marginality theory (that underparticipation results from factors such as poverty and discrimination), and (2) ethnicity theory (that recreational patterns are based on subcultural leisure norms and value systems). Data from an urban, California sample failed to support definitively either the marginality or ethnicity as explanation of black underparticipation in wildland activities.

Thus, the studies conducted to date are not consistent in their findings of whether differences in leisure participation between blacks and whites are due to ethnicity or social class. Using marginality and ethnicity theories as a conceptual framework, this study explored the outdoor leisure involvements of older blacks and other older adults.

## METHODS

The data used were taken from the Nationwide Recreation Survey (NRS 1982-1983). The NRS collected data from 6,720 respondents 12 years of age and over that reflected the national population. For the purpose of this study, data from 1,653 older adults (60+) were analyzed. Depth (how often) and breadth (how many) of outdoor leisure involvements were ascertained using a checklist of 22 outdoor activities (bicycling, horseback riding, golfing, play tennis outdoors, participate in outdoor team sports, canoeing or kayaking, sailing, motorboating, swimming in an outdoor pool, any other outdoor swimming, fishing, hunting, backpacking, camping in developed campgrounds, camping in primitive campgrounds, any other camping, day hiking, birdwatching or other nature study activities, driving motorized vehicles off improved roads (includes motorcycles but not snowmobiles) downhill skiing, cross country skiing or ski touring, and snowmobiling). The Statistical Package for the Social Sciences (SPSS) Version IX (Nie and others 1984), was used to analyze the data.

A leisure involvement or repertoire score was generated for each person consisting of how many of the 22 activities were engaged in and how often (0 days to more than 25 days a year using 4 categories) the individual participated. The potential range of scores for involvement was 0 (none of the 22 activities done at all) to 88 (all 22 activities done more than 25 days per year). A mean score was generated for each activity. The mean scores were totaled to give a Leisure Repertoire Score. This leisure repertoire score was then analyzed based on the independent variables of: age, income, education, and gender, table 1. In the leisure constraint area, respondents simply identified barriers from a given list.

Table 1—Comparison of outdoor leisure involvement for older blacks and total older Americans

| Category | Selected characteristics | |
|---|---|---|
| | Mean involvement score for older black Americans | Mean involvement score for general population of older Americans |
| All | 11.3 | 48.6* |
| **Income** | | |
| $3,000-$9,999 | 9.5 | 45.0* |
| $10,000-$19,999 | 8.5 | 50.1* |
| $25,000-$49,999 | 6.0 | 47.0* |
| **Age** | | |
| 60-69 | 9.5 | 47.9* |
| 70-79 | 3.8 | 48.5* |
| **Gender** | | |
| Females | 5.6 | 42.7* |
| Males | 11.5 | 49.9* |
| **Education** | | |
| 1st-5th grade | 7.5 | 16.1* |
| 6th-8th grade | 2.8 | 42.0* |
| 9th-12th grade | 11.5 | 47.0* |
| 1-4 yr. college | 2.0 | 47.4* |
| **Barriers** | | |
| Family related reasons | 13.3 | 2.1* |
| Not enough information | 6.7 | 1.7* |
| Activity place too crowded | 0.5 | 6.9* |
| Transportation problems | 20.0 | 6.4* |

*Significant, $p < .05$.
(Note: possible range of scores was 0-88, an 88 would indicate all 22 activities participated in 25 or more days a year.)

## SUMMARY AND CONCLUSIONS

The findings of this study supply needed information about the older black population in relation to outdoor recreation participation patterns. Results showed that 23 percent of older blacks participated in (NRS 1982-1983) at least one of the 22 outdoor activities within the one year period. The findings of this study indicate that outdoor participation patterns between older blacks and the general population of older adults are more different rather than similar. The significance of the findings is limited because only 22 outdoor activities were used, several of which are not typically favored by older adults (e.g., snowmobiling).

Generally, the results support those studies that have indicated race is a predictor of leisure engagement in later life. It is also reasonable to conclude that some outdoor leisure activity constraints are predicted by race (family related reasons, not enough information and activity place too crowded). The ramification of these findings is very obvious. One way to increase outdoor recreation participation among older blacks is through marketing. Because there is a lack of information, it makes it specifically difficult for the black elderly learn about and utilize different agencies, such as recreation agencies. Undoubtedly, administrators and program planners in the recreation field, must develop more of an awareness for the older minority population.

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# Assessing the Revenue-Capture Potential from Recreational Fees

R. Jeff Teasley, John C. Bergstrom, H. Ken Cordell

Abstract—A traditional contingent valuation approach and a "trip response method" were examined as potential techniques for measuring public area recreation revenue-capture potential. Empirical results suggest that both methods are useful for assessing revenue-capture potential. Additional research on alternative methods for assessing recreation revenue-capture potential is encouraged.

Keywords: resource economics, public land management, recreation fee valuation of non-marketed commodities.

## INTRODUCTION

As a result of increased recreational demand and reduced management budgets, public resource management agencies are taking longer looks at the revenue capture potential of recreational areas and facilities. Techniques for measuring revenue capture potential via alternative user fee mechanisms are developed which can be employed into a recreation area management strategy. An empirical case study is presented including general model specifications, data collection procedures, and a estimation results overview outlining these techniques. The potential uses and general implications of this research are discussed last.

## CONCEPTUAL BACKGROUND

### Revenue Capture

Revenue capture by a resource management agency implies acquiring funds from consumers/users. In this research we talk about capturing some additional funds from recreation users of two National Forests. In most cases, additional funds are gained by raising the price of site use or instituting a different fee structure. Hence, revenue capture could alternately be termed consumer surplus capture.

Referring to figure 1, at trip quantity level $Q_1$ and price level $P_1$, consumer surplus is equal to the area $P_1ac$. Revenues accruing to the managing agency are equal to the area $P_1cfT$. This area is the rectangle with edges bounding T (out-of-pocket travel expenditures) and $P_1$ (total trip expenditures). The current site use fee equals $P_1$-T.

Raising the site use fee to ($P_2$-T) reduces consumer's surplus to the triangle $P_2ab$. A large portion of the lost consumer's surplus ($P_2bcP_1$) is captured by the managing agency in the form of additional revenues equal to area $P_2beP_1$. Note, however, that the agency also loses revenues equal to area ecfg because of the trip decrease from $Q_1$ to $Q_2$.

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The total revenue received by the site at the higher site use fee is equal to the area $P_2bgT$. Note that the small triangle bce is not captured with the increase in fees. This area is termed deadweight loss and is, as the name implies, lost to both producer and consumer when price is raised to $P_2$. While this deadweight loss is important in social welfare considerations, as long as the gain in revenues ($P_2beP_1$) is greater than the loss (ecfg), increasing the site use fee will increase revenues at a site.

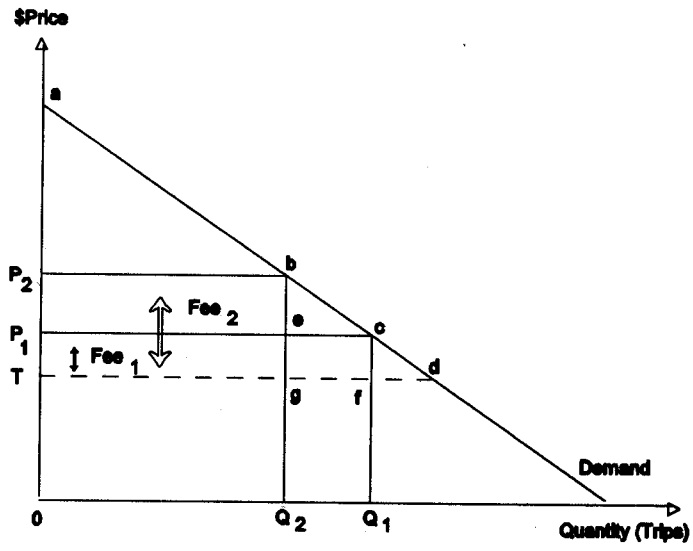


Figure 1—Increasing existing fee amounts.

Revenue can be collected by any number of methods. Daily admission passes, vehicle admission fees, hotel taxes, local guide services, and the establishment of special funds for maintenance of recreational areas are a few possible strategies for revenue capture (Loomis and Thomas 1989; Price 1990; Walsh 1986).

In order to assess revenue-capture potential under different payment strategies, some general tools must be available for estimating consumer surplus, or willingness-to-pay (WTP), associated with recreation trips. One such tool is a bid probability function, estimated using the contingent valuation method. Another such tool is a site demand function, estimated using what is termed in this paper the trip response method.

## Estimation Methods

The specific form of the contingent valuation method used in this study was the dichotomous choice approach (DCA). This technique was first used by Bishop and Heberlein in 1979 in the valuation of "extra" market goods (e.g., environmental amenities). The technique has subsequently been developed and expanded upon to value a variety of non-marketed goods (Bowker and Stoll 1988; Cameron 1988; Hanemann 1984; McConnell 1990; Sellar and others 1986). The application of this technique involves the construction of a hypothetical market or referendum (like any other CVM application) where respondents are asked to answer "yes" or "no" to a single dollar amount or posted price. The strength of the DCA is its simplistic nature and ease of implementation in a survey format. The closed-ended format is also argued to be more "market like" in that respondents can either "take-it-or-leave-it". Respondents are likely more accustomed to seeing market decisions in this format (McConnell 1990).

As many authors have argued, valuation measures attained through contingent valuation studies have both theoretical validity and consistency with market demand-based values (Bergstrom 1989; Cummings and others 1986; Walsh 1986). The ability of the CVM technique to provide estimates of willingness-to-pay makes it a very useful tool to employ for the valuation of recreation. Managers of recreation resources can use these values as a base for funding plans as well as implementing charging schemes. It is noted that some consider WTP only one of many interpretations that may be place upon an individual's value for a non-market commodity.

A CVM-based bid probability function can be specified generally by

(1) $$PROB = ](P, M, X),$$

where PROB is the probability that a respondent is willing-to-pay a given posted price, P is the posted price amount, M is household income, and X is a vector of socioeconomic variables. Mean willingness-to-pay can be estimated from Equation (1) using procedures established by Hanemann (1984) or Cameron (1988).

In addition to the bid probability function, another useful tool for the resource manager is a site demand function which shows the relationship between user fees and trips demanded. Such a demand function would allow managers to estimate changes in visitation, revenue capture potential, revenues collected as a result of different fee structures, and demand elasticities (Cameron 1988; McConnell 1990; Mitchell and Carson 1989; Sellar and others 1986). In traditional travel cost method (TCM) studies, this site demand function is estimated indirectly from a "first-stage" demand function for trips, and is termed the "second-stage" demand function (Walsh 1986).

In this study, the trip response method (TRM) was used to directly estimate the "second stage" site demand function. In the TRM, survey respondents are given a hypothetical user fee amount and asked to state how many trips they would make to the site at that fee amount. Fee amounts are varied across the sample to obtain the data necessary for econometrically estimating a site demand function.

The general site-demand function to be estimated is:

(2) $$Q = ](C, M, X),$$

where Q equals the annual number of trips to be taken, C equals the hypothetical fee (added cost), and M and X are as specified previously. Specification of the model in this form allows direct calculation of the "second stage" demand function.

The total WTP (or consumer surplus) can then be found by taking the integral of the area under this demand curve from zero to the choke price $c^*$,

(3) $$WTP = \int_0^{c^*} (C, M, X)\, dc \quad .$$

The value obtained in (3) can be compared to WTP values derived from the CVM. For a more detailed discussion of model specification see Teasley and Bergstrom (1992).

## EMPIRICAL CASE STUDY

### Study Area, Design, and Procedures

The general study area was in two National Forests in the Southeast, the Cherokee (CK) and the George Washington (GW). Specifically, in the Ocoee and Warm Springs Districts, respectively. CK and GW Forest managers are interested in information concerning revenue capture potential associated with recreation fees. The issue has come to the forefront as a result of increased opposition to below-cost timber sales and the desire to explore alternative revenue sources.

A questionnaire was designed to collect the data necessary for estimating a CVM-based bid probability function, and a TRM-based site demand function. The CVM valuation question used the dichotomous-choice approach with an annual vehicle pass as the bid vehicle. The annual vehicle pass would allow everyone in a vehicle to use sites in the District throughout the year. Respondents were asked to reply "yes" or "no" to a specific bid amount with the assumption that a "no" response would preclude them from recreating in the District in question. The TRM valuation question asked for the number of trips the respondent would take to a specific site in a District, given a daily, per person admission fee.

Both questions were asked on-site in a face-to-face interview and were included as part of a larger survey obtaining use, satisfaction, and demographic information. Surveys were delivered at specific designated sites within each Forest. Interviewers were instructed to be completely neutral in delivery and to give a minimum of extraneous information concerning the question. Interviews were conducted only with those recreationists who were leaving the area in order to gain more complete knowledge of their stay. The CVM and TRM valuation questions are reproduced in Appendix A. Response rates were almost 100 percent for the survey as each respondent was contacted in a face-to-face manner.

A survey sampling plan was constructed through intense contact with Forest and district personnel, site visits, and accumulated experience from Ken Cordell and others from the SE station. Estimates of use by site and activity were gathered from Forest personnel. These figures were then compared to the total number of surveys required and the estimated percentage of each activity within the Forest. Target numbers of surveys for each activity were then constructed so that the targeted 600 surveys would be representative of the activities occurring within the districts. The target number of surveys per activity was then split into site categories so that interviewers could go to the appropriate sites for collection of specific activity groups.

As with any large surveying project, some targets and plans have to be amended or changed after survey implementation. In this study, certain sites in each of the two Forests had to be abandoned because of low visitation or dangerous conditions for the interviewers. Also, numbers of surveys in particular targeted activity groups had to be adjusted to reflect errors in estimating the percentage of use by that activity. Total number of surveys collected for both Districts numbered approximately 1,100.

**Protest bids**--A common practice in CVM studies is to identify and eliminate respondents suspected of being "protest bidders" (Boyle and Bishop 1988; Cummings and others 1986; Reiling and others 1989). In our survey, respondents who refused to pay the stated user fee for recreation (annual vehicle pass or daily admission fee) were asked to give a reason. Protest bidders were considered to be those who responded that they "objected to these types of questions" or stated that the valuation question was "unclear to them". In either case, refusal to pay the stated user fee does not appear to reflect the respondent's true valuation of recreational access.

Table 1 shows the number of observations in total and the resulting number used for estimation after protest bidders were dropped (note - approximately 300 surveys were unusable because of interviewer error or lack of respondent cooperation with valuation questions). Elimination of protest bids did little to change valuation results. In all cases WTP rose slightly (due, in part, to the omission of zero responses). Estimation results over both logit and tobit procedures "tightened" and explanatory power rose.

Table 1—Protest bid adjustment and resulting number in data set

| Data set | Model | |
|---|---|---|
| | TRM | CVM |
| Total set | 770<br>(100%) | 768<br>(100%) |
| Adjusted set | 561<br>(65.2%) | 682<br>(64.3%) |

Estimation Results

The TRM-based site demand function in (2) was estimated using TOBIT analysis. The demand function results fit well with coefficient estimates having expected signs at fairly high levels of statistical significance. The logit function in (1) was estimated using logistic regression. All the estimated coefficients had signs as expected. The percent of values correctly predicted by this model was 77.3 percent.

WTP values were calculated from the estimation results using the trapezoidal rule of integration under the logit function and the second stage demand function for the TRM. Table 2 presents the results of this procedure for each Forest. The TRM produced estimates of annual WTP for a site and the CVM produced annual WTP for a District. For a more detailed discussion of estimation results see Teasley (1991) and Teasley and Bergstrom (1992).

Table 2—WTP values for each forest by model

| Item | Model | | | |
|---|---|---|---|---|
| | CVM | | TRM | |
| National forest | George Washington | Cherokee | George Washington | Cherokee |
| Dollar value | 55.14 | 55.12 | 7.72 | 9.05 |

Revenue Capture Potential

The overall purpose of this research was to provide the Forest Service with information about techniques for assessing total revenue capture potential, and suggest specific fee collection strategies which might be used to capture some of this revenue. The estimated site demand function was used to assess revenue-capture potential using a daily admission fee. The estimated bid probability function was used to assess revenue-capture potential using an annual vehicle pass. The use of these techniques to assess revenue-capture potential is demonstrated below through an application to hypothetical visitor use data for the Warm Springs District of the GW National Forest.

1. Annual district vehicle pass--The CVM results were first used to estimate the levels of participation shown in table 3. Equation (1) was specified empirically as:

$$Z = \frac{e^{\alpha + \beta_1 P}}{(1 + e^{\alpha + \beta_1 P})}, \tag{4}$$

where Z is the probability that a typical group is willing-to-pay the annual vehicle pass, $\alpha$ is the constant term, $\beta_1$ is the coefficient of the bid variable, and P is the logged fee amount (Teasley and Bergstrom 1992). Plugging in values for P and solving produced estimates of Z at various fee amounts. Table 3 shows the differing probabilities of a typical group being willing-to-pay for an annual vehicle pass as estimated by (4) for the GW National Forest.

The total revenue capture potential for the District can then be estimated by the equation:

(5) REVENUE = FEE x Z x G, where:

REVENUE=revenue for District.
FEE=proposed annual fee.
Z=probability that typical group is willing-to-pay fee (see table 3).
G=estimate of annual number of groups currently visiting the district.

In equation (5) above, G can be estimated by dividing an estimate of annual group visits (e.g., vehicle counts) by an estimate of annual visits per group (for example, 7). As an exercise, consider the following example. With an annual vehicle count of 200,000 (V), G is 28,571 (200,000/7=28,571). Therefore, using equation (5) in conjunction with the percentages found in table 3, we can estimate possible revenue capture amounts at varying fee rates. The results in table 4 suggest that District revenue would be maximized by setting the annual vehicle fee at about $45 per year.

2. Daily site admission fee--Unlike the annual vehicle pass, the daily site admission fee is a charge per person per trip. Thus, the fee explicitly increases the price per trip paid by each visitor. Demand theory suggests that as the price per trip increases, trips demanded should decrease. Results of the TRM were used to estimate the percent reduction in person visits. Evaluating a slightly more detailed equation (2) resulted in the term R which represents the percent reduction in visits for a typical visitor (Teasley and Bergstrom 1992). table 5 shows the percent reduction in person visits to sites which would be caused by various daily admission fees.

Again, as an exercise, consider the example below. With annual visitation of 100,000 to a site (V) and reductions in number of trips by fee charged as listed in Table 5 (R), we get the results shown in Table 6. Note in table 6 that revenue would be maximized at a daily admission fee of about $5.00 per person.

Table 3—Example of probability of typical groups being willing-to-pay fee price for the district

| Annual fee amount | Percentage of groups willing to pay fee |
|---|---|
| dol. | pct. |
| 1 | 96.1 |
| 2 | 92.5 |
| 5 | 83.1 |
| 7.5 | 72.5 |
| 10 | 70.4 |
| 15 | 60.5 |
| 25 | 46.1 |
| 45 | 28.6 |
| 65 | 18.4 |
| 85 | 11.7 |
| 110 | 5.9 |
| 150 | 0 |

Table 4—Example of estimated revenue capture potential for annual vehicle pass

| Annual fee ($) | | Percentage of groups willing to pay fee | | Number of groups currently visiting the district | | Annual revenue ($) |
|---|---|---|---|---|---|---|
| FEE | (X) | P | (X) | G | = | REVENUE |
| 1 | | 96.1 | | 28,571 | | 27,457 |
| 2 | | 92.5 | | 28,571 | | 52,856 |
| 5 | | 83.1 | | 28,571 | | 118,712 |
| 7.5 | | 72.5 | | 28,571 | | 155,355 |
| 10 | | 70.4 | | 28,571 | | 201,140 |
| 15 | | 60.5 | | 28,571 | | 259,282 |
| 25 | | 46.1 | | 28,571 | | 329,281 |
| 45 | | 28.6 | | 28,571 | | 367,709 |
| 65 | | 18.4 | | 28,571 | | 341,709 |
| 85 | | 11.7 | | 28,571 | | 284,139 |
| 110 | | 5.9 | | 28,571 | | 185,425 |
| 150 | | 0 | | 28,571 | | 0 |

Total revenue capture potential for a particular site can then be estimated by:

(6) $$REVENUE = FEE \times (1 - R) \times V, \text{ where:}$$

REVENUE=revenue for a site.
FEE=proposed daily admission fee.
R=percent reduction in person visits at each fee level (see table 5).
V=estimate of current annual person visits to site (or, number of group visits x persons per group).

Table 5—Example of percent reduction in annual trips per daily fee levels for the site

| Annual fee amount | Percentage of reduction in trips to site |
|---|---|
| dol. | pct. |
| 1 | 19.8 |
| 1.5 | 28.2 |
| 2 | 35.5 |
| 3 | 48.5 |
| 5 | 66.7 |
| 7.5 | 80.8 |
| 10 | 89.1 |
| 12.5 | 93.8 |
| 15 | 96.4 |
| 20 | 99.0 |
| 25 | 99.5 |
| 35 | 100.0 |

Table 6. Example of estimated revenue capture potential for the daily admission fee

| Daily fee ($) | | Percent of original trips to site | | Current visitation to the site | | Estimated annual revenue ($) |
|---|---|---|---|---|---|---|
| FEE | X | (1-R) | X | V | = | REVENUE |
| 1 | | .802 | | 100,000 | | 80,200 |
| 1.5 | | .718 | | 100,000 | | 107,700 |
| 2 | | .645 | | 100,000 | | 129,800 |
| 3 | | .515 | | 100,000 | | 154,500 |
| 5 | | .333 | | 100,000 | | 166,500 |
| 7.5 | | .192 | | 100,000 | | 144,000 |
| 10 | | .109 | | 100,000 | | 109,000 |
| 12.5 | | .062 | | 100,000 | | 77,500 |
| 15 | | .036 | | 100,000 | | 54,800 |
| 20 | | .010 | | 100,000 | | 20,000 |
| 25 | | .005 | | 100,000 | | 12,500 |
| 35 | | .0004 | | 100,000 | | 1,400 |

## IMPLICATIONS

Clearly, the two revenue capture strategies can produce differing amounts of revenue potential. Using pure revenue capture maximization as the decision rule in our GW National Forest example, the annual vehicle pass would be set at forty-five dollars and the daily admission pass at five dollars. However, managers may be constrained legally by the amounts they can charge or by equity considerations. Setting a daily admission pass of five dollars would price an estimated 67 percent of trips by current users out of the market. This result may not be desirable from a equity or public relations standpoint, especially considering that a National Forest is public land. On the other hand, the annual vehicle pass would reduce groups using the Forest District by 71 percent. Visitation objectives and guidelines which managers operate under will affect the revenue capture strategy at a particular recreation site or area.

The fact that expected visitation appears sensitive to the type of fee payment scheme used is not a surprising result. For example, respondents may take as many trips after a lump sum payment, such as an annual vehicle pass, as they would have taken without one. Arguments against this hypothesis consider that respondents may amortize the lump sum payment over a year's trips and adjust trips accordingly. On the other hand, a payment scheme such as a daily pass results in an explicit increase in the price per trip, this in turn causes recreationists to adjust trips downward.

The differences between the two models may also be due to payment vehicle problems. Previous studies demonstrate that the type of payment vehicle used can influence valuation behavior and results (Bergstrom and Stoll 1989; Rowe and Chestnut 1983; Schulze and others 1981). For example, different payment vehicles may induce varying levels of protest bidding which can affect values derived from contingent valuation studies. Or, payment vehicle effects may occur in the valuation estimation without being manifested in protest bidding.

It was conjectured that a TRM approach may provide a more neutral means of asking revenue-capture questions in a survey format. More research is needed, however, before any firm conclusions can be drawn regarding the relationship between protest bidding and CVM vs. TRM questions. An interesting aspect of the "trip

response model" is that the results (the second stage demand curve) can be directly compared to estimation results of more traditional travel cost studies. The estimated demand curve can also produce estimates of elasticity which can help recreation managers in the pricing of a recreation area (i.e. to what level they could raise prices before the "revenue/price increase" ratio drops below 1). Analyzing data with both methods (TRM and CVM) could make for interesting and useful future research.

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**Appendix A**

**CVM Question**

Suppose a type of pass was offered allowing you (and anyone in your vehicle) to visit any area operated by this agency in (location) for one year. This pass would not cover camping fees. The money from the fee would be used to maintain these areas in their present condition, but there would be no improvements. If the price of this year's annual pass was $_____, would you have bought one?

____ Yes

If that fee were charged, about how many days would you use the site over the next 12 months?
_____ days

____ If No then go to reasons below

_____ We do not visit (location) enough to justify buying a pass

_____ There are many other areas to visit besides (location)

_____ We cannot afford to buy the pass

_____ Question was not clear to me

_____ I do not believe fees should be charged

_____ Some other reason (specify) _____

**TRM Question**

Suppose the agency managing this site started charging a daily admission fee of $_____/person. The money from the fee would be used to maintain the site in its present condition, but there would be no improvements. This fee would not cover camping fees. Would you continue to use the site?

_____ Yes

If that fee were charged, about how many days would you use the site over the next 12 months?
_____ days

_____ If No go to reasons below

_____ I do not visit this site enough to justify buying a pass

_____ There are many other sites to visit besides this one

_____ I cannot afford to buy the pass

_____ Question was not clear to me

_____ I do not believe fees should be charged

_____ Some other reason (specify) _____

# Functions of Privacy in the Ellicott Rock Wilderness

William Rutlin and William Hammitt

Abstract—Hammitt and Brown (1984) originally conducted a study of wilderness privacy based on Westin's (1967) privacy theory. Westin theorized four functions privacy serves. Hammitt and Brown (1984) in their study of university students with backpacking experience found five functions: emotional release, personal autonomy, reflective thought, limited communication (intimacy) and limited communication (personal distance). The Ellicott Rock Wilderness Visitor Study was a replication of Hammitt and Brown (1984) except that actual wilderness visitors are used as subjects. Ninety-nine visitors to the Ellicott Rock Wilderness, Sumter National Forest, South Carolina, were surveyed in October 1992 for this study. Factor analysis of their responses to a 28 item privacy scale supported the five function model from Hammitt and Brown (1984) with some individual differences in where items factored. Emotional release was the most important function in both studies. It is concluded that wilderness users seek wilderness solitude primarily for the purpose of emotional release.

Keywords: solitude, emotional release, personal autonomy, reflective thought, intimacy, personal distance.

## INTRODUCTION

Privacy is recognized as a fundamental human need in many different studies (Altman 1975; Klopfer and Rubenstein 1977; Laufer and Wolfe 1977). This need is reflected in the fact that the Wilderness Act of 1964 (Public Law 88-577) specifically mandates that wilderness is to provide opportunities for solitude and privacy. In light of this recognition of the importance of privacy, it is essential to discover why privacy is important. What functions does privacy serve, specifically in a wilderness environment? Hammitt and Brown (1984) studied wilderness privacy, but their study was limited in that subjects were university students with backpacking experience, not actual wilderness users. The current study in the Ellicott Rock Wilderness in South Carolina was designed as a field test of Hammitt and Brown (1984), with actual wilderness visitors as subjects. Studying wilderness visitors directly should allow for more confidence in determining what functions privacy serves in the wilderness.

### Conceptual Background

In 1967, Alan Westin developed a conceptual model of privacy consisting of four dimensions (as cited in Hammitt and Brown 1984):

**Solitude** - complete isolation; the individual is separated from the group and freed from the observation of others.

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**Intimacy** - the individual is acting as part of a small unit, seeking to achieve a close, personal relationship between two or more select members.

**Anonymity** - the individual is in a public setting but still seeks and achieves freedom from identification, surveillance, and social roles.

**Reserve** - the individual keeps a "mental distance," creates a psychological barrier against unwanted intrusion, and reserves the right not to reveal certain aspects about oneself.

These four dimensions, according to Westin, serve four basic functions (cited in Hammitt and Brown 1984):

**Personal Autonomy** - the need to avoid being manipulated or dominated wholly by others; to safeguard one's sacred individuality.

**Emotional Release** - provides for respite from the psychological tensions and stresses of social roles in everyday society.

**Self-Evaluation** - the need to integrate one's experiences into a meaningful pattern and to exert individuality on events.

**Limited and Protected Communication** - Westin states two aspects:

1) It provides opportunities needed for sharing confidences and intimacies with those trusted, and
2) it serves to set necessary boundaries of mental distance in interpersonal situations.

Many other articles concerned with privacy follow up on Westin's ideas and build on them (Altman 1975; Klopfer and Rubenstein 1977; Laufer and Wolfe 1977). Laufer and Wolfe considered privacy to be essential to the development of autonomy. Without separation from others, people would never be able to develop an individual identity. Privacy also includes aspects of control and choice—the ability to choose when to be alone and to choose activities while alone. The four most frequent meanings of privacy are stated as: aloneness, controlling access to spaces, "no one bothering me", and controlling access to information. Invasion of privacy is described as a loss of control over personal boundaries (Laufer and Wolfe 1977). Relationships to Westin's ideas of personal autonomy, and limited and protected communication are evident.

Klopfer and Rubenstein focused on a biological basis for privacy. They defined privacy as a regulatory process that serves to selectively control access of external stimulation to one's self or the flow of information to others. Privacy operates similar to a cell membrane which is selectively permeable to inputs and outputs. The primary function of privacy according to Klopfer and Rubenstein is to withhold information to provide a competitive advantage in achieving economic, political, sexual, and social goals that will contribute to an individual's well being (Klopfer and Rubenstein 1977).

Altman (1975) also viewed privacy as a boundary control mechanism. Each individual uses verbal and non-verbal cues, environmental mechanisms (personal space and territory), and social norms to achieve an optimum level of interaction that varies with time and situation.

## Motivational Research

Various articles have been concerned with motivations for recreation. Some mention privacy specifically (Connelly 1987; Peterson cited in Crandall 1980). Connelly (1987) identified solitude as a critical factor for camper satisfaction. In studies focusing on backcountry or wilderness, privacy was a primary motivation for the wilderness experience (Manfredo and others 1983; Wellman and others 1982).

Other studies did not mention privacy as a motivation but detailed motivations that seem closely related to Westin's privacy functions. For example, a working session at the University of Illinois generated a list of seventeen motivations for recreation along with ideas for further research. Although privacy is considered a fundamental human need it was not identified as a motivation for recreation by this work-group. There was however significant overlap between some of the items from the list of seventeen and Westin's functions. For example, the work-group generated motivations such as escape from civilization and routine, relaxation to rest the mind, reflection on personal values,

and self-actualization (Crandall 1980). There are other instances of overlap with Westin's functions. Hollender (1977) and Brown and Haas (1980) detailed motivational factors including escape, autonomy, and reflection.

There is a definite relationship between Westin's privacy functions and well documented leisure motivations. Even in the studies such as Manfredo and others (1983) where privacy or solitude was included as a motivation, other factors such as autonomy and escape were present. Many of the motivation studies and the conceptual basis of privacy supported the position that privacy is not an end in itself but is used to achieve other needs. Thus, for this study, privacy was viewed in this fashion and an attempt was made to investigate or confirm that privacy serves the functions described by Westin in a wilderness environment.

### Empirical Testing

One of the recommendations from Crandall (1980) was to focus on a specific leisure motivation and study it in detail. This suggestion was followed by Hammitt and Brown who used the Westin conceptualization as a starting point for investigating privacy in wilderness environments. According to the Wilderness Act of 1964 (Public Law 88-577) wilderness is to provide "outstanding opportunities for solitude". Solitude is one of the four dimensions of privacy theorized by Westin (1967), thus wilderness is to provide opportunities for privacy. Since this is a specific purpose of wilderness and because privacy has been identified as an important reason to visit wilderness, it is useful to explore the benefits of privacy to attempt to provide empirical evidence of why privacy is considered so important. Reviewing Westin's discussion of privacy, Hammitt and Brown generated a list of 28 items to be used to measure the importance of the four privacy functions. Hammitt and Brown discovered five functions that privacy serves in wilderness environments. These were emotional release, personal autonomy, reflective thought (similar to Westin's self-evaluation), limited communication (personal distance), and limited communication (intimacy). The last two functions are simply a division of Westin's limited and protected communication function (Hammitt and Brown 1984). This study attempted to confirm their results on an actual sample of wilderness visitors.

## METHODOLOGY

The Ellicott Rock Wilderness Visitor Study is a three phase study consisting of fall, spring, and summer samples. This paper reports the results of phase one, a study of fall wilderness use, also being used as a pilot study for subsequent phases. An eleven page questionnaire was developed that addressed general wilderness visitor use patterns and attitudes. The questionnaire also included the twenty-eight item scale developed by Hammitt and Brown. The scale was prefaced by asking "How important for you are these general/specific functions of wilderness privacy?" Responses were recorded on a seven point Likert scale with 1=extremely important to 7=not at all important. Sampling for the pilot-study was conducted during the month of October, 1992, in the Ellicott Rock Wilderness. The Ellicott Rock Wilderness is a small wilderness of approximately 7,000 acres mostly in the northwest corner of South Carolina. Visitors were intercepted just inside the wilderness and asked to participate in the study. Participants answered a few general questions and provided their names and addresses. Ninety-nine visitors were contacted in this manner and each was mailed a questionnaire with a postage paid envelope. Three reminders were sent at two week intervals after the first mailing, generally following procedures established by Dillman (1978).

Factor analysis with principal component extraction and orthogonal varimax rotation was performed on the privacy scale using four, five, and six factors (eigen-values > 1.0 and factor loading criterion > 0.4). Only the 24 specific privacy functions were factored, to avoid any masking of factor formation by the four general items. Results of these analyses were used to substantiate Westin's (1967) four function theory, the Hammitt and Brown (1984) five function model, or the results from a field test of the functions of privacy done in Australia where six functions were discovered (Priest and Bugg 1991).

## RESULTS

Seventy-one visitors, 72 percent, responded to the survey. Table 1 shows some general comparisons between respondents to the Ellicott Rock and Hammitt and Brown studies. The wilderness respondents were older and more experienced. Also, wilderness users were divided evenly between backpacking and dayhiking.

Of the factor analyses performed, only the five factor model resulted in clean factor formation. In the four and six factor models, too many unrelated items factored together and the factors could not be assigned any overall meanings that made sense. In some ways this was a subjective interpretation since all three models resulted in factors with very high alpha values. Intuitively though, the five factor model had the tightest factors with individual items that were very close in meaning.

Table 1—Comparison of background characteristics of respondents to Hammitt and Brown and Ellicott Rock studies

| | Hammitt and Brown | Ellicott Rock |
|---|---|---|
| Number of respondents[1] | 106 | 71 |
| Average age | 22 | 34 |
| Average years of experience | 6.8 | 10.3 |
| Activity | 100% Backpacking[1] | 48% Backpacking<br>48% Dayhiking<br>4% Fishing |

[1] Subjects were students with backpacking experience, not actual wilderness users.

Tables 2-6 compare the five factor model discovered in this study to Hammitt and Brown's model. Table 2 shows the items that factored under emotional release, the most important function in both studies. All the items were the same except for the addition of "releasing psychological stress" in the wilderness study. This item is definitely related to the ideas of release and tension relief typified by this function.

Personal autonomy was ranked second in each study, table 3. There were a few item differences. Two items that loaded on autonomy in the Hammitt and Brown study ("self-evaluation" and "identifying one's inner self") did not load in the autonomy factor for the wilderness group. These items appear to be related more to self-evaluation or reflective thought anyway. One additional item associated with personal autonomy ("development of individuality in personal and spiritual concerns") was included under autonomy for the wilderness group, but not for the Hammitt and Brown group.

Table 2—Comparison of emotional release function from Ellicott Rock and Hammitt and Brown privacy function models

| Factored items | Factor loadings | Item means | Factor mean | Cronbach's Alpha |
|---|---|---|---|---|
| **Ellicott Rock** | | | | |
| Resting mind from anxiety and fatigue | 0.5727 | 1.49 | | |
| Emotional release from everyday life | 0.8870 | 1.78 | | |
| Disengaging from social roles | 0.6855 | 1.78 | 1.92 | 0.87 |
| Releasing psychological stress | 0.7590 | 2.23 | | |
| Releasing physical tension | 0.6986 | 2.31 | | |
| **Hammitt and Brown** | | | | |
| Resting mind from anxiety and fatigue | 0.4491 | 1.59 | | |
| Disengaging from social roles | 0.5681 | 1.84 | 1.95 | 0.74 |
| Emotional release from everyday life | 0.7402 | 1.87 | | |
| Releasing physical tension | 0.4558 | 2.51 | | |

Reflective thought was the third most important function, table 4. Again there were some item differences between the two studies. There did not appear to be any items unrelated to thought and reflection in the Ellicott Rock study as there were in Hammitt and Brown's. "Releasing psychological stress" and "development of individuality in personal and spiritual concerns" both loaded on this factor for Hammitt and Brown. They would appear more related to the Emotional Release and Personal Autonomy factors, respectively. Items associated with reflection and evaluation that loaded on the wilderness study and not the Hammitt and Brown study included, "being alone with one's thoughts and feelings" and "exploring personal concerns."

Table 3—Comparison of personal autonomy function from Ellicott Rock and Hammitt and Brown privacy function models

| Factored items | Factor loadings | Item means | Factor mean | Cronbach's Alpha |
|---|---|---|---|---|
| **Ellicott Rock** | | | | |
| Development sense of independence | 0.7409 | 2.39 | | |
| Maintaining sense of individuality | 0.5682 | 2.48 | 2.58 | .83 |
| Experiencing a period of personal autonomy | 0.6220 | 2.68 | | |
| Development of individuality in personal and spiritual concerns | 0.6667 | 2.72 | | |
| **Hammitt and Brown** | | | | |
| Developing sense of individuality | 0.5088 | 2.11 | | |
| Personal autonomy/self-identity | 0.6336 | 2.21 | | |
| Maintaining sense of individuality | 0.6589 | 2.32 | 2.32 | .81 |
| Self-evaluation | 0.5838 | 2.35 | | |
| Experiencing a period of personal autonomy | 0.7171 | 2.44 | | |
| Identifying one's inner self | 0.5945 | 2.50 | | |

The limited communication functions were ranked slightly differently. They were ranked identical to one another in the Hammitt and Brown study, intimacy ranked slightly higher than personal distance in the wilderness study. The intimacy function had the exact same items in both studies, all of them definitely related to intimate communication with trusted others, table 5. There were some differences though in the personal distance factors, table 6. This factor in the wilderness study excluded any items dealing with personal thought and reflection such as, "exploring personal concerns" that factored in this function for Hammitt and Brown. Two additional items factored in the wilderness study. These were, "control information that must be processed" and "limit communication to individuals who are not close friends." These were definitely related to boundary maintenance.

Table 4—Comparison of reflective thought/self-evaluation function from Ellicott Rock and Hammitt and Brown privacy function models

| Factored items | Factor loadings | Item means | Factor mean | Cronbach's Alpha |
|---|---|---|---|---|
| **Ellicott Rock** | | | | |
| Being alone with one with one's thoughts and feelings | 0.5050 | 2.29 | | |
| Regrouping one's thoughts | 0.5163 | 2.35 | | |
| Exploring personal concerns | 0.7242 | 2.43 | | |
| Recovering from trouble and depression | 0.5577 | 2.62 | 2.75 | .91 |
| Reflecting on the past | 0.6118 | 2.77 | | |
| Identifying inner-self | 0.5541 | 2.84 | | |
| Self-evaluation and re-directing goals | 0.7038 | 2.96 | | |
| Planning coming events | 0.7855 | 3.67 | | |
| **Hammitt and Brown** | | | | |
| Releasing psychological stress | 0.7495 | 2.36 | | |
| Regrouping one's thoughts | 0.8289 | 2.46 | | |
| Reflecting on the past | 0.5231 | 2.59 | | |
| Recovering from trouble and depression | 0.5988 | 2.63 | 2.77 | .81 |
| Development of individuality in personal and spiritual concerns | 0.6076 | 2.70 | | |
| Planning coming events | 0.4355 | 3.88 | | |

## DISCUSSION

Although there were differences in where items factored between the two studies, the five factor model definitely seems confirmed and strengthened by this study. The most notable difference between Westin's theory and the Hammitt and Brown study was that Limited and Protected Communication divided into two separate factors. This result was confirmed as well. The intimate communication function even contained the exact same items in both studies.

Table 5—Comparison of intimacy function from Ellicott Rock and Hammitt and Brown

| Factored item | Factor loadings | Item means | Factor mean | Crombach's Alpha |
|---|---|---|---|---|
| **Ellicott Rock** | | | | |
| Private setting for communicating with a few friends | 0.8456 | 2.41 | 2.80 | .81 |
| Sharing intimacies with trusted others | 0.6928 | 2.93 | | |
| Evaluating personal matters with intimate friends | 0.7144 | 3.06 | | |
| **Hammitt and Brown** | | | | |
| Private setting for communicating with a few friends | 0.6064 | 2.59 | 2.80 | .69 |

Table 6—Comparison of personal distance function from Ellicott Rock and Hammitt and Brown privacy function models

| Factored item | Factor loadings | Item means | Factor mean | Crombach's Alpha |
|---|---|---|---|---|
| **Ellicott Rock** | | | | |
| Maintaining desired mental distance | 0.7910 | 2.91 | 3.05 | .81 |
| Limiting visual and verbal Interaction with strangers | 0.7950 | 2.94 | | |
| Control information that must be processed | 0.6686 | 2.99 | | |
| Limit communication to individuals who are not close friends | 0.6456 | 3.41 | | |
| **Hammitt and Brown** | | | | |
| Being along with one's thoughts and feelings | 0.7164 | 2.22 | | |
| Exploring personal concerns | 0.4747 | 2.28 | | |
| Self-evaluation and re-directing goals | 0.4840 | 3.05 | 2.80 | .74 |
| Maintaining desired mental distance | 0.6350 | 3.08 | | |
| Limiting visual and verbal interaction with strangers | 0.4616 | 3.40 | | |

The factors among the wilderness users appeared stronger than those discovered surveying students. The items in each factor conformed very well to the original conceptual meanings discussed by Westin. In the Hammitt and Brown study there were usually unrelated items in each of the factors. Intuitively, all the items in each function appeared very close in meaning in the Ellicott Rock study and supported the meaning of the function. This is reflected by the higher alpha values for the Ellicott Rock factors. This difference may be due to wilderness users having a better conceptual idea of what privacy means to them. They were older and had more experience in general, thus have had more time to develop ideas about privacy and have more well defined meanings assigned. Stronger factors may also be a result of the fact that this study asked people to respond based on actual wilderness experience as opposed to a hypothetical situation in the Hammitt and Brown study.

One particular unexpected finding was the fact that wilderness users did not consider privacy more important than the student group. This may be a function of the wilderness sampled. Ellicott Rock is a small wilderness with easy access. There is a picnic area adjacent to one of the major wilderness trail heads, thus day-hikers and picnickers wander into the wilderness and may not even be aware of the fact they are inside a wilderness. These people may place less importance on privacy than overnight users. With the addition of the spring and summer samples to this study, possible affects such as this can be investigated. Are there significant differences between day-users and overnight visitors in the importance they assign to privacy? Other possible influences on privacy functions such as past experience, type of activity and amount of privacy desired in general can also be investigated.

It would also be useful in the future to replicate this study at other wilderness areas to attempt to control for possible effects of the small size and accessibility of the Ellicott Rock Wilderness. People should perhaps be allowed more open ended response to what functions privacy serves for them. This type of response would allow exploration of privacy functions that have not been considered yet.

## CONCLUSIONS AND IMPLICATIONS

In addition to confirming Hammitt and Brown's five factor model, our findings provide evidence of the importance of wilderness as a setting for achieving privacy and thus provides justification for specifically mandating solitude as a wilderness characteristic in the Wilderness Act. One of the survey questions asked Ellicott Rock wilderness users how important privacy was as a motivation for their wilderness visit. On a scale of 1 to 10 with 1 being "not important" and ten being "very important", the mean response was 6.65, suggesting that privacy is at least somewhat important. The privacy functions have a mean value of 1.92 to 3.05 (1 = extremely important, 7 = not at all important). Thus these wilderness visitors are seeking out privacy and using it to restore themselves, get away from the pressures of everyday life, and spend intimate time with significant others.

The primary management implication is that there is a need amongst the general public for opportunities to achieve privacy. Wilderness needs to be maintained as a setting for privacy. Since wilderness is not very common in the Southeast, extra efforts need to be made to maintain areas like Ellicott Rock where privacy is preserved. Again, there is a need for replication of this study to other wilderness areas to discover if the functions of privacy are perhaps even more important in a larger, more remote wilderness.

Based on research findings, managers must also realize that privacy and solitude are more complex than they may seem. Wilderness users may be seeking a variety of possible outcomes through privacy. Some may demand total solitude whereas others may be looking for limited social contacts or simply a chance to get away from the stress of everyday life. Managers need to take this into account and not only preserve wilderness, but attempt to provide a variety of wilderness conditions that will satisfy the divergent privacy needs of wilderness visitors.

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# Estimating the Local Economic Impact of Lake Recreation in Northern California

Laurie J. Hawks and J.M. Bowker

Abstract—In this study we examine the relationship between the management of water levels at Shasta Lake and the economic impact of recreation spending on the local economy. We combine a regression visitation prediction model with an input-output model and an expert panel to derive impact estimates. Our results indicate that the economy is most sensitive to management changes in drought years.

Keywords: Management, economic impact, regression, input-output, expert panel.

## INTRODUCTION

Shasta, Trinity, and Whiskeytown reservoirs were constructed near Redding, California from 1930-1960. The reservoirs are managed by the Bureau of Reclamation as part of the Central Valley Project. Initially, the lakes were used primarily for irrigation and flood control, however, state population growth has contributed to increased municipal demands downstream. In addition, a significant and perhaps unexpected recreation industry has emerged around the lakes over the past thirty years. Tourism is now one of the most important industries in this mostly rural area.

The Forest Service and Park Service manage recreation on the lakes, however control of lake levels rests with the Bureau of Reclamation. The various demands on reservoir water result in conflicts within the community, the state and between Federal agencies. The intensity of conflicts resulted in recent legislation which mandates more water for endangered species, in-stream uses, and local communities. Agricultural water contracts are also to be renegotiated to bring the cost of water closer to market values.

Effective water resource management in the face of competing demands necessitates a careful accounting of the costs and benefits of alternative water uses. In many cases, the benefits associated with recreation are often overlooked. This study addresses one component of recreation benefits. Specifically, the relationship between the management of water levels at Shasta Lake and the economic impact of recreation spending on the local economy is examined. Such information is integral to a more complete assessment of water management alternatives.

The impact of recreation and water recreation in particular, can be significant to local and/or state economies. Bergstrom and others (1990) demonstrate the large impact that recreation spending at state parks has on state economies in the Southeast. Stoll and others (1988) show that recreational boating in Texas had a total output value of over $610 million and produced almost $184 million in income to households. Other studies cited by Stoll and others (1988) include estimates of recreational boating in Michigan of more than $1 billion spent annually on boating with $469 per year spent on craft related items and $39 per boating day. In Rhode Island, between $95-110 million was spent on direct sales related to the boating industry. Marine boating sales in Florida generated $845.3 million in 1981.

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The Corps of Engineers analyzed recreation expenditures on one river and four lakes in the Southeast (Fritschen 1988). The Corps used PARVS[1] data to estimate expenditures and economic impacts of campers, day users, and other overnight visitors. Fritschen reports total household expenditure per trip of $435 for campers, $36 for day users, and $195 for other overnight visitors. These values are the mean of boater and nonboaters for each activity group. They found that user expenditures have significant impacts on local economies.

## DATA AND METHODS

The management of National Forest resources has a significant effect on local economies. Sullivan and Gilless (1990) describe how changes in one resource output, timber harvests, impact Northern California rural economies. They combine an input/output model, IMPLAN, and an econometric model to forecast changes in timber related industries and subsequent income and employment effects on these rural economies.

We employ a similar methodology to examine the impacts of recreation spending on the local economy under different water level management alternatives for Shasta Lake. Visitation estimates associated with different seasonal water levels are combined with visitor expenditure patterns and integrated with the IMPLAN input/output model to project total industrial output (TIO) and employment impacts on the local two county economy. The various components of our model are presented in figure 1.

### Visitation Model

Visitation estimates were obtained using two different approaches. First required the development of a regression model to predict annual visitation. Historical data were provided from the Forest Service and by the Bureau of Reclamation. The estimated visitation equation is:

$$E(MRVD) = -98150 + 6.1\,YEAR + 9.1\,MAY - 6.7\,RECDROP \qquad (1)$$
$$(t's) \quad (-5.9) \quad (5.6) \quad (7.5) \quad (-2.4)$$

$$R^2 = .86 \quad AdjR^2 = .83 \quad DW = 2.0 \quad N = 21$$

where, MRVD is thousand recreation visitor days, YEAR is a time trend variable, MAY is water level in feet above sea level at the beginning of May, and RECDROP is the drop in feet of the water level between May and September.

[1]Public Area Recreation Visitor Survey, developed at the Outdoor Recreation and Wilderness Assessment Unit.

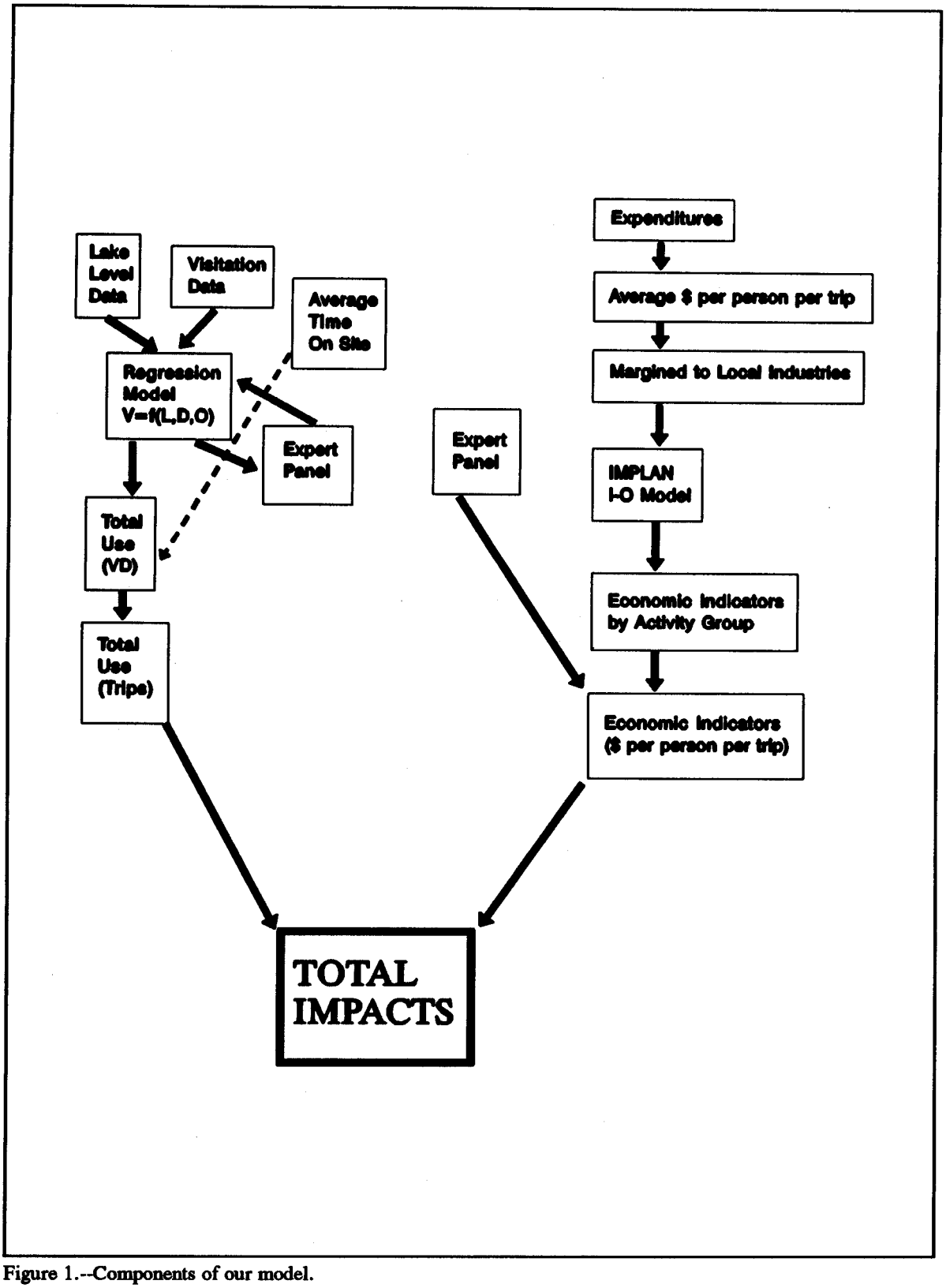


Figure 1.--Components of our model.

The regression results are then augmented by the use of the Delphi technique. Delphi methodology involves structured group input into a decision making process. This technique is often used as a proxy when historical data are not available/complete or qualitative input is needed. Delphi techniques provide valuable input into evaluating management alternatives. Singg and Webb (1979) used traditional Delphi techniques to estimate the impacts of alternative water plans in a watershed planning project. Wagner and Ortolano (1975) forecast impacts associated with alternative actions and used Policy Delphi to rank the acceptability of various alternatives.

In this case, a Delphi group or "expert panel" of local residents was chosen by the Shasta-Trinity National Forest recreation management team based on experience and familiarity with the Shasta lake area and recreation activities. The role of the panel was to (1) provide a limited set of "feasible" water level management alternatives, (2) provide activity use percentage estimates not available in the recorded visitation data and, (3) assess the validity of our regression model visitation estimates for each alternative.

Historical data were used to arrive at baseline management alternatives for the lake in both drought and nondrought conditions. Two feasible management alternatives were then chosen by the panel for comparison to each baseline. The water level management alternatives are presented in table 1.

Table 1—Lake Level Characteristics

| | | DROUGHT | | | NONDROUGHT | | |
|---|---|---|---|---|---|---|---|
| | | BASE | ALT 1 | ALT 2 | BASE | ALT 1 | ALT 2 |
| May 15 | WL (ft) | -85 | -85 | -85 | FULL | FULL | FULL |
| | SA (%) | -35 | -35 | -35 | 0 | 0 | 0 |
| | BR (#) | 5 | 5 | 5 | 6 | 6 | 6 |
| July 15 | WL (ft) | -117 | -101 | -85 | -44 | -22 | -11 |
| | SA (%) | -46 | -40 | -35 | -19 | -10 | -5 |
| | BR (#) | 3 | 5 | 5 | 6 | 6 | 6 |
| Sept 15 | WL (ft) | -149 | -117 | -85 | -85 | -44 | -22 |
| | SA (%) | -56 | -46 | -35 | -35 | -19 | -10 |
| | BR (#) | 2 | 3 | 5 | 5 | 6 | 6 |

WL is water level in feet below full.
SA is surface area reduction in percent.
BR is the number of boat ramps open at that water level.

The mix of activities to be expected at each lake level alternative is critical to estimating final total economic impacts because of differences in spending patterns associated with each activity. Panel estimates for activity use percentages for drought and nondrought years are provided in table 2. Regression visitation estimates for each scenario are combined with the activity percentage estimates and reported in table 3. It should be noted that panel members were asked to comment on the regression model estimates. With the exception of the one panelist who predicted up to 50 percent lower visitation under drought conditions than the model, panelists felt the model was not off by more than 20 percent for any one scenario and not off by more than 10 percent for most scenarios.

Table 2—Expert panel activity percentage estimates

| | DROUGHT | NONDROUGHT |
|---|---|---|
| ACTIVITY | PERCENT* | PERCENT |
| Houseboating | 33 | 35 |
| Other Boating | 27 | 27 |
| Developed Camping | 10 | 12 |
| Dispersed Camping | 10 | 10 |
| Fishing | 20 | 16 |

* Percent of total visitation

Economic Impacts

Total use is reported per visitor day, which is one person on site for 12 hours. Economic impacts are estimated on a per trip basis, hence a conversion factor was necessary to combine total use with economic impacts. Survey data showed that the average number of days on site for Shasta Lake visitors is six days. Therefore, Shasta Lake visitor days were divided by 12 to convert to trips.

An on-site stratified random sample of visitor expenditure information and trip profiles was conducted during the recreation season of 1992. Trip and equipment expenditures were margined to various industries of the local economy. This information was combined with the IMPLAN input/output model to estimate total industrial output (TIO), final demand (FD), total income (TI), value added (VA), and employment by activity on a dollar per person per trip basis.

All of the above measures were calculated for each activity group. Next, a total weighted average was calculated using the estimates of total use by activity group. Finally, aggregate impacts for the various water management alternatives are derived. In this study the major purpose is to identify the difference in economic activity supported by recreation spending under different management alternatives and natural conditions, hence the values and differences are reported.

The total economic effect of expenditures related to recreational visits is the sum of direct, indirect, and induced effects. Typically, the total effects are between 1/2 to 2 times more than the amount which the recreationists originally spent in the local economy. As is typical of most economic impact studies, expenditures made within an impact area only by nonresidents are used for analysis. These expenditures represent outside money flowing into the impact area. It is assumed that without the recreation area, these revenue dollars would not flow into the local economy. Thus, for this study only nonresident expenditures are considered. Sixty-five percent of those sampled on site were from outside the two-county region.

Table 3—Visitation Estimates (in million visitor days)

| | DROUGHT | | | NONDROUGHT | | |
|---|---|---|---|---|---|---|
| ACTIVITY | BASE | ALT 1 | ALT2 | BASE | ALT 1 | ALT 2 |
| Houseboat | 0.66 | 0.73 | 0.87 | 0.96 | 1.01 | 1.08 |
| Otherboat | .54 | .59 | .72 | .74 | .78 | .83 |
| Dev Camp | .20 | .22 | .27 | .33 | .35 | .37 |
| Disp Camp | .20 | .22 | .27 | .28 | .30 | .32 |
| Fishing | .40 | .44 | .53 | .44 | .46 | .50 |
| TOTAL | 2.0 | 2.2 | 2.65 | 2.75 | 2.9 | 3.1 |

Table 4—IMPLAN IO Results

| | DROUGHT | | | NONDROUGHT | | |
|---|---|---|---|---|---|---|
| | BASE | ALT 1 | ALT 2 | BASE | ALT 1 | ALT 2 |
| FD | 16.7 | 18.5 | 22.2 | 23.1 | 24.3 | 25.6 |
| TIO | 20.3 | 22.5 | 27.0 | 28 | 29.5 | 31 |
| TI | 11.8 | 13 | 15.6 | 16.2 | 17.1 | 18 |
| VA | 13.9 | 15.4 | 18.5 | 19.2 | 20.3 | 21.3 |
| EM | 465 | 515 | 618 | 642 | 677 | 711 |

FD is final demand in millions of dollars.
TIO is total industrial output in millions of dollars.
TI is total income in millions of dollars.
VA is value added in millions of dollars.
EM is employment in full-time equivalents.

## RESULTS

Results for dollar output measures and employment are reported in table 4, while percentage changes from the respective Baselines are reported in table 5. In general, the results show that total economic impact is significant to Shasta and Trinity counties from nonresident visitation associated with recreation at Shasta Lake. Lake levels appear to substantially affect visitation and therefore economic impacts.

During nondrought conditions, the feasible management alternatives represented in this study indicate up to an 11 percent change in economic activity and jobs for the local economy. This is not very dramatic and in nondrought years the importance of water downstream is much less of an issue.

During drought conditions the differences in feasible management alternatives are far more pronounced. In fact there is up to a 33 percent difference in economic activity between the Baseline, which represents an average drawdown from past drought years to Alternative 2, representing essentially no drawdown during a drought year. In fact, drought Alternative 2 is only marginally different than the nondrought Baseline.

It should be noted that the expert panel felt the results were, in general, more pronounced during a drought year than our models indicate. Whether this is emotional or intuitive is a good question. It may in fact represent a valid assessment of the limitations of our linear models, both the visitation and the input-output model.

Table 5—IMPLAN IO Results

| | DROUGHT | | | NONDROUGHT | | |
|---|---|---|---|---|---|---|
| | BASE | ALT 1 | ALT 2 | BASE | ALT 1 | ALT 2 |
| FD | 0 | 10.8 | 32.9 | 0 | 5.2 | 10.8 |
| TIO | 0 | 10.8 | 33 | 0 | 5.4 | 10.7 |
| TI | 0 | 10.2 | 32.2 | 0 | 5.6 | 11.1 |
| VA | 0 | 10.8 | 33 | 0 | 5.7 | 10.9 |
| EM | 0 | 10.7 | 32.9 | 0 | 5.5 | 10.7 |

FD is final demand percent change from the BASE.
TIO is total industrial output percent change from the BASE.
TI is total income percent change from the BASE.
VA is value added percent change from the BASE.
EM is employment percent change from the BASE.

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# Sensitivity of Contingent Value Surplus Estimates to Elicitation Approach: Further Evidence

J.M. Bowker, R.A. Souter, and J.R. Clemmons

Abstract.—Two elicitation approaches, dichotomous choice (DC) and payment card (PC), were commonly used in contingent valuation (CV) studies to measure Hicksian economic surplus were examined. Separate samples were used to estimate individual annual net economic surplus associated with lake recreation in the Whiskeytown-Shasta-Trinity National Recreation Area (WST) with each elicitation approach. Results indicate a large and statistically significant difference in estimates obtained from PC and DC. Results indicate that CV estimates are not invariant to elicitation technique and that use of a single CV elicitation approach in applied benefit-cost analysis should be tempered with caution.

Keywords: CV, dichotomous choice, payment card, logit, incongruence.

## INTRODUCTION

Contingent valuation (CV) is a popular and accepted method for valuing entities not commonly traded in markets (Mitchell and Carson 1989; U.S. Water Resources Council 1983). The technique utilizes survey methods to directly elicit values from individuals for the provision of a particular good or service through the use of a hypothetically structured market or similar property right transfer institution. CV presents a flexible and convenient alternative to other nonmarket valuation techniques such as travel cost (Smith and others 1986), hedonic pricing (Brookshire and others 1982), and defense expenditures (Abdalla 1990), which are indirect methods reliant on the existence of a complementary or substitute relationship between the nonmarket good of interest and some other market good (Randall 1987).

CV has been applied to a wide range of nonmarket valuation problems. Examples include studies to estimate values for wilderness use and preservation (Gilbert and others 1992; Walsh and others 1984), water based recreation (Cordell and Bergstrom 1993;Sellar and others 1985), wildlife viewing and harvesting (Bishop and Heberlein 1979; Duffield and Patterson 1991; Peterson and others 1992), and public aerobic classes (McCarville 1991).

Criticisms of CV generally focus on the many biases which can result when the method is applied (McKillop 1992). (Mitchell and Carson 1989) provide a complete typology of these biases. Additional and perhaps more indictable problems with CV relate to individual valuation processes. For example, in an experiment valuing wildlife preservation, (Stevens and others 1991) found that a large proportion of respondents simply refused to attach a money metric to species preservation. (Kahneman and Knetsch 1992) argue that values obtained in CV studies often are potentially inflated due to two phenomenon: (1) "embedding" and/or (2) "purchase of moral satisfaction." In

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addition, Samples and others (1986) have shown that sequencing of questions in CV can lead to disparate value measures and that in the case of wildlife, values for individual species, when summed exceed reported aggregate values.

Biases and other problems must be weighed against the alternative of using market information with its inherent distributional biases, or worse, assuming a zero price for a nonmarket good is efficient and legitimate. As Smith (1992) contends, "true economists can never know the 'true' values people place on any commodity—marketed or nonmarketed." Additionally, few would argue preferences and values are not somewhat dynamic.

Attempts at validation of the CV technique generally consist of convergent validity experiments. Empirical studies have been limited to the issues of: (1) temporal stability (Loomis 1990), (2) stability across elicitation procedures (Boyle and Bishop 1988), (3) comparing CV values to those obtained via indirect methods (Richards and others 1990; Sellar and others 1985; Smith and others 1986), and (4) comparing CV values to those obtained through simulated markets involving cash transactions (Bishop and Heberlein 1979; Dickie and others 1987; Kahneman and Knetsch 1992; Kealy and others 1990). While limited to a collection of case studies, the results generally suggest that when compared to indirect or simulated market values for similar goods, values estimated via CV are very reasonable, supporting convergent validity.

In spite of favorable published findings (Boyle and Bishop 1988; Loomis 1990), basic questions remain about the appropriateness of elicitation approaches employed within the CV method. Most studies select one method of elicitation, either open-ended (OE), payment card (PC), or dichotomous choice (DC). A benefit of using only one elicitation method is enhanced statistical efficiency for a given sample size, which is desirable given limited budgets and the expense of collecting survey data. A potential danger of using only one elicitation method is that elicited values may be incongruent across procedures and a level of precision may be represented which is artificially high. This occurrence may be problematic because there are no compelling reasons, theoretical or empirical, to select any one elicitation procedure as the most valid or accurate.

## DATA AND METHODS

Data used for the analysis were obtained via surveys conducted during the recreation seasons of 1991 and 1992 at Whiskeytown-Shasta-Trinity National Recreation Areas (WST). Dichotomous choice data were obtained in 1991, while the lakes were in severe drought condition, using a random sample of on-site visitors. In addition to a number of other questions, respondents were asked in a face-to-face interview to answer either yes or no to the following question aimed at eliciting annual household economic surplus obtained through using WST:

> Think for a moment about the total amount of money spent during the last 12 months to visit WST. The "amount of money" is the total amount you spent on all trips to WST in the last 12 months including this trip. If the total amount you had to spend on all trips to WST last year had been $ D higher, for example because of higher price of gasoline or other expenses, would you still have come?

The $D amount ranged from $1 to $250 in the following increments: $ 1, 2, 5, 7.5, 10, 15, 10, 15, 25, 45, 65, 85, 110, 150, 250. A follow-up question was asked to identify protest bidders. A total of 167 surveys were completed of which 3 were identified as protest bids and deleted. An additional 14 surveys were unusable because of failure to complete the questionnaire (13 of which were for the income question). The usable sample was 150 observations.

Because the DC approach is based on YES/NO responses, nonlinear binary response modeling (logit or probit) is used to estimate individual economic surplus (Hanemann 1984). The process is two-stage. First, the inverse

of the distribution function for willingness to pay (WTP), based on the probability of YES response, is estimated. The logit model is specified as,

$$P(YES)=1/(1 + \exp - (B_0 + B_1\$D + B_2INC + B_3QUAL + u)) \quad (1)$$

where, P(YES) is the probability of a YES response to an amount of $D dollars in additional annual expenses to continue to use the site, INC is household income, QUAL is an index of site quality and u represents i.i.d. mean zero random perturbation. Next, conditional means and medians for WTP can be obtained via numerical techniques (Bowker and Stoll 1988; Hanemann 1984 ). Confidence intervals for the WTP means and medians may be estimated using (1) differential, (2) bootstrap, or (3) Monte Carlo techniques (Duffield and Patterson 1991).

Payment card data were obtained via a mail back survey distributed on-site in 1992. Site conditions such as weather and water levels during both years were virtually identical. In the survey, respondents were shown pictures of water levels corresponding to the annual drought conditions and asked to:

> Consider the water levels as shown and described on page X. Consider also your estimated annual total household expenses to use WST during a drought year, for example gasoline, travel expenses, boat or cabin rentals and all other expenses. Please circle the number closest to the maximum you would pay in additional annual expenses in a drought year to continue using WST. $ 0 2 5 10 . . . . 1,000.

In all, 33 amounts, ranging from $0 to $1,000 were listed. As with the DC question, a follow-up question was asked to identify protest bidders. Observations deemed as protest bids, less than 5 percent of the sample, were deleted. A total of 111 usable observations remained.

With the PC, WTP is obtained by directly asking individuals to indicate on a payment card their WTP in the form of additional annual expenses incurred to continue to use WST. In this case, WTP (or a transformation thereof) is modeled directly using ordinary least squares (OLS)(Cameron and Huppert 1989) as a linear function of socioeconomic and site variables, where, INC, QUAL, and u are as described above.

$$WTP = B_0 + B_1INC + B_2QUAL + u \quad (2)$$

From this specification, conditional mean and median WTP measures can be directly obtained. Confidence intervals for the mean may be obtained by conventional procedures using either the sample or regression standard error. Conover (1980) provides a nonparametric procedure to estimate a confidence interval for the median.

## RESULTS

Data for the payment card method indicate a sample mean WTP of $15.67, and sample standard error of 22.76. In this case, two empirical specifications are used; the first with WTP as the dependent variable, and the second using the natural logarithm of WTP as the dependent variable, Table 1. The covariates for both specifications are income and a Likert-type quality index. Signs on the explanatory variable coefficients for both specifications are as expected; however, only the coefficient on the quality index variable is significant. These findings are consistent with other cross-sectional studies in that income often appears to be an insignificant factor in explaining WTP. Also consistent with a number of other cross-sectional studies is the low $R^2$ indicating relatively poor predictive power.

Table 1—Payment card, ordinary least squares regression estimates

| Dependent variable | CONST (Constant) | INC (Income) | QUAL (Site quality) | $R^2$ | F | N |
|---|---|---|---|---|---|---|
| WTP[1] | -4.73 | 1.33 | 4.76 | .134 | 8.34 | 111 |
| t's | (-.79) | (1.50) | (3.60) | | | |
| LNWTP[2] | -.273 | 0.019 | 0.563 | .200 | 13.80 | 111 |
| t's | (-.56) | (0.26) | (5.20) | | | |

[1] Willingness to pay
[2] Natural log of willingness to pay

Incorporating the regression standard error from the WTP model, the 95 percent confidence interval for mean WTP at the mean of the regressors is [-27.07, 58.41]. A well known property of the semi-logarithmic specification is that the antilog of the mean LNWTP provides an estimate of the median WTP. Using the regression standard error for the LNWTP model, the 95 percent confidence interval for median WTP at the mean of the regressors is [0, 134].

The estimated MLE logit regression equation from the dichotomous choice approach is presented in table 2. While the model predicts YES/NO responses correctly on 94 percent of the observations, the McFadden $R^2$ ($MDR^2$) is relatively low and the chi-squared statistic for the nonintercept parameters in the model is significant at the 10 percent level. This indicates a relatively poor fit which obtains from the fact that over 80 percent of the respondents said YES to the $D amount on their question and the proportions changed little across the range of WTP amounts. The sign on the offer amount variable, $D, is theoretically correct but statistically insignificant while income is insignificant and quality is significant at the 5 percent level.

Table 2—Dichotomous choice logit MLE regression estimates

| DEP (Dependent variable) | CONST (Constant) | $D (offer amount) | INC (Income) | QUAL (Site Quality) | $MDR^2$ | $CHI^2$ | N |
|---|---|---|---|---|---|---|---|
| P(YES) | 10.21 | 0.0047 | 0.163 | -1.26 | 0.10 | 6.38 | 150 |
| t's | (2.5) | (-1.1) | (.849) | | | | |

Point estimates of the truncated mean WTP, obtained via numerical integration over ranges of offer amounts of 250 and 1000 were $239.20 and 728.97 respectively. Alternatively, following Hanemann (1984), the parameter estimates of the above logit function can be combined to yield an estimated mean and median WTP of $790.23. A 95- percent confidence interval for the mean WTP obtained via the Krinsky and Robb Monte Carlo simulation approach is [$315.88, 14151.95].

Our findings show the DC WTP estimates to be substantially higher than those obtained via PC. Indeed, 95 percent confidence intervals for the mean WTP out of the two elicitation approaches do not intersect. This would appear to be sufficient evidence to reject the hypothesis that $WTP_{PC}=WTP_{DC}$. Our results run contrary to the findings of Loomis (1990) and Boyle and Bishop (1988), by showing that CV can be quite sensitive to elicitation vehicle selection. While our study may be an anomaly, we see no reason why our results are any more an artifact of a single strange case than the findings of either Loomis (1990) or Boyle and Bishop (1988).

## IMPLICATIONS

These results suggest that researchers using CV to estimate recreation values and benefits should consider the danger of using only one elicitation procedure versus the loss of statistical efficiency associated with splitting the sample over two or more elicitation procedures. Given that procedure selection criteria are basically ad hoc, we would argue that selection of a single approach conveys a level of precision and accuracy which is artificially high. Indeed, the DC mean WTP is 15 times higher than that for the PC.

Our findings must be tempered with a number of caveats. We recognize that a number of experimental control factors are likely to have contributed to the incongruence of our WTP estimates. For example, (1) the data generating processes were based on different questions in different years, (2) interviewing was face-to-face with DC and via mailback with PC, (3) visuals were used only with PC. However, we believe our empirical findings indicate something more fundamental; an inherent instability of WTP estimates to elicitation approach variations. An important implication of this finding is that when CV is used in public policy decision processes such as applied benefit-cost analysis, vastly different economic surplus estimates and consequent conclusions may emerge depending on the elicitation vehicle. If the results are to be aggregated across user populations (Loomis 1987) and used in the policy arena, they should be viewed and interpreted cautiously. Clearly, peoples' preferences are dynamic and measuring those preferences in a money metric is subject to error. However, incongruence of the magnitude reported in this study is hard to overlook. Such a finding appears to corroborate much of the criticism that the CV technique is currently receiving.

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# Recreational Billfishing in South Carolina: Toward Restraint and Replenishment

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Abstract.—Atlantic marlin and sailfish populations are declining rapidly, primarily due to commercial tuna longlining. Provisions of the Magnuson Act and the Billfish Plan have slowed, but not stopped, the decline of billfish in America's 200-mile EEZ. To help protect billfish stocks, recreational anglers are operating under new regulations and ethical standards. In South Carolina, where billfishing has surged in popularity, tournament organizers and sports fishermen have strongly supported the use of catch-and-release methods and related conservation measures. About 80 percent of the billfish caught today are released. Survival of billfishing in South Carolina and elsewhere hinges on a multifaceted campaign to eliminate overfishing and place billfish management on a more scientific footing. Further reduction of the longliner by-kill is especially important, but rescuing the billfish stocks also depends on the intensification of billfish research efforts, the promotion of catch-and-release methods, the revision of minimum-size restrictions, the enforcement of no-sale provisions, and related measures.

Keywords: marlin, sailfish, catch-and-release, tag-and-release, billfish tournament, saltwater fishing.

## INTRODUCTION

Most recreational fish stocks off the Southeastern coast have been overexploited and many are in a state of decline (SFI 1992a). Alarmed at this trend, fisheries managers have implemented various policies and programs to ease pressure on the remaining stocks (NMFS 1991a, 1991b). These measures have already had a significant impact on the character and quality of marine recreational fishing, and more changes are sure to come. This paper is set in the context of the campaign to halt the decline of billfish populations off the Southeastern coast and elsewhere in the Atlantic. It focuses most particularly on South Carolina, a state in which billfishing has become a popular recreational activity and tournament sport. Its purpose is to identify and discuss trends shaping the future of billfishing in South Carolina.

Five pelagic game fish in the Atlantic are classified as billfish; blue marlin (*Makaira nigricans*), white marlin (*Tetrapturus albidus*), sailfish (*Istiophorus platypterus*), broadbill swordfish (*Xiphias gladius*), and longbill spearfish (*Tetrapturus pfluegeri*). Other fish may be fun to catch and delicious to eat, but the billfishes are the best of trophies because they are big, beautiful, powerful, scarce, and hard to catch.

Atlantic billfishing has become very popular. The first billfish to be taken by rod and reel in the Atlantic was probably a sailfish caught off Miami around the turn of the century (Prince and others 1990).

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Approximately 19,000-20,000 vessels were angling for billfish off the U.S. coast by the late 1970s, and their combined annual catch exceeded 80,000 marlin and sailfish (Maiolo 1990; SAFMC 1988) Although available data are incomplete, it is known that fishing effort increased substantially during the 1980s (Prince and others 1990).

It is difficult to catch billfish, and even experienced anglers may not catch them very often. For example, only about 6,745 blue marlin were caught off the U.S. coast in all of 1977 (Beardsley 1989). In the 1980s Atlantic coast billfish anglers were averaging about 5-6 boat days to catch one sailfish, 10-20 boat days to catch a white marlin, and 10-30 boat days to catch a blue marlin (Rockefeller 1989; SAFMC 1988). The pinnacle of angling success is catching a "thousander" (a thousand-pound or larger marlin) or achieving a "grand slam" (three billfish species in one day) or "super grand slam" (four billfish species in one day). Catching any sort of billfish is a notable achievement, however, and considerable glamour is associated with the vessels and gear, skills, risk, language, and specialized clothing of the billfishing subculture (Maiolo 1990).

## SOUTH CAROLINA BILLFISHING

South Carolina's offshore waters have large amounts of prime billfish habitat (Hammond [n.d.]). In 1991, a record year, a total of 311 billfish were taken by at least 157 different boats operating off the South Carolina coast (SCWMRD 1992a). Billfish are not as abundant off South Carolina as they are off Florida or at world class billfishing meccas like Costa Rica's west coast, Hawaii's Kona Coast, or Australia's Great Barrier Reef. It is not unusual for a South Carolina billfishing boat to go scoreless for a season or two despite considerable effort and expense.

### Onset and Growth of South Carolina Billfishing

Billfishing did not arrive on the South Carolina saltwater scene until the late 1960s. The key reason is that boats operating off South Carolina normally must travel 50 or 60 miles out to sea to catch billfish. Prior to the late 1960s, few recreational boats could safely venture out more than 20 miles or so, and few anglers knew that excellent billfish habitat lay beyond reach of their boats. By the late 1960s and early 1970s, however, offshore fishing began to boom and billfishing became a routine sporting activity. Several important developments had occurred by that time.

Japanese commercial fisherman began longlining for yellowfin tuna in the Atlantic in 1956. By the mid-1960s, foreign longliners, mostly from Japan, Korea, Taiwan, and Cuba, were setting almost 100 million hooks annually for yellowfin tuna and albacore throughout the Atlantic (Beardsley 1989). When foreign longliners made significant by catches of marlin off South Carolina, they provided indisputable proof that billfish were present in substantial numbers. By then, advances in boating technology had made it possible for South Carolina fishermen to take advantage of this exciting information. Seaworthy boats under 25 feet were being marketed, and companies like Hatteras and Bertram were producing 40- to 60-foot billfishing boats with deep-vee hulls, powerful turbocharged diesel engines, outriggers, fishing decks, flying bridges, and other specialized features that made them fast, fuel efficient, stable, and comfortable. Improvements in marine electronics had also made it possible for recreational boats to operate safely and navigate with precision far offshore. A routine complement of electronics includes ship to shore radio, radar, fathometer, fishfinder, graphic plotter, and combinations of Loran-C and GPS navigation equipment capable of establishing position and repeating it within meters--anywhere, and in any weather. Today, billfishing boats in the 17- to 25-foot range are comparatively inexpensive, billfishing is no longer a "rich man's sport," and the popularity of billfishing is growing rapidly.

## The Billfishing Infrastructure

An elaborate billfishing infrastructure has evolved in South Carolina over the past two decades. The billfishing fleet, including commercial boats available for charter, now includes several hundred vessels operating out of about 46 marinas in more than a dozen different ports (SCDPRT [n.d.]). Most billfishing boats are based in wet slip marinas offering full services, but some are based in smaller marinas. Boat yards and related facilities offer a full range of repairs, maintenance, and various ancillary services.

Billfishing is an expensive sport, which helps to explain why the typical billfish angler is an affluent, white, middle-aged male (Maiolo 1990). Boats of modest size cost more than half a million dollars, and routine maintenance and repairs cost thousands of dollars per year. Wet slip rentals run about $250 per month for a 42-footer, not including electricity, and the fuel, ice, bait, and incidentals for a single day's outing can cost several hundred dollars. Even charter excursions cost in the neighborhood of $500 to $600 per day for a party of four or five.

## The Billfish Catch

The primary resource stocks for South Carolina's recreational billfishery are sailfish and marlin. The sailfish is the most abundant and commonly caught billfish species in the Atlantic, and this is also true of South Carolina's offshore waters. At least 155 were caught in 1991. Most were small, weighing only about 30 to 40 pounds. The NMFS considers sailfish to be only "moderately" exploited, whereas both species of marlins are fully exploited and swordfish are overexploited (SFI 1992a).

The blue marlin is the most prized fish in the Atlantic, and probably the most prestigious in the world. Mature ones commonly weigh 250 pounds or more, and the state record fish is a 752-pounder (The [Columbia, SC] State "Catch Shatters Marlin Record" July 7, 1993, 3C). Regardless of size, blue marlin are esteemed for their beauty and grace, sheer power, and awe-inspiring aerial displays. In 1991 at least 118 blue marlin were caught-and-released or tag-and-released by anglers operating out of South Carolina marinas.

Typically smaller than blue marlin, white marlin average about 50 to 60 pounds at maturity. They are landed in smaller numbers, primarily because their migration route keeps most of them beyond the reach of South Carolina boats. Only 38 were caught in 1991.

Swordfish and spearfish are rarely caught by sportfishermen off South Carolina. Swordfish seldom take trolled baits, and come to the surface only at night. Spearfish are so scarce that none was taken by rod and reel off South Carolina until 1986. No sport-caught landings of swordfish or spearfish were reported in South Carolina during 1991.

## Billfish Habitat

Prime billfish habitat abounds in the 10,000 square miles of continental shelf lying off the South Carolina coast. Blue marlins are solitary predators that live, hunt, and migrate on the shelf far out in the open Atlantic. In the spring they are most often found 50 to 70 miles offshore in the upwelling waters above rugged bottom terrain near the 100-fathom curve and at the western edge of the Gulf Stream (Hammond [n.d.]). Sailfish, which are more abundant and gregarious, are usually found closer to shore. By late summer they may be caught in only 15-30 fathoms.

### Season and Methods

The billfishes migrate up and down the Atlantic coast, and are normally present in South Carolina's offshore waters only from early spring to mid fall. The marlin season can get underway as early as March, but usually begins in mid-April. About half of all blue marlin are taken in May. That is the peak of the spring migration, the time when most tournaments are scheduled, and the period of greatest fishing effort. About one-quarter of the fish are taken in June, and the remaining one-quarter after July 1. The season varies from year to year, but it is normally over in October.

Billfishing tactics reflect the habitat needs and migratory patterns of the fish. Natural baits or artificial lures are trolled in areas where upwellings, current boundaries, thermal fronts, steep dropoffs, submarine canyons, and shoals may concentrate billfish and other pelagic game fish. Since billfish are scarce and spend most of their time 40 to 100 feet below the surface, an average of two or three 8-hour days of fishing may be required for each hookup. When a billfish is hooked, an angler fights the fish, the captain positions the boat, a third person pulls the wire leader to the boat, and the remaining team member tags it for release or gaffs it for landing. Only about half of the billfish hookups result in a fish being released or landed. The weight of the line used, which varies among individuals and tournaments, is one of several variables that can influence the CPUE (catch-per-unit-effort) (Browder and Prince 1990).

## OTHER PELAGIC GAME FISH

Since few billfish are caught, more common pelagic game fish provide an important source of lively action, good food, and tournament prizes. Billfishing boats commonly make incidental catches of dolphin (dorado), yellowfin tuna, wahoo, and barracuda. For every billfish that tournament fisherman caught in 1991 they landed about 16 of these incidental fish, mostly dolphin and tuna (SCWMRD 1992b).

## THE OVERFISHING PROBLEM

Atlantic billfish stocks have been subjected to substantial overfishing (SAFMC 1988). By the late 1970s, marlin and swordfish were exhibiting the classic characteristics of overexploited populations--i.e., steeply declining numbers subjected to increasing fishing intensity. This was mostly attributable to the tuna longliner by-kill, since these incidental catches account for about 90 percent of all billfish taken (Prince and others 1990). In a single set, a longlining vessel reels out and later hauls back 20 to 60 miles of horizontally strung cable from which baited hook rigs (vertical dropper lines) are suspended at intervals of about 200 feet. The standard depth for yellowfin tuna and albacore sets is about 170 meters, and the "deep longlining" sets for bigeye tuna, which are now preferred over yellowfin tuna and albacore, are at about 300 meters depth (Conser 1989). Since the baited hooks function indiscriminately, longlines set for tuna and swordfish incidentally catch thousands of marlin and sailfish. By the early 1970s, U.S. fishery managers realized that strict regulations would be needed to rescue the Atlantic billfishes (SAFMC 1988).

## CONSERVATION MEASURES

Estimates of billfish population sizes and trends are very crude. Efforts to assess the status of the billfishes have been are hampered by the poor quality of the fisheries data base and our inadequate scientific knowledge of billfish biology (Browder and Prince 1990; Conser 1989). Nevertheless, it is very clear that only responsible stewardship can preserve high-quality recreational billfishing off South Carolina and elsewhere in the North Atlantic. Fortunately, some billfish conservation measures are already in place, and more are in the offing. Of the existing measures, the most important are those that reserve billfish for recreational use, reduce the longliner by-kill, and encourage the catch-and-release approach to recreational billfishing.

## ICCAT

Since 1969, the international organization responsible for managing the Atlantic billfishes has been the International Commission for the Conservation of Atlantic Tunas (ICCAT), a 22 member-nation body dominated by commercial fishing interests. Since ICCAT manages fish species primarily on the basis of maximum sustained yield (MSY) for food (Shima 1989), and is prone to allow harvesting at levels exceeding replenishment (as with the rapidly disappearing bluefin tuna), its policies are widely criticized by sportfishermen.

ICCAT, which manages billfish because they are considered "tuna-like" and highly migratory, did not formally recognize the need for billfish conservation until 1992. In that year the ICCAT Enhanced Billfish Research Program, funded primarily by the Billfish Foundation, was established to conduct billfish research and monitor the billfish catch. ICCAT may eventually establish a commercial quota for Atlantic-caught billfish. Even if this should happen, however, it is still illegal to import Atlantic billfish into the U.S. for sale.

Since the longliner bycatch is regarded as the major threat to billfish stocks, some have called for an ICCAT regulation requiring longliners operating on the high seas to release the live billfish they catch. If such a regulation were enacted, it might cut Atlantic billfish mortality substantially.

## The Magnuson Act

Given ICCAT's belated consideration of billfish problems and its slow progress toward scientific management of the remaining billfish stocks, the passage of the Magnuson Fishery Conservation and Management Act of 1976 was an especially important milestone in the management of billfish off the U.S. coast. The Magnuson Act established the Exclusive Economic Zone (EEZ), a 200-mile buffer around the U.S. coastline. Eight regional fishery management councils were empowered to regulate and conserve marine fisheries, including the billfishes fishery, within the EEZ. The Magnuson Act substantially reduced total fishing effort for billfish by restricting longlining within the U.S. 200-mile zone. There were no conservation regulations specifically pertaining to billfish, however, until the federal government approved the Billfish Management Plan in 1988.

## The Billfish Management Plan

The federal government's 1988 Billfish Management Plan (Billfish Plan) reserves billfish for recreational use. The Billfish Plan forbids the sale of Atlantic billfish taken in U.S. waters (the Puerto Rican artisanal handliner bycatch excepted), and requires commercial fishermen operating within the 200-mile zone to release all billfish, dead or alive, without removing them from the water (Laurie 1989; Orbach 1990; SAFMC 1988).

The Billfish Plan acknowledges that salt water sportfishing is a pleasurable activity that is also the basis for a large and expanding industry of material importance to the U.S. economy (Meyer 1989; Prosser 1985). For example, a 1977 study revealed an average angler expenditure of $1,300 per billfish landed (Rockefeller 1989).

One goal of the Billfish Management Plan is to reduce the recreational kill of marlin and sailfish by 50 percent and 30 percent, respectively. Minimum size and no-sale restrictions for Atlantic recreational billfishing have been in place since 1989. Legal minimum sizes are 86 inches for blue marlin (equivalent to 200 pounds), 62 inches for white marlin, 57 inches for sailfish, and 31 inches for swordfish.

## Catch-and-Release

The growing popularity of catch-and-release billfishing is another conspicuous trend. True sportsmen have always known that stacking dead fish on the dock is not what billfishing is really about. Now it is no longer necessary to kill billfish to gain recognition or win tournament prizes. In fact, by the late 1970s about 70 percent of the billfish

caught by U.S. anglers were released (Rockefeller 1989). In the course of general fishing today, most anglers release billfish and many incidentally caught fish unless they are unusually large or wanted for the table. Billfishing tournament sponsors on the Atlantic Coast, in the Caribbean, and elsewhere are moving away from the catch-and-kill, aggregate-weight scoring approach and now usually award bonus points for tagging and releasing fish (Saltwater Conversation 1986a).

The catch-and-release ethic is now well established in South Carolina. Whereas South Carolina anglers released less than 7 percent of the billfish they caught during the late 1970s and early 1980s, the release rate had risen to 77 percent by 1991 when only 74 sport-caught billfish were killed (SCWMRD 1992a).

## Tagging Programs

Tagging various species of fish for research purposes has been an important objective in South Carolina since 1974. Kits supplied by the Marine Resources Division's Public Game Fish Tagging Program were used to tag 7,000 saltwater fish in 1991, and about 600 recaptures were reported (Laurie 1992). Supporting the tagging program and facilitating angler surveys were among the major reasons for South Carolina's 1991 Fisheries Conservation and Management Act. This law required saltwater fishermen and shellfisherman to purchase a marine recreational fisheries stamp beginning in 1992.

Of the 237 billfish that South Carolina anglers released in 1991, 172 were tagged for life history studies and related scientific research (SCWMRD 1992a). These efforts provide vital information to the NMFS Cooperative Game Fish Tagging Program and the Billfish Foundation [TBF]. NMFS tags were attached to nearly 7,000 billfish in 1990 throughout the Atlantic Ocean, Gulf of Mexico, and Caribbean (Scott and others 1991). Many fish are double-tagged, with one NMFS tag and one TBF tag.

Anglers who lodge dorsal tags in marlin or sailfish (using stainless steel and medical-grade nylon anchors) feel that they have subdued them. If they want wall mounts they can buy lifelike fiberglass replicas. Tagged marlin are exhausted by their struggles, but they normally make a speedy recovery (Scott and others 1991; SFI 1992b). A hook left imbedded in a fish's mouth tends to fall out or corrode away harmlessly unless it is plated with nickel or cadmium, which has a potentially deadly toxic effect (Waldner 1993).

Although some anglers strongly object to the practice, scientists are asking fisherman to kill tag-recaptured billfish of legal size and turn them in for scientific study. In addition to evaluating the effectiveness of various tag anchoring methods, scientists can determine a billfish's sex, measure its size and weight, and examine earbone, dorsal spine, and other structures to derive precise information about its age, growth rate, and related characteristics (Scott and others 1991). The number of fish killed for this purpose is too small to have a detrimental effect on the population. In 1990 only eight tag-recaptured blue marlin were reported to the NMFS Cooperative Game Fish Tagging Program (Scott and others 1991).

## The Governor's Cup Billfishing Series

Tournament organizers deserve much of the credit for the transition to catch-and-release billfishing (Saltwater Conversation 1986b; SCWMRD 1992b). Billfishing tournaments have been part of the saltwater fishing scene for many decades, and by the late 1980s at least 800 billfishing tournaments were being held each year in the U.S. and nearby waters (Maiolo 1990). South Carolina's oldest one, the Annual Georgetown Blue Marlin Tournament, dates to 1968. Billfishermen tend to be very competitive, and the tournament milieu is a magnet for them because it offers exciting competition for trophies, recognition, and cash prizes. The cash prizes and related wagering at some tournaments are at the level of hundreds of thousands of dollars, and a win in one of the categories can pay all expenses for several seasons (Maiolo 1990).

Media attention and the prestige of the competitors insures that tournament fishing will have a substantial impact on nontournament fishing practices. Fortunately, tournament billfishing has played a very positive role in South Carolina, and its catch-and-release format has even served as the model for North Carolina's recently inaugurated tournament series (SCWMRD 1992b).

The South Carolina Governor's Cup Billfishing Series was inaugurated in 1989 to stimulate coastal tourism and promote marine fisheries conservation (Graefe and Falk 1985; Laurie 1990; Potts 1984; Timmerman 1989). During the 1991 season (May-June) the Series featured six tournaments; a seventh, at Beaufort, was cancelled due to inclement weather. Tournament entries averaged 33 boats and involved at least 116 different vessels, counting multiple tournament entries (SCWMRD 1992b). Competitors caught 68 billfish, including 40 blue marlin and 14 each white marlin and sailfish. More importantly, two-thirds of the billfish caught during the 1991 Tournament Series were returned to the water alive, and at least 28 different boats tagged billfish before releasing them. This is attributable to Series rules that downplay aggregate-weight scoring (one point per pound) and award bonus points for tagging and releasing fish (200 points per tagged fish, regardless of size) (SCWMRD 1992c). In 1991 less than one-quarter of the points earned by Series fishermen were acquired by bringing dead billfish to the dock. Marine resource managers are pleased that sportfishermen have not only accepted catch-and-release during competitions, but have also carried this practice over into their nontournament fishing (where the release rate is even higher). Some fishermen now openly criticize fellow anglers who needlessly kill billfish.

## THE BILLFISH CATCH RATE

The 1991 rates for billfish hookups and marlin catches in South Carolina were the highest since 1983, blue marlin were more abundant and larger, and the catch rate for sailfish was at the second highest level in 15 years. Though this may seem promising, it not statistically valid evidence that conservation measures are beneficially affecting billfish populations. Billfish angling success in a particular locale varies from season to season, reflecting local levels of abundance and other variables. Local catch rates such as those in South Carolina provide no reliable basis for inferring the status of the billfish populations at large, and the weight of the evidence still points to a broad decline in Atlantic billfish populations.

## CONCLUSIONS

In the broadest context, the travails of the billfishery reflect the broader causes and consequences of human mismanagement of renewable resources like trees and fertile soil. First there is overexploitation resulting from the frontier mentality and its accompanying robber baron ethic. Then there is the growing awareness of critically depleted stocks, time running out, and dismal long-term prospects. Finally, there is the retreat from profits-oriented maximum sustained yield management and a transition to scientific, optimum sustained yield management that takes into account a variety of social benefits and resource conservation needs.

If sport billfishing is to survive, conservation efforts must be intensified. It is highly significant that ICCAT has begun to take billfish conservation seriously, and that the United States has opted to manage the billfishes for recreational use on a primarily catch-and-release basis. However, these decisions represent only the initial phase of a long and difficult process. Existing laws and regulations designed to protect billfish must be improved and stringently enforced, additional protective measures must be adopted to address lingering problems, and the remaining counterproductive attitudes, beliefs, and behavioral dispositions of fishermen, managers, and the general public must be modified. Measures that help point the way out of the mess created by neglect and mismanagement in the past include further curbs on the longliners, catch-and-release fishing, no-sale provisions, saltwater license requirements, intensified research efforts, better funded fisheries management, angler education initiatives, and perhaps even billfish sanctuaries and hatcheries.

Further reduction of the longliner by-kill is a high priority requirement. The conservation measures practiced by recreational anglers such as those in South Carolina cannot work in the long run if commercial fisherman continue

to destroy the breeding stock. It would help a great deal if ICCAT would take action to protect billfish in international waters, since the bycatch there still kills many thousands of billfish each year.

The Billfish Plan should also be upgraded to include more stringent conservation measures within the 200-mile EEZ. For example, inadequate knowledge of blue marlin biology has led to federal minimum size rules that actually encourage the selective killing of prime breeding stock. The only blue marlin that may be legally killed are those at least 86 inches in length (i.e., 200 pounds and up). However, studies of marlin otoliths (small calcified stones in the fish's heads) have revealed that nearly all the fish this size are females. It is certainly not sound management policy to kill only females and let males go. Some feel that the sport of billfishing will not be fully mature until the catch-and-release ethic is universally accepted and killing is restricted to tag-recaptured fish and others needed for scientific study.

Since billfish are highly migratory, conservation measures must be promoted on a widespread basis. It is gratifying to see that billfish tournaments in many parts of the world are now promoting catch-and-release and more countries are adopting bag limits (like Mexico's one-fish limit) or no-sale regulations for billfish.

Educating the American public about the billfish problem is another part of the managerial equation. Although the billfishes have been marketed to the American public as gourmet-quality table fare, fewer people would eat swordfish and other billfish, and more would support conservation efforts, if everyone knew that the stocks of these fish are in rapid decline. The Billfish Foundation and its supporters have been campaigning to remove Pacific marlin and sailfish from the American restaurant menus (SFI 1992c).

It may be worthwhile to establish billfish sanctuaries in some areas as a means of alleviating fishing pressure. The South Atlantic Fishery Management Council has forwarded the idea of "marine fishery reserves" that might encompass about one-fifth of the ocean waters off the southeastern coast. So far this has been discussed only in the context of replenishing reef fish stocks, and it is not clear whether sanctuaries might benefit billfish or other migratory species.

Regardless of actions on the conservation front, the billfishes off the state's coast are likely to be subjected to even greater angling pressure (Laurie 1988; Prosser 1985). Experts have projected a 4 to 10 percent annual growth rate for South Carolina salt water angling. This growth will be constrained to some degree, however, by variables related to the billfishing infrastructure. Marinas and multiple private dock developments have potentially severe environmental impacts, and the rigor of the permitting process foredooms most proposals for new construction or major expansion that would accommodate substantially more billfishing boats (Wendt 1990). It is also significant that the boats are expensive and consume vast amounts of fuel. Economic recessions, inflation, luxury taxes, changes in business deduction allowances, charter fee escalation, technological breakthroughs in boat and motor design, possible fuel rationing emergencies, and related developments can redefine the affordability or feasibility of the sport. Billfish anglers are difficult to deter, since they tend to be affluent, enthusiastic, and persistent even in the face of low catch rates (Maiolo 1990). Nevertheless, like everyone else, they live in a world of finite limits.

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# Management Conditions and Indicators of Importance in Wilderness Recreation Experiences

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Abstract.—Wilderness management plans often lack specific objectives for identifying and monitoring resource/use conditions of concern to recreationists. The Wilderness Act of 1964 was used as a conceptual guide for formulating indicator items to measure conditions of concern to recreational users of wilderness. Visitors to the Cohutta Wilderness felt that items relating to litter and damaged vegetation were of highest concern while ranger contact was of low concern. Responses to indicator items were factor analyzed to determine if groups of indicators existed for a type of condition (domain). Such condition domains can provide flexibility in selecting indicators based on user perceptions for the measurement and monitoring of conditions embodied in the Wilderness Act.

## INTRODUCTION

Few wilderness management plans include specific objectives which are directed toward monitoring resource/use conditions (Cole 1990). Conditions of concern to recreational users of wilderness are among those which need to be better understood as managers work to achieve an environment which meets policy demands of the Wilderness Act. The Wilderness Act of 1964 states that natural forces should be at work, that the imprint of humans be substantially unnoticeable and that outstanding opportunities for solitude or a primitive and unconfined type of recreation exist in wilderness areas. Wilderness managers and the research community have called for the development of indicators which reflect the conditions for which wilderness is to be managed (Martin 1990; Merigliano 1990; Reed and others 1990; Watson 1990). Conditions of concern to recreational users have been identified in recent studies (Roggenbuck and others 1993; Watson and Cole 1993). Researchers and managers need to work toward identifying conditions which are of concern to users and which may be indicators of conditions which can be monitored. The Wilderness Act provides a basis for determining what conditions provide an appropriate wilderness character. Measuring wilderness user's perceptions of conditions embodied in the Act (e.g. naturalness, unconfinement) can help determine the role that such resource/use conditions play in wilderness recreation.

With the advent of wilderness planning and monitoring systems, such as the Forest Service's Limits of Acceptable Change (LAC) (Stankey and others 1985), came the need for the development and interpretation of condition descriptors which may influence visitor experiences. The LAC system includes steps which require the identification of conditions of concern in wilderness, selecting indicators for those conditions and developing standards which can be used to monitor the conditions. LAC calls for the use of broad categories of concern or "factors" to guide the selection of indicators. Factors are used in LAC to serve as significant conditions for which measurable indicators can be chosen.

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## The Multidimensional Wilderness Experience

Complicating the question of identifying sensitive resource/use conditions and indicators of change are the many dimensions which appear to exist in wilderness recreation experiences. A number of researchers have looked at the multidimensional nature of wilderness recreation ( Brown and Haas 1980; Hendee and others 1968; Rossman and Ulehla 1977; Schreyer and Roggenbuck 1978). Findings in such research have shown repeatedly that there are a number of dimensions to the recreational experience in wilderness. Dimensions such as the experience of nature, escape from society, adventure, and education have all been associated with wilderness recreation. Research has been helpful in describing the recreational experience in multi-dimensional terms but has provided little guidance in how to tie such dimensions to specific conditions in wilderness.

## Wilderness Descriptors

The Wilderness Act provides broad descriptors which can be conceptualized as experience dimensions and used to guide the identification of conditions and thus indicators of wilderness quality. The descriptors of "naturalness" and "solitude," for example, are used in the Act and relate attributes which set wilderness apart from other outdoor places (Hendee and others 1990). Other descriptors used in the Act relate components of a recreational experience (dimensions) which may be influenced by specific attributes. Descriptors such as "primitive" and "unconfined," as well as "natural" and "solitude," can help guide the selection of conditions of concern and their related indicators. Descriptors of this type are conceptual and often difficult to measure with a single response to a single situation. Solitude, for example, is often thought of in terms of encounters with others in the wilderness. Work by Stankey (1973) revealed that different types of encounters, according to where and who was encountered, had different impacts on the wilderness recreational experience. In more recent research, Roggenbuck and others (1993) report empirically developed groups of encounter indicators. As with Stankey's work, location of encounters was shown to be of concern. Individual indicators such as people seen in camp were shown to be significantly more influential to the recreational experience than people seen along the trail. Hammitt (1982) and Hammitt and Madden (1989) have indicated that solitude may be more appropriately viewed as a component of wilderness privacy; privacy being a concept which allows for a more broad interpretation of solitude as it applies to wilderness settings. A descriptor such as "solitude" then represents a complex condition in the wilderness environment. It is a condition which has a number of indicators or attributes differentially affecting individual experiences.

The purpose of this paper is to use the descriptors of "natural," "solitude," "primitive," and "unconfined" as guides to developing measurable indicators of the wilderness recreation experience. These four descriptors are considered a priori conditions to manage for as outlined in the Wilderness Act of 1964. It is hoped that the use of these descriptors as conceptual guides will add to current thinking on the methods used in the selection of indicators by incorporating a link to the basic definition of wilderness. It is postulated here that wilderness condition domains exist which may influence certain dimensions of a wilderness recreation experience. If condition domains related to descriptors exist, then it may be possible to better understand what meaning recreationists attach to the descriptors and select indicators for monitoring which are significant to the experience.

# METHODS

## Approach

First, items were developed to measure specific conditions believed to represent dimensions of naturalness, solitude, primitiveness and unconfinement. The level of concern that recreational users held for 35 items developed to represent conditions was measured by asking respondents to mark a seven point Likert type scale from "not at all concerned" (1) to "extremely concerned" (7). This approach provided measures of concern users held for specific conditions, such as "number of directional signs placed in the wilderness by managers," an item designed to measure concern for primitive conditions in wilderness.

contact in the wilderness. Other items ranking low in level of concern related to distances one might travel from main roads to trailheads and distances from trailheads to campsites.

Table 1—Level of concern Cohutta Wilderness recreationists hold for wilderness conditions[1]

| Condition item | Mean level of concern | Standard deviation |
|---|---|---|
| The amount of litter found in campsites | 6.64 | 0.84 |
| The amount of litter seen along the trail | 6.58 | 0.88 |
| The number of trees or other vegetation damaged by previous users | 6.41 | 0.98 |
| The amount of noise heard in the area which comes from outside the wilderness | 5.83 | 1.31 |
| The amount of fully mature forest in the wilderness area | 5.66 | 1.41 |
| Observing a natural ecosystem at work | 5.62 | 1.41 |
| The amount of solitude your group experiences | 5.54 | 1.24 |
| The amount of noise heard in the area which comes from other wilderness visitors | 5.52 | 1.43 |
| The number of different species of wildlife you see | 5.33 | 1.38 |
| The number of areas in the wilderness that are very remote | 5.24 | 1.58 |
| The distance between your campsite and the campsite of others | 5.21 | 1.44 |
| Seeing specific types of wildlife | 5.07 | 1.48 |
| The amount of light visible at night which comes from outside the wilderness | 4.98 | 1.76 |
| The level of trail maintenance | 4.94 | 1.56 |
| The number of groups that pass within sight of your camp | 4.89 | 1.53 |
| An area in the wilderness which is left completely primitive (no trails, bridges) | 4.88 | 1.79 |
| Having a portion of the wilderness where camping location is unconfined | 4.78 | 1.57 |
| Having trail markers placed by management (blazes, cairns, posts) | 4.77 | 1.84 |

The 35 items measured were initially formulated based on written documentation found in hearings which lead to the passage of the Wilderness Act of 1964. Documentation was reviewed for content which related to the four descriptors in question. Colleagues were also consulted regarding the intended meanings of these descriptors. Items were then written according to interpretations of background documentation and direct input from many who are knowledgeable of wilderness and its recreational opportunities. A pilot study was conducted, using the resulting items, with students in resource management classes at four universities. Results of this pilot study allowed for refinement of scale content.

### Sample

The summer use season of June through early September 1992 was used to sample recreational users of the Cohutta Wilderness. The Cohutta Wilderness is located in northern Georgia, approximately a two hour drive north of greater Atlanta, and a one hour drive southeast of Chattanooga, Tennessee. The Cohutta Wilderness is the largest Forest Service wilderness area in the southeastern part of the United States, at approximately 37,000 acres. On-site contacts were made with recreational users at two trailheads. Although the Cohutta Wilderness has eleven trailheads, the majority receive light to moderate use. In order to make the best use of personnel, sampling for this study was restricted to one heavily used trail and one moderate to light use trail. This was done in order to contact a broad range of user types who may also hold a broad range of concerns for the condition resource/use items being measured (Lucas and others 1971).

Clusters of four days (Thursday through Sunday) and five days (Saturday through Wednesday) were randomly assigned across the June through September use season as potential sampling blocks. Ten of these blocks were randomly selected yielding 45 sampling days. Two of three possible four hour daily time blocks, between 8 a.m. and 8 p.m., were randomly assigned within each block of days and to each trailhead to establish actual places and times for visitor contact. All recreational users entering or leaving the wilderness at the prescribed trail and time were contacted and asked to participate in a mail back survey on wilderness attitudes. The survey included wilderness use variables, and 35 condition indicator items for which respondents were asked to indicate a level of concern. There was a 99 percent on-site agreement to participate in the mail survey and a response rate of 65 percent for those to whom surveys were sent yielding 361 useable responses. Three mailings were used in a modified Dillman (1978) approach. The first mailing included a survey, the second a reminder, and the third, if required, a second survey. These mailings were spaced at 10-14 days in each case. Postage paid, self-addressed return envelopes were provided with each of the survey mailings.

## RESULTS

Descriptive results of the level of concern recreationists held for the 35 wilderness condition items are provided in Table 1. As with previous research conducted in the Cohutta Wilderness (Roggenbuck and others 1993; Watson and others 1992; Young 1990), results indicate that items regarding visitor impacts such as litter, damaged vegetation and noise were those of greatest concern to recreationists. The Beech Bottom Trail and Jacks River Falls area, visited by many respondents, receive relatively heavy use by day and overnight recreationists. The Jacks River Falls area is a popular gathering spot for swimming, sun bathing, and camping. This high level of use and mix of user types likely contributes to the high level of concern for human impacts to the physical environment. Other findings are similar to those reported by Roggenbuck and others (1993); for example, items related to encounters in camp and on the trail were scored in much the same way. The level of influence on the quality of the experience in the Roggenbuck study and level of concern reported here for seeing others pass by one's camp was higher than that for seeing others along the trail. Findings support past research indicating that among different types of encounters, those that occur at the campsite are of most concern to recreationists (e.g. Stankey 1973).

Condition items regarding naturalness in the wilderness environment were also of high concern to respondents. Items referring to the type and amount of wildlife seen and the amount of mature forest present in an area had relatively high concern levels. Of least concern to Cohutta recreationists were two items related to ranger

Table 1—Level of concern Cohutta Wilderness recreationists hold for wilderness conditions[1]—Continued

| Condition item | Mean level of concern | Standard deviation |
|---|---|---|
| The total amount of time that your party has in an area without seeing or hearing anyone else | 4.71 | 1.67 |
| The amount of restriction management places on where you may travel in the area | 4.67 | 1.78 |
| The number of permanent structures placed by management in the wilderness | 4.65 | 1.57 |
| Seeing an unusual type of plant | 4.57 | 1.78 |
| The amount of restriction management places on where you may camp in the area | 4.57 | 1.78 |
| The level of difficulty required to obtain an overnight permit | 4.52 | 1.91 |
| The number of vehicles you see at the trailhead | 4.48 | 1.69 |
| The number of fire rings found in a campsite | 4.47 | 1.75 |
| The number of days in a row you are able to stay in the wilderness on a given trip | 4.41 | 1.75 |
| The number of signs designating locations in the wilderness | 4.39 | 1.69 |
| The number of groups you pass during the day while traveling | 4.27 | 1.65 |
| Having signs placed by wilderness managers which state regulations about wilderness | 4.13 | 1.85 |
| The amount of wilderness which does not have trails in it | 4.04 | 1.85 |
| The distance of campsites from trailheads | 3.94 | 1.73 |
| The number of rangers you see in the area | 3.70 | 1.85 |
| The amount of ranger contact in the back country to check your permit and/or explain regulations about use | 3.65 | 1.90 |

[1] Mean values based on the response format: 1 = not at all to 7 = extremely concerned.

## Determining Conditions Dimensions

Selecting condition indicators of significance to wilderness recreationists, as proposed by the LAC planning system discussed above, involves an understanding of conditions which reflect the multidimensional experience of wilderness recreation. Managers could use results such as those included in Table 1 to select a group of recreational indicators, for which standards might be developed and monitoring implemented, based solely on highest levels of concern. This method however, may encourage the selection of indicators and related standards which consider only part of the overall recreation experience (Roggenbuck and others 1993). Such an approach also fails to take into account the different orientations of recreationists toward the ideal of wilderness as defined by law and how different conditions influence recreational experiences.

Data analysis was conducted to determine if broad condition domains existed which may be related to dimensional aspects of the experience. Factor analysis was conducted on the 35 condition items. Factor analysis allows underlying processes to be interpreted from a large group of variables. This serves to simplify the data by reducing 30 or 40 variables to 5 or 10 factors. The resulting factors, in this case, were considered broad condition domains containing specific indicators (individual items).

The factor analysis was conducted using principle components extraction with orthogonal varimax rotation (Norusis 1988). Selecting an appropriate number of factors for interpretation was aided by reviewing percent of variance explained by each factor (minimum 5 percent) and eigenvalue screen plots. A minimum factor loading of 0.40 was used to include an item in a factor. Table 2 contains the six factors or condition domains interpreted based on respondents' level of concern for condition indicator in wilderness. Cronbach's alpha was 0.91 for the 35 item scale indicating a reliable measure. Alpha values for the individual factors ranged between 0.70 and 0.85 indicating relatively strong reliability for each of the six condition domains as well.

The six condition domains relate to concepts embodied in the Wilderness Act. Items of the first domain, that with which respondents were most concerned, were interpreted as representing a "human impacts" condition. Items related to litter and visitor damaged vegetation defined this domain. As discussed above, these impacts are prominent in certain high use areas of the Cohutta Wilderness. Second in level of concern (between "concerned" and "very concerned") was a group of five items related to a "natural features and processes" condition in wilderness. This domain was defined by items relating to wildlife seen, the presence of mature forests and other specific plant life. Third was a domain defined by seven items related to the wilderness condition commonly described as "solitude." Items which questioned concern for noise made by other visitors, distances between occupied campsites, number of groups encountered at campsites and on the trail, number of vehicles at the trailhead, and time without seeing or hearing others defined the solitude domain. Respondents level of concern was given a mean value of 4.96, or "concerned," for the condition of solitude. The fourth condition domain was represented by four items relating to "management confinement" or restrictions that managers might place on the recreational experience. Items questioned concern levels for management restricting camping location, travel routes, and requiring permits. While respondents were less concerned with the confinement condition than that of solitude, the mean value indicated they were "concerned." Finally, the fifth and sixth domains were represented by items dealing with conditions related to travel in wilderness. The fifth condition domain was interpreted as "primitive travel," being defined by two items that dealt with having areas with no trails and no bridges in wilderness. This domain seems to measure a level of concern for places in the wilderness where even the most traditional travel feature, trails, are not present. The sixth condition domain was interpreted as one of "management aided travel," and was defined by items related to the presence of trail markers and signage conveying locations and regulations. These last two conditional domains have significantly different levels of concern from the other four domains but do not differ from each other. Cohutta recreationists as a whole appeared to be "somewhat concerned" with these travel related conditions.

## DISCUSSION

Results of this study indicate that Cohutta Wilderness recreationists perceive conditions to exist in a format which reflects descriptors embodied in the Wilderness Act. The "human impacts" domain can be interpreted as relating to concepts in the definition of wilderness which refers to the desirability of a primitive, natural environment with "the imprint of man's work substantially unnoticeable." The "natural features and processes" domain has long been used in describing wilderness and is defined here by items which represent indicators of the flora and fauna present in the wilderness. The presence of native wildlife in wilderness is perceived as a good indicator of wilderness health (Hendee and others 1990). Fully mature forests represent nature free of human intervention. Solitude, too, has been seen as one of the key attributes of wilderness. The "solitude" domain developed here is represented by encounter levels, distances between parties and noise levels all of which measure concern for the presence of others. Conditions of naturalness and solitude are mentioned specifically in the legal definition of wilderness and have long been seen as important management goals.

Table 2—Wilderness condition for Cohutta Wilderness recreationists

| Domain name<br>Items | Item loading | Mean concern for item | Mean concern for factor [1] |
|---|---|---|---|
| Human impact: | | | |
| The amount of litter found in campsites | 0.76 | 6.64 | |
| The amount of litter seen along the trail | .83 | 6.58 | |
| | | | 6.56[a] |
| The number of trees or other vegetation damaged by previous users | .63 | 6.41 | |
| Natural features and processes: | | | |
| The amount of fully mature forest in the wilderness area | .58 | 5.66 | |
| Observing a natural ecosystem at work | .60 | 5.62 | |
| | | | 5.26[b] |
| The number of different species of wildlife you see | .78 | 5.07 | |
| Seeing specific types of wildlife | .75 | 5.07 | |
| Seeing an unusual type of plant | .66 | 4.57 | |
| Solitude: | | | |
| The amount of solitude your group experiences | .70 | 5.54 | |
| The amount of noise heard in the area which comes from other wilderness visitors | .65 | 5.52 | |
| The distance between your campsite and the campsites of others in the area | .77 | 5.21 | |
| The number of groups that pass within sight of your camp | .82 | 4.89 | |
| | | | 4.96[c] |
| The total amount of time your party has in the area without seeing or hearing anyone else | .72 | 4.71 | |
| The number of vehicles you see at a trailhead | .61 | 4.48 | |
| The number of groups you pass during the day while traveling | .67 | 4.27 | |

Table 2—Wilderness condition for Cohutta Wilderness recreationists—Continued

| Domain name and Items | Item loading | Mean concern for item | Mean concern for factor[1] |
|---|---|---|---|
| Management confinement: | | | |
| Having a portion of the wilderness where camping location is unconfined | 0.63 | 4.78 | |
| The amount of restriction management places on where you may travel in the area | .59 | 4.67 | |
| | | | 4.65[d] |
| The amount of restriction management places on where you may camp in the area | .82 | 4.57 | |
| The level of difficulty required to obtain an overnight permit | .52 | 4.52 | |
| Primitive travel: | | | |
| An area in the wilderness which is left completely primitive (no trails, bridges) | .55 | 4.88 | |
| | | | 4.47[e] |
| The amount of the wilderness which does not have trails in it | .73 | 4.04 | |
| Management aided travel: | | | |
| Having trail markers placed by management (blazes, cairns, posts) | .74 | 4.77 | |
| The number of signs designating locations in wilderness | .75 | 4.39 | |
| | | | 4.45 |
| Having signs placed by managers which state regulations about wilderness | .68 | 4.13 | |

[1] Different superscripts indicate significantly different means at the 0.05 level using paired t-Tests.

The last three condition domains which appear in this study are interpreted as relating to a "primitive and unconfined type of recreation." Responses indicated that different meanings existed for condition domains which contained items intended to measure unconfinement and primitiveness. Responses to specific items such as "the amount of restriction management places on where you may travel," in the management confinement domain, help to better define the "unconfined" concept. Responses to items on number of signs or trail markers and the presence of trails and bridges define condition domains which may be measuring aspects of primitive recreation. For example, primitive recreation is often thought of as the use of skill to travel and way find in wilderness. Management's placement of signs or even trail markers may influence the level of primitiveness in the experience for some users.

Roggenbuck and others (1993) note that it is important for managers of wilderness to monitor a variety of conditions given that different types of conditions are likely to influence different dimensions of a wilderness experience. The purpose here has been to determine if conditions exist which not only represent dimensions of the experience but which also reflect the broad policy directives of the Wilderness Act. Condition domains of "human

impact," "natural features and processes," "solitude," " management confinement," "primitive travel," and "management aided travel" are all of concern to recreationists using the Cohutta Wilderness. Although some appear to be of more concern than others, it is likely that each influences the experience. It is also likely that condition domains are perceived differently by different types of wilderness recreationists. For example, overnight users are likely to have different perceptions than day users regarding campsite conditions.

Past research on the experiences of users in wilderness has focused on carrying capacity and more specifically on the number of users in an area (Stankey and McCool 1989). The emphasis on numbers of users as an indicator of quality in the environment, and of user experiences, has been ineffective in explaining experience quality (Graefe and others 1984). As Roggenbuck and others (1993) point out, there are many potential indicators of wilderness quality that have less to do with use, (i.e. litter, vegetation damage) and more to do with the behavior of those using an area. As with the Roggenbuck and others study (1993), many of these same behavior related impacts were of greatest concern to the Cohutta recreationists reported on here.

Beyond numbers of users and their behavior, there are other conditions which may influence the perceived quality of the environment and thus of the wilderness experience. Managers and their behavior may also be impacting the environment and experiences in the process. As indicated by the condition domains of management confinement, primitive travel and management aided travel, there is a concern among Cohutta recreationists for conditions which are even further removed from use levels than behavior. Understanding condition domains relating to management's influence on difficulty of travel and the amount of restriction placed on travel and camping may be important to developing objectives toward managing for a dimensional visitor experience.

Other implications of the condition domains which resulted here involved policy based decisions. Higgins (1992) and Mitchell (1992) debate the merits of a national versus local or regional policy for identifying conditions of concern in wilderness and the standards needed to monitor them. While this is a complicated issue, managers and the wilderness system could benefit from a uniform set of condition domains, operative at the national level, to help guide the selection of indicators. The specific indicators by which the spectrum of conditions are monitored may be more appropriately dictated by local or regional concerns. Such a process would provide a link to system wide policy while allowing flexibility in managing "on the ground." This study suggests that the use of condition domains which contain indicator items based on wilderness descriptors may help to address both the multidimensional nature of the wilderness experience and to meet policy based objectives of wilderness managers.

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# Adirondack Park Residents' Perceptions of Development and the Forest Products Industry in the Adirondack Park[1]

Robert B. Buerger and Thomas E. Pasquarello

Abstract.—During the summer of 1989, 330 Adirondack park residents responded to a mail questionnaire regarding their perceptions of the effects of recreation development and the forest products industry on the Adirondack Park. The results indicate that park residents perceive negative environmental effects occurring from growing recreation development while viewing the forest products industry as important in protecting the character of the park.

## INTRODUCTION

The Adirondack Park, located in northern New York, combines private (60 percent) and public (40 percent) lands in a unique six million acre preserve that is approximately the size of the state of Vermont or Massachusetts--an area which is one million acres larger than Yellowstone, Yosemite, Grand Canyon, and Everglades National Parks combined.

Within the Park's boundaries are 2,300 lakes and ponds, 1,200 miles of river, 30,000 miles of brooks and streams, 43 state camp grounds, 2,000 miles of hiking trails, 42 peaks over 4,000 feet in elevation, numerous theme parks, "upscale" shopping districts and other tourist attractions, and, often overlooked amidst this physical inventory, nearly a quarter of a million permanent and seasonal residents. Several million visitors each year make the park one of the premier recreation areas in the nation (Liroff and Davis 1981).

The nearly 2.5 million acres of Forest Preserve (public) lands are protected by one of the strongest pieces of wilderness legislation ever passed (1894) in the United States, and lie side by side with the approximately 1.1 million acres privately owned by the forest products industry[2] (Smith 1990). In recent years, industrial timberland holdings in the Adirondacks have been the target of corporate speculators; the full value of such land has not been reflected in the price of the company's stock. Thus, a buyer with little interest in forest products can purchase a company for the price of the company's stock, break it into its various components, such as processing plants and timberlands, and sell them separately for short-term gain. Under these circumstances, industrial forest lands in the Adirondacks could be for sale with increasing frequency in the near future (Empire State Forest Products Association 1990). "The financial pressures on timberland-owning firms force them to view their forest lands as "profit centers." They must

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[2] "The lands of the state, now owned or hereafter acquired, constituting the forest preserve as now fixed by law, shall forever be kept as wild forest lands. They shall not be leased, sold or exchanged, or taken by any corporation, public or private, nor shall the timber thereon be sold, removed, or destroyed."—Article XIV of the New York State Constitution.

reap maximum value from their lands or become targets for hostile takeovers by raiders who will. But fragmentation of the forests and the forest industry would alter permanently the landscape, the delicate park environment, and the lifestyle of the park's residents and their communities. It is a fate that must be prevented" (Commission on the Adirondacks in the Twenty-First Century 1990).

Much of the forest products land recently sold has been targeted for new second homes and tourism and commercial recreation development. New York State Governor Mario Cuomo has stated: "Recent developments suggest that we may be entering a new period in the history of the Adirondacks, an era of unbridled land speculation and unwarranted development that may threaten the unique open space and wilderness character of the region" (Commission on the Adirondacks in the Twenty-First Century 1990).

The continued development of the park's private forests may result in a permanent alteration of the Park's natural resources, residents' lifestyles and traditional recreation use (Governor's Task Force on Northern Forest Lands 1990). Understanding the park's nearly quarter million permanent and seasonal residents' perceptions of the changing forest products industry may well provide critical information needed by resource managers planning for the future of the Adirondack Park.

The recently released Report of the Governor's Task Force on the Forest Product's Industry in New York State (1989) concluded that: "Many publics have an unfavorable perception of forestry and forest industry. Increased public support is essential to the continued existence of forest industry in New York and its successful expansion and further development." In an era when foresters and environmentalists are increasingly at odds with each other in many parts of the country, the fate of the forest products industry in the Adirondacks may serve as a "bellwether" for the industry in the 21st century.

## RESEARCH QUESTIONS

To better understand how park residents perceive the forest products industry and the impact of changing land use on the Adirondack Park the following research questions were developed.

1. What are the perceptions of Adirondack Park residents toward the impact from commercial recreation and tourism development on environmental quality and lifestyle within the Adirondack Park?

2. What are the perceptions of Adirondack Park residents towards the forest products industry located within the Adirondack park?

## METHODS

With the help of the Adirondack Park Agency, the New York State Department of Environmental Conservation, the Northeast Forest Lands Study, and Cornell University's School of Rural Sociology (Geisler and others 1985), a survey instrument was designed to measure the behaviors, beliefs, and characteristics of park residents in five general dimensions: demographics, recreation, development and the environment, park management, and the forest products industry. A probability sample of households residing within park boundaries was drawn by Survey Sample Inc. of Norwalk, Connecticut from its comprehensive data base of 78 million homes and addresses comprising an estimated 88 percent of all U.S. households. After two mailings, 330 households had responded to the questionnaire, for a response rate of 40 percent. To control for non-response bias, a follow-up phone survey of 100 non-respondents was conducted during the summer of 1990, of which 79 agreed to answer the survey questions.

## RESULTS

Respondents averaged 55 years of age, 14.2 years of schooling, and 10 months of residence in the park each year. The median household income was $30,000. Most of the respondents were male and most had lived in the park for all or most of their adult life. Only 8 percent of the respondents rented their home, and 33 percent were retired or semi-retired. The demographic results from the non-response telephone survey were not markedly different from the original survey.

The results from the Adirondack Park questionnaire present an interesting insight into residents' perceptions of the forest products industry as it relates to changing land use within the Adirondack Park. In reviewing the results, residents' responses can be discussed from two perspectives: (1) residents' perceptions of the environmental quality of park natural resources and (2) residents' perceptions of the forest products industry within the Adirondack Park.

## ENVIRONMENTAL QUALITY

Based on both the New York State Governor's Office (Commission on the Adirondacks in the Twenty-First Century 1989) and the media's (Barth 1988, 1989; Bauer 1988; Gallagher 1987; Kuntsler 1989) portrayal of the rapid development, especially tourism and commercial recreation development, park residents were questioned about the rate of development and associated impacts of such development. From the data collected, park residents can be characterized as perceiving development within the Adirondack park occurring too fast, having a negative impact on the park, and that people who live outside the park are largely responsible for changes resulting from development. The data presented in table 1 shows that by a wide margin, respondents felt the rate of development within the park was too fast (58.6 percent reported it is occurring too quickly). In comparison, only 7.8 percent of subjects felt that development was occurring too slowly. As a result of the increased rate of development, an overwhelming majority (72.7 percent) of those who responded perceived the "character" of the Adirondack Park is changing, table 2. Table 3 reports the effect Adirondack Park residents believe the change in "character" is having on the park. As can be seen, 63.9 percent of the respondents perceive environmental conditions within the Adirondack Park as declining. In comparison, 6.7 percent of subjects see environmental conditions improving. Interestingly, a similar percentage (7.8 percent) of respondents also thought the rate of development was too slow, table 1.

Table 1—Adirondack Park residents' perceptions of the rate of development within the Adirondack Park (n = 324)

| Perception of development | Frequency | Percent |
|---|---|---|
| Too fast | 190 | 58.6 |
| About right | 86 | 26.5 |
| Too slow | 25 | 7.8 |
| Don't know | 23 | 7.1 |
| Total | 324 | 100.0 |

Table 2—Adirondack Park residents' perception toward whether increased development is changing the character of the Adirondack Park (n = 330)

| Development is changing the character | Frequency | Percent |
|---|---|---|
| Agree | 240 | 72.7 |
| Neutral | 35 | 10.6 |
| Disagree | 43 | 13.1 |
| Don't know | 12 | 3.6 |
| Total | 330 | 100.0 |

Table 3—Adirondack Park residents' perception of environmental conditions within the Adirondack Park (n = 327)

| Perception of condition | Frequency | Percent |
|---|---|---|
| Improving | 22 | 6.7 |
| About same | 96 | 29.4 |
| Declining | 209 | 63.9 |
| Total | 327 | 100.0 |

When asked who is responsible for increased development within the park, 56.2 percent of the subjects believe people who live outside the park boundaries are responsible, while 43.8 percent of those responding felt development responsibility falls either on people who live in the park or equally on people who live inside and people who live outside the park boundaries. However, the majority (64.9 percent) of residents sampled believe that New Yorkers who live outside the Adirondack Park have too much control over what happens in the park, tables 4 and 5.

Table 4—Adirondack Park residents' perception of who is responsible for new development within the Adirondack Park (n = 324)

| Perception of responsibility | Frequency | Percent |
|---|---|---|
| People outside park | 182 | 56.2 |
| People inside park | 36 | 11.1 |
| Inside/outside equally | 106 | 32.7 |
| Total | 324 | 100.0 |

Table 5—Adirondack Park residents' perception of the amount of control New Yorkers who live outside the Adirondack Park have over what happens in the park (n = 328)

| Perception of control | Frequency | Percent |
|---|---|---|
| Too little | 20 | 6.1 |
| Too much | 213 | 64.9 |
| Enough | 62 | 18.9 |
| No opinion | 33 | 10.1 |
| Total | 328 | 100.0 |

One argument often used to offset concern over environmental and quality of life changes due to increased development is the economic benefit that will be gained by local residents primarily due to the creation of new jobs. When residents sampled were asked whether jobs created by development are worth the changes they cause in the Adirondack park, almost three to one (64.9 percent to 26.4 percent) responded that they felt jobs were not worth the associated changes, table 6.

Table 6—Adirondack Park residents' perception of whether jobs created by development are worth the changes they cause to the Adirondack Park (n = 322)

| Perception towards jobs | Frequency | Percent |
|---|---|---|
| Jobs worth changes | 85 | 26.4 |
| Jobs not worth changes | 209 | 64.9 |
| Don't know | 28 | 8.7 |
| Total | 322 | 100.0 |

Forest Products Industry

The forest products industry historically has been a major component of the Adirondack regional economy. The question of perceived importance of such an industry in a period of economic growth from the tourism and commercial recreation sector would seem important in understanding changing land use within the Adirondack Park. Residents questioned about the forest products industry located within the park responded positively concerning both the impact of the industry and its level of activity within the park. When asked about the effect the forest products industry has on the Adirondack Park, 42.2 percent of those sampled believe the forest products industry has a positive effect on the park. In comparison, only 28.9 percent of respondents viewed the effect to be negative, table 7. Similarly, residents felt the forest products industry should "keep production levels the same" (55.2 percent) or "increase production levels" (15.5 percent). Only 23.6 percent of those who responded believe the production level should be decreased, table 8. Park resident respondents felt so strongly about the valuable role that the forest products industry plays in the Adirondack Park that 73.6 percent believe New York State should provide the forest products industry with incentives (tax incentives, technical assistance, subsidies, etc.) to keep their land in production. Only 11.8 percent of the sample disagreed with the idea of incentives, table 9.

Table 7—Adirondack Park residents' perception of the effect of the forest products industry on the Adirondack Park (n = 325)

| Resident's perceptions | Frequency | Percent |
|---|---|---|
| Negative effect | 94 | 28.9 |
| Positive effect | 137 | 42.2 |
| No effect | 36 | 11.1 |
| No opinion | 58 | 17.8 |
| Total | 325 | 100.0 |

Table 8—Adirondack Park residents' perception of the forest products industry production level in the Adirondack Park (n = 330)

| Resident's perceptions | Frequency | Percent |
|---|---|---|
| Increase production | 51 | 15.5 |
| Decrease production | 78 | 23.6 |
| Keep production same | 182 | 55.2 |
| No opinion | 19 | 5.7 |
| Total | 330 | 100.0 |

Table 9—Adirondack Park residents' perceptions towards whether New York State should provide the forest products industry with incentives to keep their land in production (n = 330)

| Should provide incentives | Frequency | Percent |
|---|---|---|
| Agree | 243 | 73.6 |
| Neutral | 35 | 10.6 |
| Disagree | 39 | 11.8 |
| Don't know | 13 | 4.0 |
| Total | 330 | 100.0 |

## DISCUSSION

As a result of the questions asked of Adirondack residents regarding development (mainly from commercial recreation and tourism), it seems apparent that those sampled perceive development as having a negative impact on the park. Conversely, the forest products industry is viewed as important to the protection of both the quality of life and environmental quality of the park. Of those responding, only 5.5 percent have jobs in the forest products industry while 12.8 percent have jobs in the recreation/tourism industry during some part of the year. Consequently, employment bias would not seem to be a factor in subject responses. A closer look at the results suggest some further insight into Adirondack Park residents' perceptions. Residents' responses indicate they do not have control

over what is happening in the park from a developmental perspective and that potential economic gains associated with development do not appear to overcome residents' desire to protect the environmental quality in the park and their associated present quality of life. These findings are seemingly contrary to popular belief about Adirondack Park residents. Recent media articles (Barth, 1989; Bauer, 1988; Gallagher, 1987; Kuntsler 1989) and the results of a public hearing in October, 1989, for park residents concerning future development would suggest those living within park boundaries place a higher priority on personal economic gains than on protection of environmental quality. This idea, in light of the fact that park residents per capita income in 1985 was only 72 percent of the state average (Dunne 1990) makes sense. However, the results of this study indicate that there is at least a large subgroup of Adirondack residents who believe protection of the park's environmental quality is more important than economic gains at the expense of the natural resources of the park.

Since most of the new development within the park is tourism and commercial recreation related, it can be speculated that much of residents' concern over development is related to changes in the visual and social environment as opposed to actual degradation of the physical environment (air pollution, water contamination, etc.). Much of the change in character of the park as viewed by residents may be associated with increased crowding, changing landscapes (from natural scenery to vacation homes, tourism supported businesses, etc.), and changing community composition (rural/traditional to seasonal/recreational). Associated economic growth (i.e., jobs) does not appear to offset residents' negative view of increased development.

The forest products industry controls over one million acres, nearly a third of all private lands within the Adirondack Park. From the data collected, it seems that park residents view the forest products industry as important in protecting the character of the park. Residents may believe that if forest products industry lands go out of production, these lands would then be sold for commercial development. As previous results have shown, residents believe increased development is changing the character of the Adirondack Park, Table 2. Consequently, park residents may equate the protection of the forest products industry through state incentives as a way of protecting the Adirondack Park by reducing the opportunity for new development. Logically, park residents believe (62.2 percent) that if forest product lands are going out of production, the State of New York should buy them so these lands could be added to the Forest Preserve, thus protecting them from development.

## CONCLUSIONS

The present societal concern for environmental protection has led to a simplistic view by the public regarding management of natural resources. That view assumes industries that are consumptive in nature with regard to the use of natural resources degrade the environment and need to be curtailed. On the other hand, industries that focus on non-consumptive enjoyment of natural resource are positive and the associated growth of such industries should be promoted. The results of this study of changing land use in the Adirondack park would indicate that the reverse would be true. Specifically, that the forest products industry is viewed positively by residents even though in the short-term it is consumptive in nature. Conversely, the public perceives the growth of the commercial recreation and tourism industry as having major negative impacts on both quality of life and the park's natural environment. The historical familiarity with the impact of the forest products industry would seem much more acceptable to park residents than the uncertainty and type change associated with tourism and commercial recreation development. This is remarkable considering the creation of the Adirondack Park was a direct result of the "rape and run" forest harvest practices of the mid to late 1800's. Today's view by park residents of the important role the forest products industry plays in maintaining the environmental and social quality of the region is indicative of the responsible management practiced by the industry in the Adirondack Park. This public perception is illustrated in the strong support for maintaining the forest products industry even when it would require public expenditures to continue present levels of activity.

As this study suggests, those charged with management of forest resources both in the public and private sectors need to be aware of public sentiment regarding their management policies. Lack of understanding of public perception may well result in misdirected educational efforts, public confusion, and at the extreme, conflict between resource managers and the public. Perhaps the worst mistake from a management perspective with regard to working

with the public is to accept the notion that public response to management action is uniform and predictable. In the case of the Adirondack Park, understanding park residents' perceptions concerning changing land use is an important step in the process of planning and managing for the Adirondack Park of the future.

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# Public Parks, Recreation, and Museums' Role in the International Tourism Economy: Florida as a Case Study

Neha Shah, Cecilia Keller, and John C. Crotts

## INTERNATIONAL TOURISM AND THE U.S. ECONOMY

Deficit, long a big word in discussions of U.S. tourism and the balance of trade, has disappeared from the industry vocabulary. For the third straight year, the U.S. earned more from international visitors than U.S. travelers spent abroad, table 1. In 1991, approximately 16.1 million overseas visitors came to the U.S. and spent $64.4 billion and created a tourism surplus of $16.8 billion. In 1991, international receipts put tourism ahead of agricultural goods ($40.1 billion) and chemicals ($36 billion) as an export generator.

Tourism is Florida's number one industry generating $28 billion in revenue. In 1991, Florida received 41 million visitors which included 5.9 million visitors from overseas markets. This number of overseas arrivals represent an increase of 13 percent over 1990. Canada was the largest source of international visitors to Florida with 2,349,500 visitors in 1991, followed by residents of the United Kingdom with 879,175 visits, and Germany with 383,628 visitors.

Table 1—Balance of payment in the tourism sector 1984-91 (in $ billions)

| Year | Foreign visitor receipts | Expenditures overseas | Balance |
|---|---|---|---|
| 1984 | 21.4 | 28.6 | -7.2 |
| 1985 | 22.3 | 31.0 | -8.7 |
| 1986 | 26.1 | 32.5 | -6.4 |
| 1987 | 30.7 | 36.6 | -5.9 |
| 1988 | 38.6 | 39.9 | -1.3 |
| 1989 | 47.1 | 41.7 | 5.4 |
| 1990 | 58.6 | 48.0 | 10.6 |
| 1991 | 64.4 | 47.6 | 16.8 |

Source: United States Travel and Tourism Association, 1992.

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The purpose of this paper is to describe Florida as a tourism destination and the role of public parks and museums in the Florida and U.S. tourism economies. More specifically, it conceptualizes the partnership between public recreation agencies and a state's tourism marketing organizations.

Evidence used to underscore the importance of public recreation agencies in Florida's and the U.S. economy is drawn from two international data sets. The first is from the United States Travel and Tourism Administration's survey called the "The Survey of International Air Travelers." The survey has been conducted continuously each month at randomly selected airports and randomly selected scheduled flights to international visitors prior to leaving the country. The University of Florida analyzed the USTTA's survey responses of 7,008 respondents whose visits to the U.S. included a stay in Florida. Canadians are excluded in the USTTA survey. Canadian travel to Florida is estimated through Statistics Canada's "International Travel Survey." The survey is administered by telephone to randomly selected households in Canada. Respondents are asked to describe their international trips within the previous 2 month periods. Analyzed are the responses of 6,444 subjects who reported visits to Florida in 1991.

## WHY IS FLORIDA'S INTERNATIONAL TOURISM ECONOMY SO STRONG?

There are three factors that drive the international tourism market to Florida. First, the U.S. dollar for the last several years has been relatively weak against the foreign currencies of Europe and Asia's supplier nations. This situation makes Florida and the rest of the country a bargain as compared to other international destinations. Payment of $150-$250 per night is not unusual for a modest room in Italy, France, or Germany. Hotel and motel rooms in Orlando averaged $67.26 a night in 1991 (Florida Department of Commerce 1992). Many Europeans find that it is actually cheaper to vacation in Florida than in the Mediterranean.

Second, Florida's year-round warm weather plays a significant role in why foreigners choose Florida. Picture the foggy, dreary days of London weather or the Arctic chill of Canada juxtaposed against a 75 degree Fahrenheit (23 C°) winter day in Florida.

Finally, international tourists prefer destinations that have a wide range of places to see and things to do. In addition to visiting major theme parks such as Walt Disney World, Sea World, etc., international visitors can be found in such diverse locations as the Florida Everglades, state parks, and wildlife preserves. According to the Florida Division of Tourism (1992), European holiday visitors are becoming more adventuresome in their choice of Florida destinations, often heading off to more remote resorts and attractions across the state. Many are looking for new and different experiences since they are typically high repeat visitors to the state and U.S. (mean of 4.6 visits to the U.S. in the past 5 years).

## THE SELLING OF INTERNATIONAL TRAVEL TO FLORIDA

One would be naive to think of Florida as a single travel entity composed of Orlando theme parks and nearby beaches. Rather, Florida is a multitude of destinations ranging from the underwater parks and wildlife preserves in the south to the fresh water springs in the north. Though an impressive 21.4 percent of all international visitors to Florida visited an amusement park (12.7 percent visited Walt Disney World) in 1991, 9.1 percent visited a national or state park in Florida, 8.9 percent visited a historical site, and 5.5 percent visited a museum or art gallery. Florida's national, state, and local parks are increasingly being recognized as an important component of the state's economic development strategies emphasizing tourism.

The selling of international travel to Florida is a multifaceted activity. Often it involves the cooperative effort between commercial and government bodies. Public beaches, parks, museums, and a variety of other cultural opportunities compose the primary attraction base for many destination areas. Once the decision to visit the area has been made, restaurants, lodging establishments, and other private businesses benefit from the

visitation. Unfortunately, park managers are ill-equipped and ill-at-ease to be associated with tourism businesses because their traditional focus has been protection rather than promotion. Nevertheless, many park managers have carefully managed and promoted tourism in such a way that the creation of parks is seen as a means of economic development.

## ENHANCING PUBLIC PARKS, RECREATION, AND MUSEUMS' ROLE IN TOURISM DEVELOPMENT

The task of defining and analyzing markets underlies most, if not all, of the strategic decisions tourism marketing organizations must make in order to compete effectively in the international tourism arena. In the Florida experience, the following statistics provide base-line direction for understanding international demand for public parks and cultural opportunities in the state (table 2). In 1991, international demand for Florida's historic places, parks, museums and art galleries came primarily from English speaking countries. Nearly all were on vacations, spent more than a week on their U.S. trip and contributed much to Florida's and the U.S. economy. Within a tourism marketing context, protecting and enhancing the product is a means of ensuring future success in a tourism development strategy.

## STRENGTHENING THE PARTNERSHIP BETWEEN PUBLIC RECREATION AND TOURISM MARKETING ORGANIZATIONS

Creating a partnership among public park managers and business persons is needed to ensure that strategies are defined to guide tourism development in an appropriate and sustainable manner. The effort goes beyond simply being a form of good public relations. Instead, input from parks and natural resource managers can provide "a balance to the short term objectives of the business sector, and possibly encourage greater variation and local flavor in future projects" (Murphy 1985). Some business leaders may understand this approach as putting the "resource first, tourists second." However, research suggests that the desired experiences of visitors are to interact with pristine natural and cultural resources (Jenkins 1988). Therefore, such a mechanism may be a case of "resource first, tourist first."

Strategies for tourism development espoused by such partnerships in Florida attempt to draw upon the unique character of the host community. These strategies bring the type of economic development that provides recreation and conservation benefits rather than imposing an extra burden on residents; furthermore, they enhance social and environmental landscape.

Positive elements of a tourism development strategy cited in the literature include (Cox 1985; Pigram 1992):

+ development of the community's sense of place, reflected in architectural style and sensitivity to the unique heritage and environment;
+ preservation, protection, and enhancement of the quality of the natural and cultural resources which are the basis of the community's tourism appeal;
+ fostering development of additional visitor attractions with roots in the community which compliment the local attributes;
+ development of visitor services that enhance the local heritage and quality of life; and
+ endorsement of growth where and when it improves things, rather than where it is destructive or exceeds the carrying capacity of the natural environment nor the limits of the social environment, beyond which the quality of community life is adversely affected.

All these elements of a sustainable tourism development plan must not be considered a barrier to economic development but a resource and opportunity. Similar elements have been echoed in tourism development strategies in Australia, Canada and New Zealand. The new era of environmental concern in the U.S.

and abroad suggests that communities which successfully manage their unique social and environmental resources may prosper through tourism. It is ironic that the very consequences of the lack of development in certain areas, the unspoiled character of the landscape and the distinctive local culture, become positive resources where tourism is concerned (Pearce 1989).

Table 2—Summary statistics for international visitors to Florida

| Selected variables | Units | Visit historic places | State/federal park visitors | Museum/art gallery visitors |
|---|---|---|---|---|
| Number of respondents* | | | | |
| Overseas visitors | num. | 624 | 634 | 386 |
| Canadian visitors | num. | 671 | 1,125 | 1,462 |
| Weighted totals | | | | |
| Overseas visitors | num. | 322,068 | 325,687 | 199,031 |
| Canadian visitors | num. | 256,500 | 432,500 | 605,200 |
| Total estimated visitors | num. | 578,568 | 758,187 | 804,231 |
| Residence of visitor | | | | |
| Canada | pct. | 44.3 | 57.0 | 75.2 |
| Ontario | pct. | (61) | (59) | (55) |
| Quebec | pct. | (26) | (24) | (29) |
| United Kingdom | pct. | 21.4 | 17.9 | 6.1 |
| Germany | pct. | 9.8 | 9.9 | 5.2 |
| Brazil | pct. | 4.5 | 2.7 | 1.9 |
| Percent on vacation | | | | |
| Overseas visitors | pct. | 87.9 | 90.7 | 79.8 |
| Canadian visitors | pct. | 75.2 | 79.8 | 84.6 |
| Median nights in U.S. | | | | |
| Overseas visitors | num. | 8 | 8 | 11 |
| Canadian visitors | num. | 14-16 | 10-13 | 10-13 |
| Mean expenditures for overseas visitors per travel party/trip | dol. | 1,693 | 1,511 | 2,018 |
| Median expenditures for Canadian visitors per travel party/trip | dol. | 1,630-2,400 | 1,630-2,400 | 810-1,600 |

* Canadian estimates are separated from overseas visitor estimates due to different methodologies and different framing of the response categories.

By defining and analyzing Florida's international markets down to these specific activity segments, Florida in general and the tourism economy in particular will be able to compete effectively in the international tourism arena. It is hoped that public parks in partnership with tourism marketing organizations will use this information to strengthen their focus on markets they currently influence as well as begin asking why they have only a limited share of other important markets. If Florida's tourism economy prospers in a setting where public parks, recreation, and museums serve as a primary attraction base, the support for these recreation organizations among economic development agencies is further enhanced.

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