Journal of Leisure Research
1998, Vol. 30, No. 1, pp. 64-78

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National Recreation and Park Association

Accounting for Ethnicity in Recreation Demand: A Flexible Count Data Approach

J. M. Bowker and V. R. Leeworthy

We examine ethnicity and individual trip taking behavior associated with natural resource based recreation in the Florida Keys. We estimate trip demand using the travel cost method. We then extend this model with a varying parameter adaptation to test the congruency of demand and economic value across white and Hispanic user subgroups. Our findings indicate significant differences in price response leading to divergent per-trip consumer surplus and price elasticity between these two groups. These differences raise important distribution and equity concerns with respect to the possible future use of pricing policies like user fees.

KEYWORDS: *Ethnicity, travel cost, price response, consumer surplus, count-data, equity, user fees*

Introduction

Studies focusing on minority preferences and behavior have been an important component of recreation research since the 1960's. Social scientists have examined and developed a number of theories attempting to explain observed differences in recreation behavior, especially for outdoor activities, among various ethnic or racial subgroups in the US population.

Ethnicity and marginality have emerged as the two major competing theories (Washburne, 1978). Ethnicity theory maintains that lower levels of participation in outdoor recreation by minorities are primarily explained by distinct subcultural values about leisure. The marginality perspective attributes minority differences in recreation behavior to social structural barriers such as lack of discretionary funds, lack of transportation, and inadequate information about facilities. These two predominant theories have given rise to a number of offshoots such as opportunity theory, compensation theory, and class polarization (Floyd, Shinew, McGuire, & Noe, 1995). The preponderance of work has focused on identifying and testing for differences in black and white recreation preferences and participation although some studies have included or focused on Hispanics (Carr & Williams, 1993; Floyd and Gramann, 1993). A current review of the theoretical and empirical ad-

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vances in this body of literature can be found in Johnson, Bowker, English, and Worthen (1997).

To date, recreation and natural resource economists have done relatively little to explore and assimilate proven class and cultural differences into demand models explaining trip-taking behavior. This would appear to be a potentially important omission when one considers that these demand models are generally accepted for estimating nonmarket use value and price response in water resources and forest recreation related studies (US Water Resources Council, 1983; Bergstrom & Cordell, 1991). Moreover, important economic policy measures such as consumer's surplus (used in benefit-cost and damage assessment) and price elasticity (used to examine user fees), derived from these demand models, are fundamental inputs for both public and private land management planning decisions.

Hof and Kaiser (1983) allowed for race in their study of long-term national outdoor recreation participation in thirteen popular activities. Race was found to be a significant factor in ten of the activities. In these activities whites were found more likely to participate than nonwhites. Bowker, English, and Cordell (1997) obtained similar results for both participation and consumption (primary purpose trips and activity days) across twenty-two activities modeled in each of four major regions of the continental U.S. However, neither of these studies included price in their empirical specifications. Therefore, information about economic value and price responsiveness based on race or ethnicity cannot be recovered.

Peterson and Arnold (1987) assessed the economic benefits of mountain running at Pike's Peak using a travel cost demand model. In their aggregate model, based on demographics for participants' counties of origin, they found that percent Hispanic had a negative and statistically significant effect on travel demand. However, their model included the percent Hispanic variable as a demand shifter and thus price response differences between whites and Hispanics were not assessed.

In a study examining the net economic value of twelve types of outdoor recreation activities across nine Forest Service regions, McCollum, Peterson, Arnold, Markstrom, and Hellerstein (1990) found that race was a significant explanatory factor in over one-third of their regional aggregate travel cost models. Using counties as the unit of observation, they found that where statistically significant, the percentage of whites in the county usually led to increased demand for the recreation activity. However, they did find that the percentage of whites had a negative effect on demand for big game hunting in the Northwest and for general recreation in the Northeast.

Bayless, Bergstrom, Messonier, and Cordell (1994) included race in their demand analysis of designated wildlife viewing sites. However, the race variable in their model was insignificant. Unlike the studies by McCollum et al. (1990) and Peterson and Arnold (1987), the model was based on individual observations rather than county aggregates. However, like McCollum et al. (1990) and Peterson and Arnold (1987), the variable accounting for race was included as a demand shifter so that potential differences in price re-

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sponse (demand curve slope) between whites and nonwhites were not examined.

Assuming demand differences based on race potentially exist based on the findings of the sociological and economics studies above, identifying these differences in recreation demand models could provide useful economic information for public policy in at least two ways. First, by accounting for omitted ethnicity variables, specification bias in empirical models could be avoided and the quality of estimated demand parameters and derivations thereof such as elasticities and surpluses would be improved. Second, and perhaps more importantly, a quantitative account of differences in demand, based on ethnicity, allows for a richer distributional assessment of resource and recreation policies. For example, implementation of user fees at a site could result in a disproportionate decrease in participation for one ethnic group over another if the groups respond differently to price. The issues of equity and distribution of benefits associated with pricing policy have previously been raised regarding local and nonlocal use of recreation sites (Walsh, Peterson, & McKean, 1990). However, no studies of which we are aware, have focused explicitly on ethnicity-based differences in recreation demand and the potential consequences.

In this paper, we use data from a recent survey of recreation visitors to the Florida Keys to explore some of the above issues. First, we use a currently popular regression model based on discrete counts of trips to estimate a travel cost demand model for visitors partaking in natural resource based recreation. We employ a variation of this model that allows us to statistically test whether reported ethnicity affects price response and valuation for Hispanic and white ethnic subgroups.[1] Given that our findings reject the hypothesis of homogeneous demand across these two groups, we explore the magnitude of the differences in consumer's surplus and price elasticity and discuss some of the implications of this disparity for public policy decisions.

Methods

The travel cost method (TCM) is one of the most popular means of nonmarket valuation used over the past 30 years. The theoretical basis for TCM derives from the basic economic notion of utility maximization subject to budget and time constraints. The method is predicated on a number of assumptions, foremost of which is that individuals perceive and respond to changes in the travel-related component of the cost of a visit to a recreation site in the same way as they would respond to a change in admission price (Freeman, 1993). In its various forms (see Fletcher, Adamowicz, & Graham-Tomasi, 1990; Smith, 1989; or Ward & Loomis, 1986) TCM has generally been preferred to estimate economic values derived from site use over other nonmarket methods because of its behavioral base.

[1]Blacks were insufficiently represented in the sample (<2%) to test for differences from Hispanics and whites.

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However, TCM is not without limitations. The most obvious of which is its limitation to use value. Moreover, as Randall (1994) points out, it is still an indirect or inferential means for quantifying values. As such, in spite of its direct link to actual behavior, some "art" as well as a number of assumptions and researcher judgements are required to get from reported trips to relevant policy measures like price elasticity of demand and consumer surplus. Also, from an *ex ante* policy analysis perspective, TCM is somewhat limited in its capacity to provide information on multiple management alternatives, particularly for proposed changes. This limitation arises because sampling is generally necessary under each alternative. To mitigate this limitation, the hedonic travel cost method was developed (Brown & Mendelsohn, 1984). More recently, hybrid forms of TCM based on travel costs and intended behavior or attitudinal response to changes in costs or site characteristics, have been employed (see Ribaudo & Epp, 1984; Teasley, Bergstrom, & Cordell, 1994; Layman, Boyce, & Criddle, 1996). Due to their hypothetical nature however, these hybrids suffer from many of the same criticisms as contingent valuation.

The most frequently used TCM empirical approaches are the zonal approach and the individual approach. The zonal model (ZTCM) was the first to be developed and is still widely used (English & Bowker, 1996; Hellerstein, 1991; Richards, King, & Brown, 1990; Walsh et al. 1990; Peterson & Arnold, 1987). It is based on establishing a relationship between per capita participation rates at a site from various geographic origin zones and the costs incurred in travel from the origin zone to the given site. The individual travel cost model (ITCM) is conceptually similar to the zonal model, however, the travel cost/trip relationship is based solely on individual observations. Examples of ITCM applications in recreation include Adamowicz, Fletcher, and Graham-Tomasi (1989); Creel and Loomis, (1990); Englin and Shonkwiler (1995); and Bowker, English, and Donovan (1996).

Currently, ITCM seems preferred over ZTCM for reasons such as: (a) statistical efficiency, (b) theoretical consistency in modeling individual behavior, (c)avoiding arbitrary zone definitions, and (d) increasing heterogeneity among populations within zones. In addition, statistical methods are now available for better dealing with the integer nature of individual trip demand and and the lack of observations reporting zero trips which is an artifact of on-site sampling (Creel & Loomis, 1990; Yen & Adamowicz, 1993).

Data and Empirical Methods

Data for this study were obtained as part of a larger project designed to determine the economic impacts and values of natural resource based tourism in the Florida Keys. Two separate sample designs were used. One was a stratified random sample based on mode of access (auto, air, cruise ship) through the use of exit interviews. This sample was also stratified, within mode of access, across different days of the week and times of the day for the auto and air modes. Cruise ships were on fixed schedules and an attempt

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was made to obtain a representative sample of the three size classes of ships visiting Key West. This on-site sample, with a response rate of 85 percent, was used for estimating the number of person-trips and person-days for the entire visitor population by region and season (June-November 1995 and December-May 1996). Activity participation was estimated for 68 activities. Mail-back follow-ups obtained information on trip spending and importance satisfaction ratings for 25 natural resource attributes, facilities, and services. Response rate for the mailback was 38 percent. This sample also provided information to derive estimated per mile travel expenses.

The second sample design called "CUSTOMER," was implemented on-site using face-to-face survey procedures at over 200 sites throughout the Keys. Sites included hotels, campgrounds, marinas, boat ramps, beaches, parks, museums, historic sites, boat rental operations, concessions, and dive shops. A delphi approach using local community experts was used in choosing sites across the four regions of the Keys which would yield a representative sample. Individuals 16 and older were randomly selected for exit interviews. For recreation groups, only one person was selected based on the "birthday rule" by which the person in the group having the most recent birthday was interviewed. Response rate for this on-site sample was 98 percent.

Information gathered from CUSTOMER included information on participation in 68 activities as well as intensity of use (days and hours) over 39 of these activities. Additionally, demographic information was obtained for up to eight members in each group along with detailed information on trip itinerary, multiple travel modes, days spent at alternate sites, lost income, trip motivation, annual time in the Keys, previous visit experience, current trip length, and whether the Keys was the primary destination of the current trip. For a more detailed description of sample methods see Leeworthy (1996).

For purposes of this analysis we use the summer season subsample of 1,781 observations obtained in July and August of 1995. This subsample consisted of those that participated in natural resource-based activities including wildlife and nature study on land and various water activities in natural settings. During the summer season, natural resource-based visitation accounted for 80 percent of the total person-trips to the Keys.[2]

Our on-site sampling format leaves the researcher with a sample that is zero-truncated because only participants are sampled and endogenously stratified because the probability of being chosen in an on-site sample is not independent of the frequency of usage (Shaw, 1988). Peterson, Dwyer, and Darragh (1983) recognized such problems when they developed an urban

[2]Our intent here is to focus on demand for the setting as opposed to the demand for any given activity as nearly all participants were involved in multiple activity trips. Hence, the results cannot be directly applied to answering on-site management questions dealing with competing or conflicting use by different activities. A good extension of the concept of this paper would be to examine for ethnicity differences among specific recreation activities.

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recreation site choice model with an on-site sample. Moreover, these problems have been shown to effect a bias in regression-based demand models which do not take them explicitly into account (Hellerstein, 1992). Shaw (1988) and Englin and Shonkwiler (1995) have developed estimation procedures based on count data which attempt to correct for potential biases resulting from on-site sampling. However, their methods are based on the condition that time on site for any given trip is constant regardless of trip frequency and other factors. Violation of such a condition could result in biased estimation.

In this study, trip duration varies substantially across observations and hence there is no easy solution for the on-site sample problem. Preliminary assessment of the sample responses indicated that trip duration and trip frequency were inversely related. Therefore, we assume that the potential bias caused by over-representation of frequent visitors in the sample is offset by the longer time on site common to infrequent visitors. We account for the fact that our sample is limited to observations having at least one trip and that trips are reported as integers by using a truncated negative binomial regression model (Creel & Loomis, 1990; Yen & Adamowicz, 1993). Hellerstein (1991) makes the important point that truncated individual models rest on the presumption that all nonvisitors have the same demand parameters as visitors. If such is not the case, truncated individual models may be more biased than zonal models which incorporate nonvisitor information. Here we would argue that our truncated model estimates would be applicable to the population which includes current visitors as well as potential visitors, i.e., those that would visit if they were facing a lower price. It would be inappropriate to apply our results to the general population wherein people with no intensions of visiting the Keys at any price would be included.

Under the structure most common for truncated negative binomial recreation demand models, individual trip demand is generally specified as:

$$\ln (TRIPS_i) = \beta_0 + \beta_{tc}TC_i + \beta_s SB_i + \beta_m M_i + \beta\ SE_i + u_i \qquad (1)$$

where, for the ith individual, ln (TRIPS) is the natural log of the quantity of recreation trips, TC is the travel cost per trip, M is income, SB is a substitute variable, SE represents a vector including other relevant variables, e.g., other socioeconomic and site attributes, the β's are regression parameters and exp(u) is assumed to follow a gamma distribution with mean 1.0 and variance 5 (Greene, 1995).

In order to identify and test for differences in price response between Hispanic and white user groups we adapt the varying parameter travel cost concept of Vaughan and Russell (1982) into the count data model structure by introducing two new variables which permit the slope and the intercept of the demand curve for whites and Hispanics to differ. We include an intercept shifter to account for unexplained differences in trip demand between the two groups. Unlike previous studies, we also include a price interaction term which is the product of the binary ethnic variable and the travel

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cost, TC, variable. This interaction term introduces a level of flexibility into the model allowing for response to travel costs or the slope of the demand curve to differ between the two groups.

The deterministic component of the model can now be written:

$$\ln (TRIPS_i) = \beta_0 + \beta_h H + \beta_{tc} TC_i + \beta_{htc} TC * H + \beta_s SB_i + \beta_m M_i + \beta\ SE_i \quad (2)$$

where, variables are as described above with the exception that H is a binary variable representing ethnic group (1 if Hispanic, 0 if white) and TC*H is the product of travel cost and the ethnic group dummy. Unexplained differences, or shifts in demand between whites and Hispanics can be tested with H_0: $\beta_h = 0$, while differences in the slope of the trip demand function between the two groups can be tested with H_0: $\beta_{htc} = 0$. Rejection of the latter null hypothesis would indicate a different price response for each group implying different price elasticities and consumers surpluses.

We follow Bowker, English, and Donovan (1996) and define the dependent variable as a person-trip. Hence, a family of four visiting the Keys once per year would account for four person-trips. The same is true of an individual visiting the Keys four times in one year. However, given the same origins and travel modes, the price of a person-trip would be lower for the family of four than it would be for the individual visiting on four separate occasions. For unrelated individuals traveling together, shared costs were apportioned to each individual. While this dependent variable construct is not often used, it is practical for situations where group travel by car is common. As well, it helps to avoid the empirical problem of low dispersion in the dependent variable (Ward & Loomis, 1986).

Defining travel cost in TCM models continues to be a subject of debate among researchers and practitioners. In-transit costs may be based on respondents' reported trip costs or costs imputed from researcher-imposed mileage rate(s). Using mileage rates reduces information needed from respondents while presuming linearity between cost and mileage. It also imposes homogeneous per-mile costs in the sample, which as Randall (1994) argues, contributes to questions regarding the use of TCM to generate cardinal welfare measures. Gathering actual cost information allows for greater variability in trip cost data but affords an increased probability of response or recall bias, along with differences in what individuals perceive as travel costs (Ward & Loomis, 1986).

Here we used the expenditure mailback survey to derive separate estimates of per mile costs for auto only and multiple mode travelers. Costs for the auto mode included rental, gas and oil, repair and service, and parking fees and tolls. Costs for the multiple mode included all auto costs plus taxi, bus, and airline fares. Total costs were divided by total roundtrip mileage from permanent or temporary residence (depending on the visit origin) to a midpoint of the southern-most region of the Keys visited. Auto only costs

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were estimated to be $0.14 per mile while multiple mode costs were $0.30 per mile. Person-trip costs then become mode costs for a given visit adjusted for the number in the group sharing expenses. In the case of a multiple destination trip where the Keys was not the primary purpose, only the round-trip mileage from the temporary residence to the Keys was included in the travel costs. For example, someone traveling to Disneyworld from Boston and then taking a side excursion to the Keys would only have the mileage costs from Orlando to the Keys included. While we feel this approach is appropriate, our interpretation of the literature is that this remains a debatable researcher judgement. Less than 10 percent of the sample fell into this category, hence while our approach is ad hoc, it is unlikely that the results are seriously affected.

The inclusion of time costs, both in-transit and on-site is also subject to considerable debate. Theoretically, Freeman (1993) demonstrates that both kinds of time costs should be included. However, he points out a number of problems which continue to plague applied researchers. One is the inability of a large portion of the sample to easily substitute between working increased hours at their normal (or overtime) wage rate and leisure time. Another is the possibility of utility or disutility resulting from work, travel, or on-site time, hence rendering the full wage rate a potentially poor measure of the shadow cost of time. He also points out that while most surveys elicit a pretax income measure, a more realistic wage rate would be derived from after tax income. McConnell (1992) states that judgements about time and the cost of time have been dominated by theoretical considerations rather than empirical results. Interestingly, 85 percent of those surveyed reported that they lost no opportunity to earn income during their visit(s) to the Keys. Hence, we chose to avoid the common but arbitrary practice of factoring a percentage of the household wage rate into mileage costs opting instead for a binary variable to indicate the group indicating that they gave up the chance to earn income by making the trip(s).

Other variables in the model which are based on typical recreation demand studies include, age and age squared, years of experience visiting the Keys, substitute availability, length of trip, and whether the current trip is a day trip. The latter variable is useful to distinguish whether local demand is differs from extended stays in an autonomous way. A complete listing of model variables and abbreviations is reported in Table 1.

Results

The truncated negative binomial model represented in equation 2 was estimated and is reported in Table 2. Regression coefficients follow expectations supported by economic theory. For example, the coefficient on the travel cost variable, TC2PPTH, is negative and highly significant indicating a downward sloping demand curve. The coefficient on the income variable, INC, is positive indicating increased income would shift out the demand curve although it is insignificant. The insignificance of this variable is not

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TABLE 1
Independent Variable Definitions

TC2PPTH—Travel cost per person-trip in, hundreds of dollars, based on round-trip distance and estimated mileage cost of $0.14 for auto only mode and $0.30 for multiple mode.
HISPANIC—Binary variable representing ethnicity (1 = Hispanic, 0 = non-Hispanic).
HISPINT—Hispanic travel cost interaction (HISPANIC *TC2PPTH).
INC—Household income.
YRKEYS—Number of years experience visiting Florida Keys.
AGEH—age in hundreds of years.
AGESQH—age squared in hundreds of years.
DSUB1—Binary substitute variable (1 = would travel to alternative site, 0 = no alternative site).
DTRIP—Number of days for current trip.
DTIME—Binary variable for time (1 = income forgone by taking trip, 0 = no income forgone).
DDAY—Current trip is single day trip.

uncommon in recreation demand models. A couple of possible reasons could be that people of similar incomes choose similar recreation pursuits or that income is somewhat collinear with other explanatory variables resulting in an inflated variance for the estimated income coefficient. Experience, YRKEYS, has a positive and significant influence on trips. This phenomenon is fairly typical in recreation demand, indicating familiarity and attachment to place. The substitution variable, DSUB1, has a negative and

TABLE 2
Full Model Maximum Likelihood Parameter Estimates (Dep. var. = annual person-trips) for Natural Resource Based Recreation During the Summer Season in the Florida Keys (n = 1546)

Variable	Coefficient	Standard Error	z = b/s.e.	P[|Z|≥z]	Mean of X
Constant	2.7906	0.16037	17.400	0.00000	
TC2PPTH	−0.12855	0.88174E-02	−14.580	0.00000	2.454
HISPINT	−0.69624	0.28283E-01	−24.617	0.00000	0.9487E-01
INC	0.29543E-02	0.10735E-01	0.275	0.78315	6.029
HISPANIC	1.0763	0.80750E-01	13.329	0.00000	0.1397
YRKEYS	0.36516E-01	0.30853E-02	11.835	0.00000	11.05
AGEH	−0.67149	0.77453E-01	−8.670	0.00000	3.940
AGESQH	0.66822E-01	0.11050E-01	6.047	0.00000	16.91
DSUB1	−0.43989	0.12086	−3.640	0.00027	0.2096
DTRIP	−0.50363E-01	0.35294E-02	−14.270	0.00000	4.864
DTIME	0.56180E-01	0.14427	0.389	0.69698	0.8344E-01
DDAY	−0.13369	0.70219E-01	−1.904	0.05693	0.9056E-01
α	3.1208	0.33705	9.259	0.00000	

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significant impact on trip demand indicating that those having readily available substitute sites or activities would take fewer trips than their counterparts given other factors are constant.

The coefficients on the age variables, AGEH and AGESQH, have opposite signs and are both significant. This suggests a curvilinear relationship between trip demand and age. Interestingly, this quadratic relationship is common to many recreation demand studies, however, the relationship usually is concave downward indicating trips diminish with age. We speculate that the nature and cost of the Keys trip may preclude participation somewhat for younger recreationists although this merits further investigation. The trip length variable, DTRIP, has a negative and significant impact on trips which seems intuitive in that people taking longer trips would tend to take fewer of them. The DDAY dummy variable is negative and not quite significant at the 5-percent level. The negative sign on this coefficient suggests that other factors equal, that day-trippers, more than likely locals, take fewer trips. This could be due to the nature and location of the site or it might be an artifact of how we designed the dependent variable. A peculiarity of this variable is that so few people take one-day trips, roughly 9 percent. The variable indicating that work time and leisure time were easily substituted, DTIME, had a positive sign on its estimated regression coefficient but was insignificant. Only 8 percent of our estimation sample reported that they could easily substitute an income earning opportunity for the leisure time they attributed to their trip(s). This finding suggests that the usual practice of including a portion of the household wage in travel costs may be inappropriate.

As the main purpose of this paper is to explore ethnic differences in natural resource-based recreation demand in the Keys, the coefficients on the Hispanic binary variable, HISPANIC, and the travel cost interaction variable, HISPINT, are of the most interest. Both regression coefficients are statistically significant at the 1-percent level providing very strong evidence to reject the previously stated hypotheses of demand congruency between whites and Hispanics, H_0: $\beta_h = 0$ and H_0: $\beta_{htc} = 0$. The positive coefficient on the HISPANIC variable suggests that, controlling for all other factors, recreationists of Hispanic ethnic background take more trips to the Keys than nonhispanics. Perhaps more interesting is the sign and significance of the travel cost interaction variable for Hispanics, HISPINT, suggesting a very different price response for Hispanics than whites. The magnitude of this difference can be best understood in terms of the two important policy measures derived from the demand model, consumer surplus and price elasticity of demand.

Price elasticity of demand (E_p) is a unitless measure of demand response to price changes. It is defined as the percentage change in quantity divided by the percentage change in price. The higher the price elasticity (in absolute value) the more responsive demand is to changes in price. For the semi-log specification used in our estimated travel cost demand model, price elasticity may be generally calculated as, $E_p = \beta_{tc}$* TCOST, where β_{tc} is the

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estimated slope of the demand curve and TCOST is the price or travel cost. However, given that we rejected the hypothesis that Hispanics and whites have identical demand curves, the estimated model allows for calculating different price elasticities for each group. For whites, price elasticity is calculated as $E_{pw} = \beta_{tc}$* TCOST, while for Hispanics, the price elasticity would be calculated as $E_{ph} = (\beta_{tc} + \beta_{tch})$ * TCOST. While price elasticity can be calculated at any price, we use the Hispanic group average travel cost to derive $E_{ph} = -.9378$. Using the group average travel cost for whites, we obtain $E_{pw} = -.6555$.

The price elasticity difference suggests that Hispanics are more sensitive to price changes and that increased travel costs, resulting from entities such as increased entry or access fees could have dramatic, if not uneven, effects on the current ethnic distribution of recreation visitors to the Keys. Such a difference should at least be carefully considered qualitatively for future policy actions in the area. For example, it is currently estimated that during the summer season whites account for 871,955 person-trips while Hispanics account for 81,000. Using our estimates of price elasticity and the respective group average travel costs, a price increase of 10 dollars per person-trip would effect an 8.26 percent drop in Hispanic person-trips and a 1.28 percent drop for whites. The difference arises from the difference in the slope of the two demand curves and the fact that a 10 dollar increase in price is a larger percentage of Hispanics' average cost than it is for whites. In absolute terms, an increase by 10 dollars per person-trip translates to a decrease of 6,688 Hispanic person-trips and 11,202 white person-trips. Interestingly, Hispanics would account for 37 percent of the 17,890 decrease in person-trips although they account for only 8.5 percent of the current number of person-trips in total.

Consumer surplus per trip, representing net economic value and a primary input in cost-benefit analysis, is also different for the two groups. Using our empirical model, consumer surplus per person-trip is calculated as the negative inverse of the slope of the demand curve. Thus, consumer surplus for whites is $CS_w = -1/\beta_{tc} = \$757$, while for Hispanics, $CS_h = -1/(\beta_{tc} + \beta_{tch}) = \$121$. This difference is significant at the 5 percent level based on variances calculated via the delta method (Yen & Adamowicz, 1993). Somewhat alarmingly, such a result suggests that a policy inducing a relative increase in white visitation could be judged as more "efficient" from an economic perspective. Although our methods differ, our results are similar in spirit to Walsh et al.'s (1990) findings pertaining to local and nonlocal users at Pike's Peak and the Boundary Waters.

Discussion

There is little available literature in recreation economics with which to directly compare our results. Few studies have been done regarding recreation demand in the Florida Keys. Moreover, virtually no economic studies to our knowledge have explored price response and consumer surplus differ-

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ences in recreation demand conditioned by ethnic group. Our findings demonstrate that indeed there can be significant differences in the structure of demand across ethnic subgroups and that the differences appear nontrivial. As well, our findings seem to corroborate previous literature in recreation and leisure science which indicates that ethnic differences in recreation behavior exist. At the very least, our results suggest that researchers involved in recreation demand should strongly consider including ethnic slope and intercept variables or other means of differentiating demand models by ethnicity to better identify potential differences which could be important in making management decisions.

While it is clear that more research is necessary and that we are subject to the usual case-study caveats, our findings appear to have important policy/management implications for the area. The Florida Keys land base lies entirely within the jurisdiction of Monroe County, which is currently in the process of implementing restrictive growth management regulations. In addition, all the waters surrounding the Florida Keys were designated a National Marine Sanctuary (FKNMS) by Congress in 1990 and a multi-agency, multi-jurisdictional management plan was approved by the Florida Governor and Cabinet in early 1997. These events represent the first major effort in integrated coastal management in the U.S.

From June 1995 to May 1996, an estimated 2.5 million visitors spent over 13.3 million person-days in the Florida Keys. Visitors spent over $1.67 billion in South Florida, which had a total impact of $2.94 billion in output and sales, $1.69 billion in income, and almost 28,000 full-time equivalent jobs (English, Kreisel, Leeworthy, and Wiley, 1996). About $1.2 billion of the $1.67 billion spent in South Florida was spent in Monroe County accounting for 60 percent of output and sales and 46 percent of income and employment. Under the new policy/management conditions, the future of this area most likely will be characterized by increasing demand in the face of restricted supply. Prices will reflect this relative scarcity. In addition, to achieve many of the policy/management objectives of the FKMNS management plan, businesses, households, and government will be required to make greater investment in environmental protection. Businesses will likely respond by shifting their marketing efforts towards groups willing and able to pay for these investments. This will further push price upwards.

Given the Hispanic population's sensitivity to prices (relatively more elastic demand function) and their relatively lower consumer surpluses, we would expect that without some policy/management intervention, the Hispanic population will increasingly be priced-out of the market. Even economic efficiency guidelines may fail to address this issue because, as we have shown, the Hispanic population has relatively lower consumer surplus values and these would be inputs into efficiency-based benefit-cost analyses.

The issue of Hispanics being priced-out of the market is an issue of fairness, equity, and/or the distribution of benefits and costs. Clearly such issues are and will continue to be important in future recreation management and environmental planning for the Florida Keys. Moreover, like the

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findings of Walsh et al. (1990) regarding pricing policy and the distributional impacts on local and nonlocal users, the findings of this study are very likely applicable on a much broader scale, especially to nationally famous sites held in public trust. In the future, as user fees and related market-based methods of public land management are implemented, recreation researchers should make an increased effort to identify and quantify the distributional effects of these policies from both income and ethnic perspectives. Such information can and should be used by policy makers and managers to assure more equitable access and a diverse public.

Acknowledgement

We acknowledge C. Y. Johnson, P. Wiley, an associate editor, and two anonymous reviewers for their valuable input.

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