COMPONENTS OF OUTDOOR RECREATIONAL VALUES: KISSIMMEE RIVER BASIN, FLORIDA*

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INTRODUCTION

It is widely recognized that outdoor recreation is an important segment of our economy. Most recent efforts to quantify the size of the recreational segment of our economy result in determining only isolated parts of total recreational value. This is particularly true of efforts to determine the value of various aspects of publicly owned natural resource systems. This paper presents procedures to estimate total recreational value of water in a river basin system: the Kissimmee River Basin, Florida.

Two types of recreationists utilize the Kissimmee River Basin Waters. There are recreationists actually living (either permanently or during vacations and holidays) on lakefront property, as opposed to those traveling to the area primarily to partake in recreational activities through facilities providing public access to the water. For both types of recreationists the primary water-based activities include fishing, waterskiing, boating, and swimming. Visiting recreationists also enjoy camping.

Procedures used in this study include interviews with both types of recreationists in order to obtain estimates of the annual value of recreation. To obtain as much homogeneity as possible, the year was divided into the following four time periods, determined partly by the types of recreation existing in each period: (1) February - May, (2) June - September, (3) October - November, and (4) December - January.

The procedures for estimating recreational value, as applied to the Kissimmee River Basin will be discussed first for waterfront residents and then for recreational visitors utilizing public facilities.

WATERFRONT RESIDENTS

Residents in the Kissimmee River Basin living adjacent to a lake, canal, or river benefit from the presence of water by being able to participate in recreational activities and by realizing increased land values. A sample of waterfront residents was interviewed to obtain information regarding property values, recreational activities, and characteristics of the residents.

The sampling frame used in this study included all permanently stationed houses, cabins, houseboats, and trailer houses, which (1) were located no more than 400 yards from the water, (2) were on property with frontage on the water. The population of interest was all waterfront dwellings in the sampling frame which were either: (1) permanent residents on lots smaller than ten acres and not also serving as a place of business, or (2) weekend or seasonal dwellings either owned by their occupants or rented or leased by their occupants for one month or more.

A sample of 100 residents was selected from which 56 interviews were obtained.[1] Most of the remaining 44 were not interviewed due to an inability to contact the occupants. Most of these 44 dwellings were seasonal or weekend-type vacation homes and were occupied only occasionally. Of the 56 completed interviews, only 14 were from seasonal or vacation-type residences. Therefore, it is reasonable

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[1] For more detail concerning the sample, interview procedures, and results of the survey, see [3].

Table 1. ACTIVITIES AND EXPENDITURES ON WATER-BASED RECREATIONAL ACTIVITIES BY WATERFRONT RESIDENTS, KISSIMMEE RIVER BASIN, FLORIDA, 1970.

	Activity	Time periods				Annual totals	Ave. expenditure per day (std. dev.)	% of sample participating[a]
		Feb.-May	June-Sept.	Oct.-Nov.	Dec.-Jan.			
No. of days per participating family[c]	Fishing (ave.)	44.22	44.42	21.42	19.90	129.96		89
	(std. dev.)	26.65	36.77	13.25	19.19	110.56		
	Boating (ave.)	19.41	24.06	9.60	8.78	61.84		57
	(std. dev.)	20.65	27.28	8.16	11.76	70.76		
	Swimming (ave.)	29.00	58.15	8.45	2.15	97.74		48
	(std. dev.)	25.94	46.61	12.73	10.77	86.77		
	Waterskiing (ave.)	14.86	32.87	5.66	2.93	56.33		29
	(std. dev.)	16.71	26.51	7.03	6.45	58.76		
$ spent per participating family[b,c]	Fishing (ave.)	175.11	175.90	84.83	78.80	514.64	3.96 (3.08)	
	Boating (ave.)	73.95	91.67	36.58	33.45	235.61	3.81 (3.17)	
	Waterskiing (ave.)	79.21	175.20	30.16	15.62	300.24	5.33 (2.96)	
Average aggregate ($) expenditure	Per participating family[c]	328.27	442.77	151.57	127.87	1,050.49		
	Per interviewed family	212.31	286.37	98.04	82.70	679.40		

[a]The "percent of sample participating" refers to the percent of the total respondents who reported that their family engaged in an activity at least once during one of the time periods.

[b]No expenditures were reported for swimming by survey respondents.

[c]These expenditures refer only to that segment of the respondents whose families actually engaged in an activity at least once during a particular time period.

to assume that conclusions drawn from the survey primarily represent non-vacation lakefront residences in the Kissimmee River Basin.[2]

Recreational Activities

From the questionnaire it was determined which activities, such as fishing, waterskiing, swimming, and boating, were most popular, how often residents participated, and the variable expenditures associated with their use of the lake.[3] Survey respondents were asked to report the number of times they participated in various recreational activities during each of four time periods of the year. These activities included only those which originated from the respondent's own lakefront property.

Answers to these questions are summarized in Table 1. The average number of activity days per participating family includes only those families that participated at least once in the given activity in any of the four time periods of the year.

Expenditures included in Table 1 were for items (such as gas, oil, bait, and picnic lunches) associated directly with recreational activities on the lake. It is assumed that the residents were willing to pay at least as much as the variable expenses incurred. This represents an estimate of the value of water use privileges to the resident. Across all interviewed families, the average expense was $679.40 per year. Expenses for equipment and traveling to the lake (in those cases where the lakefront residence was not the permanent home) were not included in these cost estimates. Average monthly expenditures were lowest in December and January and highest during the months of June through September.

By expanding the average expenditure of the

[2]The primary reason for the relatively large percent of the lakefront residences not being interviewed was that the survey was conducted during the months of May and June, 1970. Most of the seasonal occupants had left their winter homes.

[3]Ideally, it would be desirable to obtain enough information to derive a demand curve for recreational use of the water by the waterfront residents. Due to the limited scope of this portion of the study, only actual expenditures were obtained.

Table 2. ARITHMETIC MEANS OF LAKEFRONT PROPERTY VALUES REPORTED BY SURVEY RESPONDENTS, KISSIMMEE RIVER BASIN, FLORIDA, 1970.

	Average $ estimate	Standard deviation
Average selling price today	27,370	23,070
Average buying price today	22,710	18,670
Average selling price if the lake were permanently drained[a]	14,250	13,710

[a]Buying price was not estimated for permanently drained lake.

residents interviewed in this study to the total population of all lakefront residents in the Kissimmee River Basin, an estimate of the total expenditure of the lakefront population can be obtained. On the basis of approximately 800 lakefront residences in the Kissimmee River Basin in 1970, an annual total expenditure of approximately $544,000 = (800 · $679.40) was made for all recreational activities.[4]

Lakefront Property Values

In addition to recreational activities, increased appreciating of natural resources has resulted in increased demand for property bordering lakes and streams. As more people seek property for recreational and aesthetic purposes, values increase substantially. One of the purposes of this study was to estimate the value of the presence of water frontage to residential property owners in the Kissimmee River Basin. In estimating value of the presence of water, lakefront residents were asked what they would sell their property for if it were put on the market today, and what they would pay for their property if they were going to purchase it today. A difference of $4,660 was reported in the average values (Table 2). The source of this difference may be explained as follows: when respondents were asked to name a price for which they would be willing to sell their property, the question was not meant to imply that most of the respondents wished to sell their property, for most indicated that they were not interested in selling. Thus, the average selling price of $27,370 probably represents a figure substantially above the market price of the property. On the other hand, responses to their willingness to pay for the property if they did not own it could be interpreted as a more realistic indicator of the true market value of the property.

To obtain an indication of the value of the property that could be attributed to the presence of the lake, the respondents were asked to estimate their selling price if the lake were permanently drained and they were to sell the property today. In response to this question, the respondents felt that they would be willing to sell their property for an average of $14,250. This figure represents 52 percent of the average sales price reported with the lake present and 63 percent of the average buying price when the lake was present. This indicates that the presence of the lake, according to the lakefront residents in this survey, contributes anywhere from 37 to 48 percent of the value of the property.

The value of the property represented by the total 800 lakefront residences was estimated to be between $14.2 and $18.2 million (average buying or selling price times 800, the number of residents). Based on opinions of the lakefront residents, if the lake were permanently drained, the total property values would decrease to between $7.6 and $11.6 million. Thus, the value of the lakes in terms of these differences in property values could be estimated at approximately $7 million.[5]

RECREATIONAL VISITORS

In addition to waterfront residents, many

[4]The expenditures ($679.40) represent a weighted average of permanent and seasonal residents from the sample. The proportion of permanent and seasonal residents in the population is not the same as that in the sample. Thus, the expenditures are underestimated. For a comparison of expenditures, see [3].

[5]It should be noted that the estimated 800 lakefront residences represent only a small part of the total lakefront property in the Kissimmee River Basin. Thus, the value of the water capitalized into all lakefront property would be considerably more than $7 million.

recreationists visit the Kissimmee River Basin from nearby residences, other parts of Florida, and from locations outside the state boundary. To evaluate the economic significance of water to recreational visitors, a demand curve showing willingness of users of the area to pay measurable sums for specified amounts of recreation is needed.

Demand for recreation, in the absence of an efficient market, has been estimated in two ways: the direct and indirect methods. In the direct method, the recreationist is asked how much he would be willing to pay for a specified amount of recreation. The indirect method (utilized in this study) involves estimates of willingness to pay for recreation by observing the amount a recreationist actually spends in order to participate in a recreational experience. This observation was accomplished by the use of a questionnaire designed to determine the total cost of the recreational experience (including travel and on-site expenditures), the amount of recreation, and other pertinent socio-economic information.

The total recreational usage (total visitor days) of an area can be defined as number of visits times number of days per visit. The number of days per visit can be considered the quantity variable in a demand relationship and the daily on-site costs a price variable. Based on the demand relation for the average visit, the aggregate demand for recreation can be derived by expanding according to the number of visits.[6] The subsequent procedures were developed to determine both components of total visitor days.

Days Per Visit

For visiting recreationists, it is assumed that a certain travel cost, k, will be incurred prior to on-site costs associated with participating in outdoor recreation. This travel cost will then compete with on-site costs and costs of all other commodities for the recreationist's budget. In addition, it is assumed that a daily on-site cost of such magnitude exists that the recreationist will choose not to engage in the recreational experience should the cost exceed this amount. This cost is called the critical on-site cost, P*, and its value is a function of travel costs, the price of all other competing commodities, income, and the recreationist's utility function. The existence of this critical price causes a discontinuity in the demand relationship.[7]

The demand relationship utilized in this study can be expressed as:

$$q = f(k,p,y,n) \qquad \text{for } p \leq p^*$$

Where q is the number of days a recreationist utilized the facilities per visit, k is round trip travel cost per recreationist, p is daily on-site costs for each recreationist, y is family income, and n is size of the recreation group.

Sampling Scheme A sample of lakes and streams was chosen to collect recreational data. Every access point on each sampled lake became the site for interviewing. These access points were fish camps, boat ramps, and/or campgrounds that furnished public access to the lake.

A proportional sample was taken to account for differences in use among (1) the sampled lakes, (2) the access points on each lake, (3) weekdays versus weekends and holidays, and (4) various activities.[8]

Empirical Results A demand relationship for an average visit was estimated as:

$$\ln q = 2.183 + .026k^{**} - .051p^{**} + .0001y^{*} - 1.399\frac{1}{n}^{**} + .229D_1{}^{*} - .25D_2{}^{*} - .368D_3{}^{**}$$

for $p \leq \$17.77$

$R^2 = .351$ F = 72.7 d.f. 942

Where the D_i refers to seasonal dummy variables, and the other variables are as defined above. Statistical significance at the one and five percent levels are indicated by ** and *, respectively. Average values for the variables are shown in Table 3.

Critical on-site costs were estimated by obtaining the minimum number of days recreationists were willing to recreate, ceteris paribus. This corresponds to the maximum price recreationists are willing to pay on a demand curve. By substituting average values of all independent variables except p, and then substituting the minimum number of days for q in the demand relationship, the maximum value of p can be obtained.[9] Thus, an estimate of the critical on-site costs of $17.77 was obtained.

Values of recreation, for each time period, were obtained by holding all the variables except p at their means and integrating the demand curve from the average price to the critical price. This gives an estimate of $59.91 for the consumer surplus per visit (per recreationist), on the average.

[6] An alternative method of deriving aggregate demand would be to relate the number of visits to price and other relevant variables, and then solve simultaneously with the days per visit relation. This was not done due to voids in data.

[7] For a detailed derivation of the theoretical model, see Gibbs [4].

[8] For more detail concerning the sampling scheme, see McGuire [5].

[9] Recreationists had a good idea what the minimum length of stay would be, but they were not able to give a rational estimate of the maximum on-site cost they would incur. This is the rationale for computing the critical on-site costs in the above manner.

Table 3. AVERAGE VALUES OF VARIABLES FOR OUTDOOR RECREATIONISTS IN THE KISSIMMEE RIVER BASIN, 1970.

Time Period	Days per visit (q)[a] (days)	Travel cost (k) ($)	Daily on-site cost (p) ($)	Income (y) ($)	Group size (n) (no.)	Minimum days per visit[a] (days)
Feb. - May	7.95	20.16	3.25	11,782	3.07	4.01
June - Sep.	5.16	7.80	2.41	10,079	3.27	2.08
Oct. - Nov.	3.75	7.16	3.38	10,048	2.77	1.98
Dec. - Jan.	4.38	17.31	3.66	11,997	3.06	2.58
All periods	5.64	13.38	3.23	10,964	3.06	2.78

[a]Measured in terms of 12-hour periods.

Table 4. ESTIMATED NUMBER OF VISITS BY TIME PERIOD, KISSIMMEE RIVER BASIN, 1970.

Time Period	Feb.-May	Jun.-Sep.	Oct.-Nov.	Dec.-Jan.	Total
Estimated Visits	158,229	135,104	91,059	95,339	479,731

Number of Visits. In order to convert per visit values to an aggregate, an estimate of the number of visits in the Kissimmee River Basin was needed. Since no prior information was available, mechanical traffic counters were located at each public access point on three selected lakes for one year. The access points were located at organized fish camps and single, two or three lane boat ramps. Data obtained directly from the traffic counters had to be adjusted in order to obtain an estimate of the number of people using the area rather than just the number of axles tripping the meter. Correction factors were determined to account for (1) number of crossings each car accounted for per visit; (2) additional axles due to a trailer; and (3) number of people per car. Personal interviews and observations were used to determine correction factors.[10]

The above procedure enables determination of the estimated visits at the three sampled lakes. It was then necessary to expand this to the entire basin, consisting of approximately 57 public access points. This was done by airplane overflights to count recreationists actually partaking in outdoor recreational activities in the entire river basin. Flights were averaged to estimate the percentage of people in the river basin utilizing the three sampled lakes. These lake totals were expanded to estimate the total number of visits for each time period (Table 4).

Seasonal values for recreational visitors are derived by multiplying values per visit by the estimated number of visits. The yearly value is estimated as $28.7 million.

SUMMARY AND CONCLUSIONS

The recreational use of the river basin reported in this paper is composed of waterfront residences and recreational visitors. The values accruing to each are different. Waterfront residences accrue value through land appreciation and through availability of water for recreation. Recreational visitors accrue value through their willingness to pay in excess of required costs to recreate. Their consumer surplus is a measure of this value.[11]

The aggregate value in recreational use of the Kissimmee River Basin can be thought of as the sum of value accruing to both recreational visitors and waterfront residences. In addition, there is the recreational and aesthetic value of the basin that is capitalized into residential property value. The yearly values to recreational visitors was estimated to be

[10]For details on the procedure for estimating the number of visits see [1].

[11]Another measure of value is the actual expenditures. In this study the average recreationist spent $3.23 per day while recreating. There was an estimated 5.64 days per visit, thus the total amount spent per visit was $18.22. This represents an estimated $9.7 million in actual expenditures by recreationists.

$28.7 million, while the estimated annual expenditures of waterfront residents was $544,000. If the residents' annual expenditures are assumed to be an estimate of the value of recreation, then it can be concluded that the presence of water in the Kissimmee River Basin is worth about $29.2 million to recreationists. In addition, the recreational and aesthetic value of the water adds an estimated $7 million in capitalized residential waterfront property alone plus an additional, but unknown, amount for other waterfront and adjacent property.

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