DERIVING DEMAND CURVES FOR SPECIFIC TYPES OF OUTDOOR RECREATION

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GENERAL STATEMENT

Demand theory can be related to outdoor recreation by considering outdoor recreation like any other good or service for which there is demand. Outdoor recreation opportunities may be considered to be used to the extent that people believe their satisfactions are exactly equal to the cost involved. Of course, ignorance and uncertainty about the process may cause a divergence of satisfactions from costs, but this is a circumstance not uncommon in any market.

The major difference between the market for outdoor recreation and the market for the goods usually used in illustrations of demand theory is that the small entrance or user fee, which is the direct cost of using recreation facilities, does not constitute a correct measurement of total cost or price paid to partake of a recreation opportunity. The people who use any particular area for outdoor recreation will incur various costs in doing so—some in cash, some in time, and some of an even more subjective nature. If they continue to use an area, then it is logical to assume that their satisfactions are as great or greater than the total costs. It is the marginal user or the marginal trip by a habitual user who equates his marginal trip costs to his estimate of marginal trip satisfactions. Thus, if entrance or user fees, or for that matter, any of the costs incurred are increased, then this would tend to affect the amount of use made of an area.

The early economists considered certain commodities as "free goods." They recognized that such goods as air, sunshine, and water had very great utility for man, but were free of costs. People, acting through their governments, can artificially place a zero price on a product, and thus make it a free good. Thus, if outdoor recreation is provided is provided in as great a quantity is wanted, at no charge, the recreation opportunity at the point of supply becomes valueless in monetary terms. It is simply a matter of people using it until the marginal utility falls to zero.

Taking all the above into consideration, it is suggested that the total outdoor recreation experience is, to a large extent, a package deal. This means that it must be viewed as a whole, in terms of costs, satisfactions, and time, for all members of the family as a group. In the calculation of consumers by total costs, and

comparisons of costs with expected satisfactions, the price of entrance into or use of a recreation area certainly are taken into consideration by users and potential users.

The demand curve for the total recreation experience, like the demand curve for other types of goods or services, is applicable to large numbers of people, rather than to individuals. With large numbers of people, the extreme values, which might characterize some person taken individually, are averaged out so that there is a predictable and measurable reaction to some outdoor recreation opportunity. Therefore, if a demand curve can be established for a large group of people, then it is probable that another similarly characterized large group would respond in similar fashion to prices and other characteristics of a reaction opportunity. That there is a predictability of reaction to similar factors of price and value is an assumption of rationality basic to all demand curve analysis.

DATA AND METHODOLOGY

The procedure suggested for deriving a demand curve for outdoor recreation involves two steps. The first step is to determine the demand for the total recreational experience. The second is to use the demand for the total recreational experience as the basis for a demand curve for a unique recreational opportunity.

The demand for the total recreational experience involves (a) measuring price by the total spending necessary to participate in a visit to some particular recreation site, and (b) measuring quantity in terms of proportions of total population in various tributary distance zones which actually participated. For example, the latter can be expressed in terms of the number of visits per 1,000 population in each distance zone. This is roughly analogous to per capital consumption data for some product. It is assumed that the visit to the particular recreation site was the chief purpose for the trip. Otherwise, it would not be very meaningful to attempt to relate the cost incurred in making the trip to a particular recreation site.

The demand curve for the recreational opportunity per se is derived from the above. This provides a basis for computing the degree to which the rate of visitation per 1,000 population in each distance zone will change for given changes in the cost of making a trip. More specifically, mean family trip expenditures and visitation rates for each zone provide a basis for estimating change in quantity demanded within each zone for assumed changes in price (family trip expenditures or costs).

The procedure for achieving the above rests upon two basic assumptions: (1) users will view an increase in entrance or user fees (or other costs) rationally, and (2) the experience of users in one location zone is a proper measure of what people in other location zones would do if the costs were the same. Therefore, the

difference in mean expenditures and visitation rates between adjoining zones is the basis for calculating the reaction to assumed cost (price) increases in each zone. Then, after totaling the change in all zones and subtracting this from the original visitation figure, a quantity demanded is ascertained for each cost rise (price) assumption. In this respect the demand curve for outdoor recreation is no different from that for other products. Demand curve analysis almost always requires a transfer of experience from one group of people to another or from one time to another.

Estimates can be made for various increases in user fees (or costs) of the new number of visits per 1,000 population in each distance zone. Each new member must be multiplied by the base population of each distance zone to get the new number of visits. For example, an increase of $1 in costs per person would tend to reduce total visits to a recreation area by some percent, and an increase of $2 would tend to reduce total visits by a larger percent. The contention here is that from the data on estimated numbers of visits at each level of increased costs it is possible to construct a demand curve.

The price axis is a reflection of various assumed increases in average family expenditure on a trip (cost of trip). When it is recognized that the costs incurred on a trip are, in effect, the price paid for the recreation experience as a whole, and that because of the "free good" feature of the recreation site per se, each assumed increase in costs of trip becomes potential prices which might be charged for the use of the recreation site. As such, price is equivalent to entrance of user fees. The quantity axis is the quantity demanded at each assumed price and is calculated as explained above.

It is important clearly to recognize that such demand curves apply to a single point in time since the basic factors underlying them may change rather considerably. Population shifts, change in real income levels, improvement in access roads, and increase in leisure time are just a few of the changes occurring in a dynamic and changeful economy.

It is the contention of this study that the demand approach can be applied not only to analyzing demand for outdoor recreation at some specific site, but it can also be usefully applied to an analysis of demand for specific types of outdoor recreation such as camping, pleasure boating, and fishing at some particular site. In order to demonstrate this approach to deriving demand curves, data from a specific recreation site will be analyzed.

THE DEMAND CURVE FOR CAMPING

The data in Exhibit 1 is the basic data for a demand schedule or curve for outdoor recreation trips to a recreation site where camping is the primary purpose

for the trip. Each zone is defined in terms of counties so that each zone is approximately 50 miles wide. The starting point for the establishment of 50 mile zones was the recreation itself, and each zone is a concentric circle encompassing about 50 miles. Consideration was given to the accessibility of each county as reflected by the availability of direct highway routes.

The reason for establishing concentric rings of counties is that Census data is available by county, and this was essential to the determination of population contained in each concentric zone. The number of families in each concentric zone of counties is shown in column two of Exhibit 1. The percent visitation from each zone is based upon a survey taken by the author and are the sample percents for each visitation zone. Since 94.1 percent of the sample was from the first four distance zones and the other 5.9 percent spread very thinly over farther distances, only four zones are used in this demand analysis. It would have been preferred that the analysis involve more distance zones. However, in view of the above, and since establishing smaller zones (such as 25 miles) tends to cloud the pattern of different expenditures for various zones, only four zones are considered. The demand curve for camping is constructed on the basis of this consideration. This is a product of visitation being drawn so heavily from the immediate area. Other recreational sites could conceivably draw from a wider area and make possible the use of more distance zones.

The number of visits at current costs is simply the result of an application of the percent family visitation from each zone to the total visitation figures for families having camping as their primary purpose for visiting the recreation site. This figure was derived from Corps of Engineers data.

Visits per 1,000 families are computed using the data in columns one and three in Exhibit 1. In order to estimate a demand curve, some measure of volume is needed and this is expressed in terms of the proportions of a total population which make use of a recreational opportunity. What is established is the proportion of each 1,000 families in each tributary zone who visited the recreation site with camping as the primary purpose. Therefore, if 10,213 families visited the recreation site from a zone containing 46,242 families, then the rate of visitation per 1,000 families is 220.8.

Cost per visit is considered to be the price paid by a family for a camping recreational experience, and visits per 1,000 families are considered to be the quantity demanded. This is roughly analogous to expressions of per capita consumption, and in this case reflects the variation in visitation due to the cost of time necessary to get to the recreation site. This data is shown graphically in Exhibit 2. Because of the very great variation in quantity and a somewhat less variation in price, this data is more clearly presented on a semi-log scale that on a simple arithmetic scale. Since costs incurred relate to the entire trip and not just the site

itself, the schedule being presented is the demand for a total recreation experience and not the demand for camping recreation at the site as much.

In order to construct a demand schedule for the latter, it was necessary to analyze the effect of changes in the cost of visiting the site in order to participate in camping. Estimates were made for various increases in costs of a new rate of visitation per 1,000 population in each distance zone. Each new rate was multiplied by the base population of each distance zone to get the new number of visits. Then, by summing the number of visits from all zones for each assumption of cost increase, a schedule of quantities demanded was ascertained.

This is presented in Exhibit 4. Each column reflects the change in quantity of camping trips to the recreation site demanded for each dollar of increase in cost. This approach to demand curve analysis required a transfer of experience from the people of one zone to the people of another. This is subject to the limitation that the people from different regions may react differently to a change in the accessibility or price of a recreation trip. Since 94.1 percent of the visitation to the site is from an area within 200 miles of the lake, it is unlikely that any significant degree of regional differences can be found.

The calculations of the change in visits per 1,000 families for each assumed cost rise of $1 involves using the rate of visitation per 1,000 families for each zone from Exhibit 1. The process of determining the rate of visitation per 1,000 families for each zone for each assumption of cost increase involves a transfer of experience from the people of zone to the people of another. This means that the people of Zone "B," where costs are higher, are used to provide an indication of what will happen to the rate of visitation per 1,000 families in Zone "A" when cost increases. Similarly, the people of Zone "C" are used to indicate the degree of change in rate of visitation in Zone "B."

The data from Exhibit 4 is presented graphically as a demand curve in Exhibit 3. It is contended that this curve approximates the true demand curve for camping at the recreation site because it shows the relationship between number of family visits and different changes in cost or price paid to engage in such an outdoor recreation experience in a given period of time. Since outdoor recreation is virtually free at the recreation site in that only a minimal fee is charged for entrance at some but not all sites, the increase in costs treated previously can be thought of in terms of being various prices which might be charged for a camping recreational visit. Thus, the various cost increases from $1 on through $15, respectively, can each be regarded as a potential market price payable for a camping visit and the quantities demanded from Exhibit 4 complete the picture as far as a demand curve is concerned. Alternatively, the increases in costs can be thought of as being increases in entrance fees, and serve as a useful guide to the reaction by camping families to increases in entrance fees.

In a computation of arc elasticity, it is shown that the demand for camping at the recreational site was relatively inelastic. Further, the indicated tendency is for inelasticity to be greater for the initial increase in price and for demand to become more elastic as further price increases occur. It is recognized that this will always be the result when demand curves are linear, and the demand curves of this study are nearly so. However, since the rate of visitation and average expenditures change from zone to zone, the methodology does not result in a linear curve. The indication is that campers forego camping trips at a site to an increasing degree as price is increased. This is to be expected, especially since it is assumed that the price of alternative camping opportunities remain unchanged.

DEMAND CURVES FOR CAMPING, PLEASURE BOATING, AND FISHING COMPARED

The same methodology can be applied to data for families having pleasure boating or fishing as their primary purpose. The same assumptions and considerations apply in all cases. Exhibit 5 shows the demand for a total recreational experience by families having camping, pleasure boating, or fishing as their primary purpose; and, Exhibit 6 shows the demand curves for camping, pleasure boating, and fishing per se at the recreation site.

It is shown that the demand for pleasure boating at the recreation site was relatively inelastic for the initial assumed price increases of one dollar, but tends to become more elastic as subsequent one dollar price increases are assumed. Finally, demand becomes relatively elastic. This would indicate a strong tendency on the part of pleasure boaters to seek alternatives or to forego the pleasure of boating as costs (price) increase. In view of the rather large investment necessary for pleasure boating, it is more likely that the change is primarily a matter of seeking alternative boating sites.

In a computation of arc elasticity, the demand for fishing at the site was very inelastic. Consequently, fishing families tend to change their quantity demanded relatively less than the change in price. There seems to be no marked pattern of increasing or decreasing degree of elasticity. In any case, the degree of inelasticity is greater for fishing families than for the other two recreation types.

In conclusion, this paper has attempted to provide a methodology for deriving demand curves in the Neoclassical sense for specific types of outdoor recreation activity. These demand curves, like any demand curve, face the usual limitations. They apply to a given time and place *ceteris paribus*. The basic factors influencing them may change with new highways, etc. These are illustrative of shifts that can occur for any demand curve, and are not unique to outdoor recreation demand.

As a final point, there is very little to be found in the literature where empirical data has been used to derive demand curves for specific types of outdoor recreation. It is hoped these efforts help make a beginning where much more research needs to be done—developing precise demand curves for specific types of outdoor recreation, as well as for other service-type economic activities.

Exhibit 1: Number of families visiting a site in relation to total population and expenditure per visit, by distance, zones, and where camping is the primary purpose.

Distance Zones	Number of Families in Group of Counties	Per Cent Visitation From Each Zone	Number Of Visits At Current Cost	Visits Per 1000 Families	Cost Per Visit
A	46,242	22.685	10,213	220.85	$ 39.68
B	281,106	55.239	24,869	88.46	43.16
C	647,166	15.361	6,916	10.68	77.39
D	633,607	0.813	366	.57	78.25
E	977,091	0.305	137	.14	86.00
Other	60,864,535	5.595	2,519	.04	151.33

Exhibit 2: Demand for recreation experience in which camping is the primary purpose.

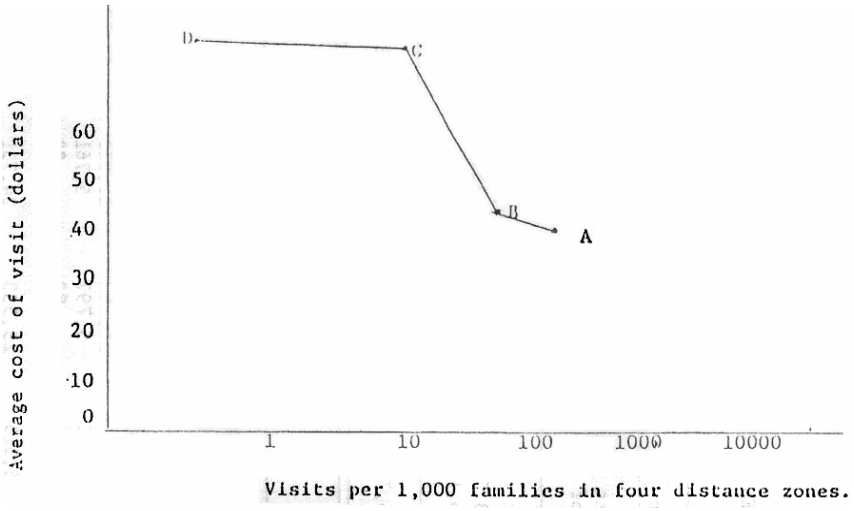


Exhibit 3: Demand for camping.

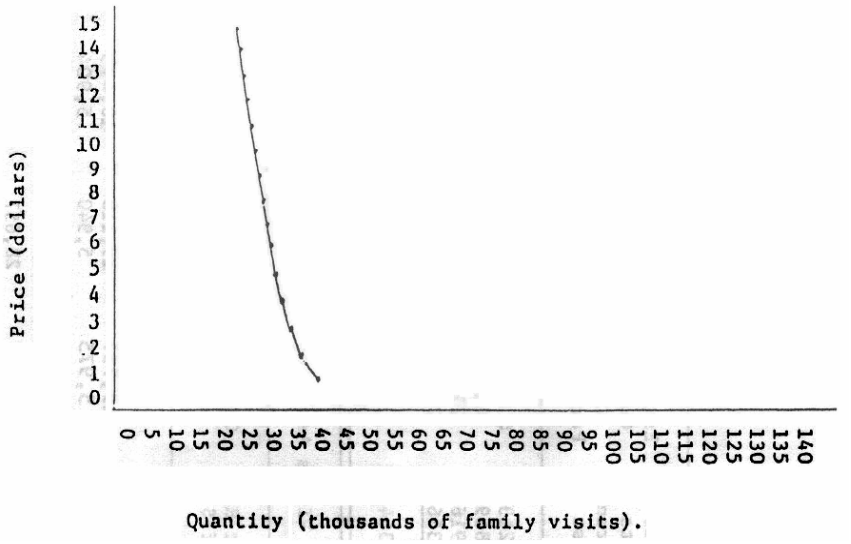


Exhibit 4: Estimated effect of increasing costs and/or entrance fees for a family visit by campers.

Distance Zones	Number of Visits at Current Cost	Estimated Current Cost Per Visit	Change in Visits Per 1000 Families For Each Cost Rise of $1	Estimated Total Visits Assuming: Cost Rise of $1	Cost Rise of $2	Cost Rise of $3	Cost Rise of $4	Cost Rise of $5
A	10,213	$39.68	38.04	8,454	6,695	4,936	4,037	3,932
B	24,869	43.16	2.27	24,230	23,591	22,952	22,313	21,67[illegible]
C	6,916	77.39	1.18	6,225	6,190	6,154	6,118	6,083
D	366	78.25	.06	330	294	259	223	187
Total	42,364			39,239	36,770	34,301	32,691	31,876

Estimated Total Visits Assuming:

Cost Rise of $6	Cost Rise of $7	Cost Rise of $8	Cost Rise of $9	Cost Rise of $10	Cost Rise of $11	Cost Rise of $12	Cost Rise of $13	Cost Rise of $14	Cost Rise of $15
3,826	3,721	3,616	3,511	3,406	3,301	3,196	3,091	2,985	2,880
21,035	20,396	19,757	19,118	18,479	17,840	17,201	16,562	15,923	15,284
6,047	6,011	5,975	5,940	5,904	5,868	5,832	5,797	5,761	5,725
152	116	89	88	87	85	84	83	82	81
31,060	30,244	29,437	28,657	27,876	27,094	26,313	25,533	24,751	23,970

Exhibit 5: Demand for a recreation experience in which camping, pleasure boating, or fishing is the primary purpose.

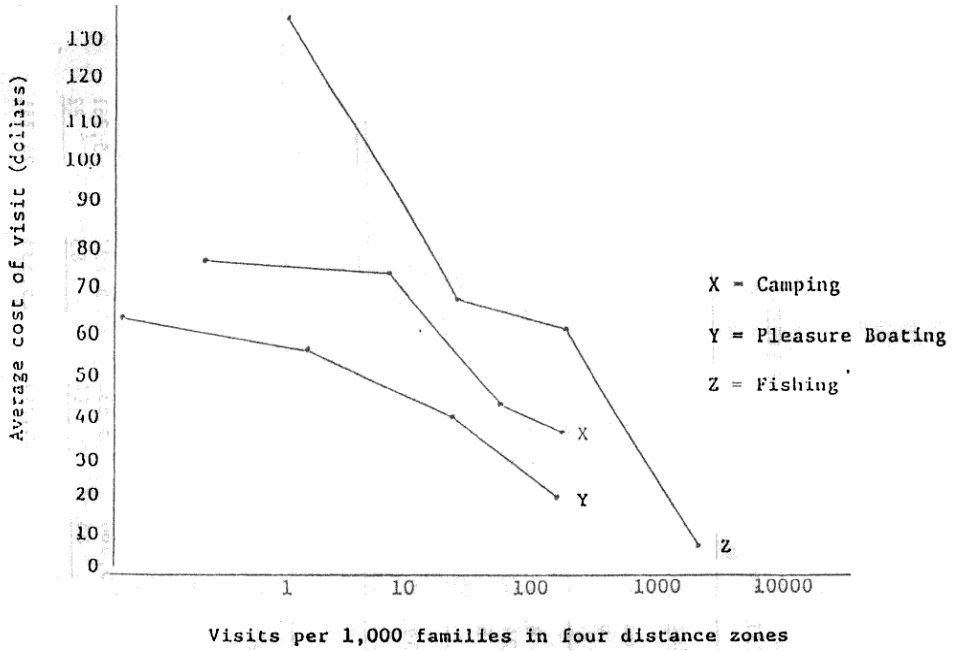
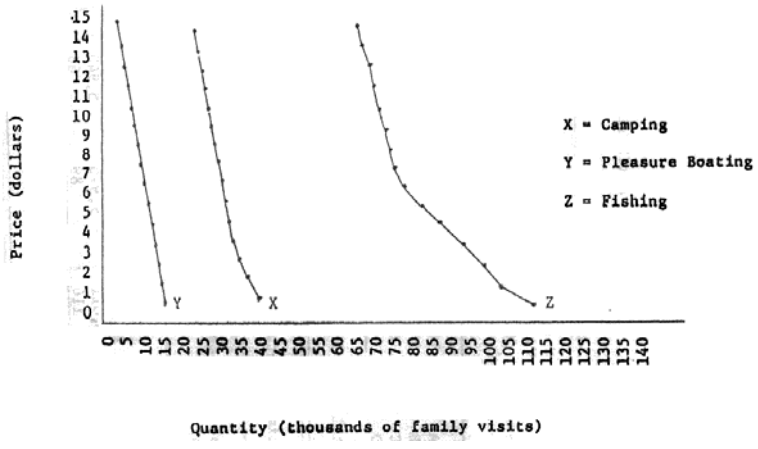


Exhibit 6: Demand for camping, pleasure boating, or fishing.



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