AN EXAMINATION OF ALTERNATIVE METHODS FOR DETERMINATION OF DEMAND FOR OUTDOOR RECREATION

by

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INTRODUCTION

Outdoor recreation is flourishing, as a look at the statistics of attendance in almost any recreation area will show.

Outdoor recreation is " a use of land and water which often compete against other potential uses of land, both in terms of the value of its output and in the political arena".[1] As a result of the outdoor recreation boom, land for recreational development is increasing rapidly in value.

An economic analysis of outdoor recreation planning is usually concerned with the balance of the recreational supply and demand equation and with the relationship between the demand for outdoor recreation and the optimal siting and development of outdoor recreation facilities. When the supply equals or exceeds the demand, the supply is adequate, at least for the present. One important question facing us now is whether the resources are adequately meeting the current demand.

Fundamentally, studies of the demand are important. They must include a study of the patterns of behavior of individuals in the use of all kinds of recreation areas. Only then can one find the explanation and analysis of the problems to develop recreation planning and policy formulation.

In the past, however, there has been a bias in outdoor recreation planning in favor of giving more attention to supply than demand. When demand has been noted, realistic and practical

bases for park usage projections and urban area standards have not been given.[2]

Clawson was first to say that a study into recreation demand should begin with research to determine the best methods of collecting data on recreational activity and on use of recreation area.[3]

This paper will review the methods that planners currently use to estimate the demand for outdoor recreation. It will emphasise methods that public agencies can use. At the same time, it will develop a rational, comprehensive method for relating the demand for outdoor recreation in a given area to the location of the recreation facility and the activities that might best be developed at the location. This is necessary for decision purposes.

Before surveying the methods, certain terms should be defined. This is desirable because the same word means quite different things to different people and cause much misunderstanding and vagueness. It is also desirable to explore the probable future trend of some of the socioeconomic factors which affect the quality and quantity of demand for outdoor recreation.

Definition of Terms

There seems to be a general acceptance of the terms listed below:[4]

Recreation - Any leisure activity which is pursued for its own sake.

Outdoor Recreation - Leisure activities which utilize an outdoor area or facility.

Activity - A medium through which individuals satisfy their recreation needs and interests. Recreation activities are performed during leisure and may be of a passive or active nature.

Standard - A measure for the allocation of resources to existing or potential needs as determined by stated objectives.

Demand - "Demand" as applied to outdoor recreation, is a word with several meanings. To the economist, it emphasize effective demand - the willingness and ability of people to participate - rather than the mere existence of unsatisfied needs or desires for outdoor recreation.[5] It means a schedule of volume (visits, user-days, etc.) in relation to a price (cost of the recreation experience).[6] To the Bureau of Outdoor Recreation, it is defined as the amount and kinds of outdoor recreation opportunities or facilities the public desires.[7] In the popular sense, it means the total number of visitors. Our primary concern is with the last meaning. Because "regardless of which interpretation one accepts, neither is any reflection of the quality of a recreation experience which may be the more important measure."[8]

Chapter 1

Causal Factors in the Recreation Demand

Planning to meet the demand for outdoor recreation requires an understanding of the factors that promote recreational activities and the development of a model for predictive purposes. In Economics of Outdoor Recreation,[1] Clawson and Knetsch singled out population, leisure, travel ability, and income as the major factors affecting demand. The Outdoor Recreation Resources Review Commission Study Reports also concentrated on population, family income, occupation, place of residence, age, sex, and added the proportion of young people and distance level.[2] Boyet and Tolley found that income, population and distance from the park, as a proxy for price, were the significant explanatory variables.[3] A report by the National Parks and Wildlife Service of New South Wales discussed various factors impinging on park use. These factor were the size, growth, distribution and age-structure of the population; overseas visitors; leisure; income and vehicle registrations.[4] From a survey of household, Ranken and Sinden found that participation in various outdoor recreation activities in Armidale, New Wales, is related to such things as the income of the household, the proportion of adults, average age of the children, the age, education and sex of the household head and, for all but the most accessible areas, the numbers of holidays.[5]

Conclusively, the most predictor variables of the outdoor recreation planning are as follows; population, income, leisure, education, and mobility.

Population

The population is the most important variable associated with recreation demand, and the one which we have extensive information over a long period. In 1800 the population of the United States was 5 million. Fifty years later, 1850, it soared to 23 million. In 1900 the population increased to 75 million. By 1950 it had more than doubled, to reach 151 million. In 1972 it exceeded 210 million.[6] Currently the United States is growing at a record rate of between 2 and 3 million people per year. The consensus of projection lies between 221 and 230 million persons by 1980, and between 250 and 300 million by the year 2000.[7]

Perhaps of more importance, socially, economically, and for recreation planning, has been the shift of population from rural to urban areas. The United States has changed from a rural nation of 4 million people in 1790 to an urban one of approximately 203 million in 1970. In 1970, over 68 percent of Americans live on 10 percent of the land in 243 metropolitan areas.[8]

In addition to the total population and urbanization, the kinds and the amount of recreation demanded are affected by the age distribution, household, race, ethnic background, physical

condition, and geographic location (see Appendix A). Much of this information is available in the United States Census of Population and there is no need to duplicate it here.

Income

In terms of purchasing power per capita, the interest or demand for outdoor recreation can be measured. The use of income may be divided into that of basic subsistence and that which is discretionary. Although many outdoor recreation activities are free, the amount of discretionary income is more important than actual income.

According to the statistics, in 1950 average personal income per person in United States was $ 1,501, and by 1960 it had increased to $ 2,219. By 1970 per capita income had reached $ 3,935; in 1971 it was $ 4,160; and in 1972 it exceeded $ 4,480. Economists predict that in the later 1970's personal income for every man, woman, and child in the United States will reach $ 4,800.[9]

Recreation expenditure as percentage of disposable personal income has varied from 5.8 percent to 6.5 percent between 1950 and 1970.[10] It has been estimated that today we spend 10 percent of discretionary income on sports and outdoor recreation.[11] All trends of personal discretionary income are upward for foreseeable future. Clawson projects that expenditures for outdoor recreation in 2000 will be eight times these of 1966.[12]

Leisure

Leisure, any portion of an individual's time not occupied by gainful employment or in the pursuit of essential activities, provides the time dimension for outdoor recreation and has clearly an important association with outdoor recreation.[13] The amount of leisure is closely dependant upon each individual and his stage in life.

Ott Romney estimates that for the typical American adult, leisure is approximately 5 hours per day. He defined leisure as the time remaining after a minimum level of existence and subsistence have been accomplished.[14] A study, Summary of United States Time Use Survey, indicates that the average married working man or the housewife spends 20 percent of every average working day in non-essential activities. And the average working adult has 5.1 hours of free time per average day, and of this only 1.4 hours are spent in outdoor leisure. Of this outdoor leisure, an estimated 0.1 hour is spent in local public parks with the remaining 1.3 hours spent for outdoor gardening, walking, reading, and conversation.[15]

These figures are an approximation, but do give us an idea how much leisure we have, what the distribution of leisure and the size of its increments are. These are very important factors in planning for outdoor recreation.

As the work week becomes shorter and vacation periods become longer, an "enormous" rise in the time spent on outdoor recreation can be foreseen in the future.

Education

Education has two influences on planning for outdoor recreation. First, the more years of education one has, the higher income he demands. Higher income influences what people do for recreation and where they go to practice it. Second, the further a person is educated, the broader his horizon of interests, appreciations, and skills in recreational pursuits are likely to be.

Table 1 shows the relationship between the purpose of a trip and the education of the household head in 1967. There is, however, one exception to this generalization. Men with a college education participate less than men who are only high school graduates. These educational findings reflect in part age and income differences. Those of minimal education in this country tend to mostly older people who, as we shall see, participate less in outdoor activities. Yet, education itself, does have a distinct bearing on interest in outdoor recreation, even after the influence of this factor is taken into account.

TABLE 1

Person-Trip-Distributions by Purpose of Trip and Travel and Education of Household Head: 1967

Education of Household	Person Trips		Percent Distribution by Purposes of Trip							
	Millions	Percent	Visit to Friends & Relative	Business	Attend Convention	Outdoor Recreation	Entertainment	Sightseeing	Other Pleasure	Personal & Family Affair
No School/ or Elementary	43.7	100.00	48.6	9.9	1.6	12.7	2.9	6.5	1.6	16.2
High School	159.4	100.00	44.0	9.4	1.6	20.6	3.3	7.8	1.9	11.4
College	154.4	100.00	38.2	19.8	2.9	15.2	3.9	7.0	2.3	10.7
No Answer	3.7	100.00	--	—	—	—	—	—	—	—

Source: U.S. Department of Commerce, Bureau of Census, 1967 Census of Transportation, p. 26, Table 8

Since the population is growing rapidly, a greater number of students are going to school at every level. Table 2 shows school enrollment at any level from 1930 to 1970.

TABLE 2

Enrollment-By Types of School (in thousands) in 1930-1970

Level	1930	1940	1950	1960	1970
Kindergarten	786	661	1,175	2,293	2,821
Elementary	22,953	20,466	21,032	30,119	34,290
High School	4,812	7,130	6,453	9,600	14,518
College	1,101	1,494	2,659	3,216	7,136
Total	29,653	29,751	31,319	45,228	58,766

Source: U.S. Department of Commerce, Bureau of Census, Statistical Abstract of the United States, 1973, p. 107, No. 159

All of this increased attention to education suggests that in the future people will demand more areas, facilities, and programs to satisfy their increased interests, appreciation, and skills.

Mobility

At present America is experiencing rapid changes in its mobility. Transportation can be by land, air, or sea, with increasing rapidity and ease. This mobility determines relative

travel time and amount of outdoor recreation that most people can enjoy. In short, mobility affects outdoor recreation in terms of monetary cost and influences the character of recreation experience.[16]

Today, travel is influenced greatly by the level of automobile ownership. The volume of travel based on means of transport is shown in Table 3. This table also revealed the significance of outdoor recreation accounting for about 10.5 percent of total volume of travel.

TABLE 3

Volume of Travel Based on Purposes and Means of Transport in 1972

	Person-Trip (in millions)		Person-Miles (in billions)	
	Number	Percent	Number	Percent
Means of Transport				
Total	159	100.0	125	100.0
Auto/Truck	133	83.4	80	63.9
Bus	3	2.0	2	1.6
Train	1	0.5	1	0.7
Air	21	13.3	41	32.9
Other	1	0.8	1	1.0
Purposes of Trip				
Visiting	60	37.9	44	35.2
Business	38	23.9	33	26.6
Outdoor Recreation	17	10.5	9	7.5
Sightseeing & Entertainment	17	10.7	16	13.0
Other	27	17.0	22	17.6

Source: U.S. Department of Commerce, Bureau of Census, Statistical Abstract of the United States, 1973, p.211, No.340

The quality and quantity of road systems have also made significant contributions to the volume of travel. In the past two decades, the number of registered cars, highway mileage, and percentage of families owning automobiles is rapidly increasing. Shown in Table 4. For determining the demand for outdoor recreation, the trend of these three factors can not be ignored.

TABLE 4

The Number of Registered Cars, Highway Mileage,and Privately Owned Automobile: 1950-1970

	Motor-Vehicle (in thousands) (1)	Mileage (in thousands) (2)	Family Owning Automobile (percent) (3)
1950	49,300	3,313	59
1955	------	3,418	70
1960	73,869	3,546	77
1965	90,341	3,690	79
1970	108,375	3,730	82

Source: U.S. Department of Commerce, Bureau of Census, Statistical Abstract of United States, 1973, (1) No. 902, (2) No. 889, and (3) No. 905

With the development of airplane routes, people can go farther and faster in search of recreation. Large numbers of people can be delivered to the gates of every outdoor recreation area in the world. This will have significant effects on the demand for outdoor recreation.

The Impact of Energy Shortages on Outdoor Recreation.

There is a question facing us: what is the impact of energy shortages on outdoor recreation services and facilities? In a survey by the National Recreation and Park Association in 1974, it was revealed that recreation facilities were affected by the energy situation: (1) almost one-fourth of the agencies experienced modest decrease of around 10 percent in facility use, and (2) facility use has fallen off moderately (between 10 and 20 percent) in 37.5 percent of the state park agencies. On the other hand, 20 percent of the agencies surveyed in moderately populated cities experienced increased local facility use. 75 percent of the county and special district agencies agreed that efforts to save energy by car-pooling, mass transportation, and reduced speed, substantially affected visitor use.[17]

In a study of supply and demand for energy, William Iulo pointed out that currently transportation accounts for about 23 percent of total energy consumption, but by the turn of the century it will use only 20 percent of total energy consumption. The united States has historically been self sufficient in energy supply, and still is, except for petroleum and small amounts of natural gas. In the current oil emergency, the United States could approach the problems of self sufficiency if each citizen would adopt the idea of saving energy.[18]

From the above discussion we can conclude that mobility does affect the demand for outdoor recreation. But the energy crisis is just a temporary problem. In the long-range, the demand for outdoor recreation is still increasing. Where it is to be located continues to be a question of priorities.

Chapter 2

Alternative Methods of Estimating Outdoor Recreation Demand

Because projection of future demand for outdoor recreation is necessarily uncertain, and because projections have not been made over a long enough period to test accuracy of different techniques, a number of different approaches have been tried. Here the application of four of them, which Robert J. Daiute has called the "major approaches"[1], will be discussed: (1) Clawson Demand Curves, (2) ORRRC Approach, (3) Gravity Model, and (4) Transportation Planning Approach.

Since an adequate comparison of all the above methods is not possible in this report, the emphasis of this chapter will be on the principles and the qualitative advantage and disadvantage of each method.

Clawson Demand Curves

Clawson set out a method to estimate recreation demands.[2] He used the neo-classical demand curve by which the travel costs and other expenses are a factor in determining the demand. It placed numbers of visits to a specific outdoor recreation area along the X-axis, while on the Y-axis are costs of using this recreation opportunity or prices in the economist's sense.

Assume that numbers of people in the tributary area, their incomes, their means of travel, their tastes as to outdoor recreation, all continue unchanged;[3] the demand curve is a schedule of numbers of visitors and scales of prices. The length of the time period being considered here, and in subsequent discussion, is left open.

Estimation of the demand curve for an outdoor recreation area must proceed in two stages: one curve for the total recreation experience, a second one for the recreation opportunity per se. For the first stage, the cost of visiting the park would vary with the distance from the park to the zone involved. Consequently, the number of visits would also vary. To illustrate these ideas, we might take the following form and assume that there are three population zones located at different distances from the park:

TABLE 5

Demand Schedule of Whole Experience for Hypothetical Recreation Area

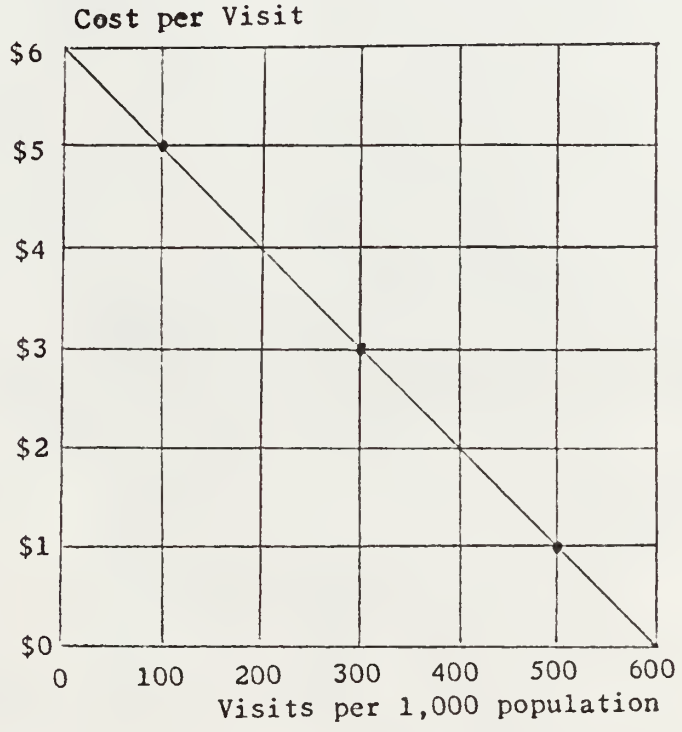
Zone	Population	Cost Per Visit	Number of Visits	Visits Per 1,000 Base Population
A	1,000	$1	500	500
B	4,000	$3	1,200	300
C	10,000	$5	1,000	100

Source: Clawson Marion and Knetsch, Jack L., Economics of Outdoor Recreation, p. 79

In this table, the number of the total experiences from each area varies according to distance from the park. And the number of visitors per unit of total population decreases with increased costs. These data are plotted and a line is drawn through the three points in Figure 1. The linear relationship assumed here is for convenience.

FIGURE 1

Demand Curve for Whole Recreation Experience for Hypothetical Recreation Area



Source: Clawson, Marion and Knetsch, Jack L., Economics of Outdoor Recreation, p. 79

On the second stage, the cost of visiting the area is of major concern, and would include such things as food, lodging, travel, and miscellaneous expenses. It may be noted that without any added cost, total number of visits is 2700. If a charge is made, the number of visits would be expected to decrease. It is this relationship that we are seeking to determine the quantity response to different prices for the recreation visit.

Assume that the entrance fee is $ 1 per visit. The people in zone A, who had been paying a cost of $ 1 per visit, are now faced with the cost of $ 2 per visit. They have been going to the area at the rate of 500 per thousand, but the demand curve of Figure 1 indicates that now they would attend at the rate of 400 per thousand. Similarly the visit rate of zone B falls from 300 per thousand to 200 per thousand, total attendance would drop from the original 1200 to 800. An increase of $ 1 in the cost of attending from zone C would push the cost to $ 6 per visit. The demand curve shows that at that cost the rate of visit would fall to zero; thus no one would be expected to attend from zone C.

The total visits is the sum of each zoned rate of use multiplied by the base population. This, in the case of a $ 1 charge or added costs, gives a total of 1,200. The effects of a $ 2 charge would be to further reduce the number of visits, to 300 from zone A and 400 from zone B, or a total of 700.

A $ 3 charge would result in total visits of 200, all from zone A. A $ 4 charge would result in 100 visits, and a $ 5 charge in no visits. Table 6 is a new demand schedule and Figure 2 is a new demand curve.

TABLE 6

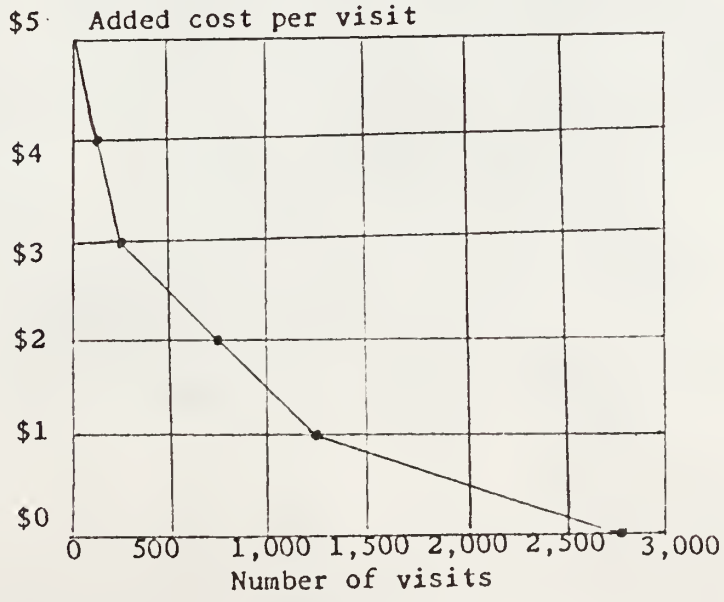
Effect of Increases Cost on Numbers of Visits to Hypothetical Recreation Area

Zone	Number of Visits at Added Cost Per Visit of:					
	$ 0	$ 1	$ 2	$ 3	$ 4	$ 5
A	500	400	300	200	100	0
B	1,200	800	400	0	0	0
C	1,000	0	0	0	0	0
Total	2,700	1,200	700	200	100	0

Source: Clawson, Marion and Knetsch, Jack L., Economics of Outdoor Recreation, p. 80

FIGURE 2

Estimated Effect of Added Cost on Total Visits, Hypothetical Recreation Area



Source: Clawson, Marion and Knetsch, Jack L., Economics of Outdoor Recreation, p. 80

Limitations of Clawson Demand Curves. This method involves a number of limitations.[4] First, it is likely to underestimate the "true" demand for the given resources. This stems from the fact that money costs (or the mileage distances as an index to costs) are not the sole hindrance on visits to a recreation area. The number of alternative opportunities would no doubt increase with increasing distance from the recreation site. Second, it is difficult to put a direct measure on the value of time used for outdoor recreation purpose. It would vary greatly for different individuals, at different times for the same individual, and for going to differ places. Third, in many instances the demand for the recreation resources is implicitly determined by the behavior of people rather than directly as in a market place. More depends on the availability of free time and the time required than upon the monetary price.

Under the assumptions of the procedure, however, this method gives an economical demand relationship. It also gives a stronger basis for meaningful benefits and for introducing economic rationality into outdoor recreation planning. This would supplement other methods of measuring the direct benfits or satisfactions to recreationists.

ORRRC Approach

The Outdoor Recreation Resources Review Commission (ORRRC) takes an aggregative and empirical approach by examining a large number of individual determinants of demand for recreation of different types.[5] Home interviews were conducted to find participation rates for the 17 popular outdoor recreation activities. They took into account variations in rates of participation of various socio-economic factors including family incomes, education, occupation, place of residence, age, and sex. The rates were defined as the number of separate days in which persons 12 years and over participated in the activities. Multivariate analysis was used to isolate the effect of each one of the socio-economic characteristics on demand, and from them to make a projection for 1976 and 2000.

The basic assumption of this approach is that the relationship of demand to socio-economic factors observed in 1960 would continue into the future. This approach can be summarized as follows:

(1) The Gross Effects of Socio-economic Factors

The gross effects from 1960 to target dates on participation rates of each of five socio-economic factors were estimated by reweighting the 1960 rates according to projected distributions of the population by each of these five factors: family income, education, occupation, place of residence and age-sex. The current patterns of partic-

ipation in outdoor recreation were obtained from National Recreation Survey[6] (Appendix B).

Given distribution of the population by socio-economic factors as of 1960, these outdoor activity participation rates when reweighted will show the rates to be expected from changes to 1976 and 2000 in socio-economic factors (Appendix C). For example, using the income factor and the swimming activity, the data are as shown below:

TABLE 7

Gross Effects of the Income Factor and the Swimming Activity

Family Income ($1,000)	1960 Participation Rate	Weights = Proportionate Distribution of Population		
		Actual	Projected	
		1960	1976	2000
Less 1.5	1.20	0.102	0.056	0.032
1.5-3	2.21	.133	.065	.041
3-4.5	4.47	.175	.089	.068
4.5-6	5.02	.211	.124	.068
6-8	6.67	.166	.166	.104
8-10	7.55	.093	.153	.117
10-15	9.49	.087	.232	.318
15 or More	10.05	.032	.116	.251
All	.....	1.000	1.000	1.000

Source: Prospective Demand for Outdoor Recreation, ORRRC Study Report 26, p. 13

By multiplying weights and participation rates within classes and adding the results, it gives weighted averages of 5.2143[7] for 1960, 6.861 for 1976, and 7.892 for 2000. The gross effect upon participation rates to be expected from changes in the income distribution is defined as the percentage changes in weighted rates and, therefore, for swimming, it is equal to the increases for 1960-76 of 31.6 percent and for 1960-2000 of 51.4 percent.

(2) The Net-to-Gross Adjustments

The gross effects were reduced to a net basis by adjustments developed through multivariate analysis. The multivariate analysis of the net effects of socio-economic factors upon outdoor recreation participation rates for specific activities was prepared by the Survey Research Center[8] (Appendix D).

Again income is used as the example:

TABLE 8

Deviation From Average Swimming Activity by Income Factor

Family Income (1,000)	Deviation from Average		Net Effect ÷ Gross Effect
	Gross Effect (Unadjusted)	Net Effect (Adjusted)	
Less than 3	-2.49	-1.06	0.43
3 - 5	- .12	- .11	.92
5 - 7.5	+1.19	+ .41	.35
7.5 - 10	+1.79	+1.24	.69
10 or More	+1.44	+ .46	.32

Source: Prospective Demand for Outdoor Recreation, ORRRC Study Report 26, p.13

A constant adjustment was estimated for income at 0.44 by averaging the observations within all class intervals. A similar analysis was made for the four additional factors and the net-to-gross adjustments were shown as follow.

TABLE 9

Net-To-Gross Adjustments for All Activities

Factor	Estimated Constant Net ÷ Gross Ratio	Proportion of Persons 12 Years and Over Included NRS	Adjustment Applicable to Gross Effect of Factor
Family Income	0.44	1.00	0.44
Education	.50	.71	.36
Occupation	.35	.58	.20
Place of Residence	.75	1.00	.75
Age-sex	.67	1.00	.67

Source: Prospective Demand for Outdoor Recreation, ORRRC Study Report 26, p.13

Using the adjustment ratios in the third column above, the net effect upon participation rates of changes expected in the factors can be derived. For example, the gross effects of expected changes from 1960 in family income upon swimming participation rates were expected to raise these rates 31.6 percent for 1976 and 51.4 percent for the year 2000. Applying the 0.44 adjustment found for the income factor yields the net increases expected as the result of family income changes of 14 percent for 1976.

(3) Two Additional Factors

The net effects associated with expected changes in leisure and in opportunity were each estimated directly as follows:

Net Effect of Expected Changes in Leisure.

Changes in hours worked, the number of holidays, and the length of paid vacation are considered as three measures of leisure. All these three measures are available by occupation for 1960 and projected to 1976 and 2000 for the labor force as a whole (Table 10).

TABLE 10

Three Measures Pertaining to Leisure: 1960 by Occupation and Projections for 1976 and 2000 for the Labor Force

	Hours Worked	Weeks Vacation	Holidays
1960	38.5	2.0	6.3
Professional	38.5	2.8	8.4
Managers & Officials	47.4	2.9	7.6
Clerical & Sales	36.2	1.9	6.4
Craftsmen	38.9	2.1	6.3
Operators	37.2	1.8	5.8
Service	35.0	1.3	4.2
Farm	44.5	.7	3.9
1976	35.4	2.8	8.5
2000	30.7	3.9	10.1

Source: Projections to the Years 1976 and 2000, ORRRC Study Report 23, p.72

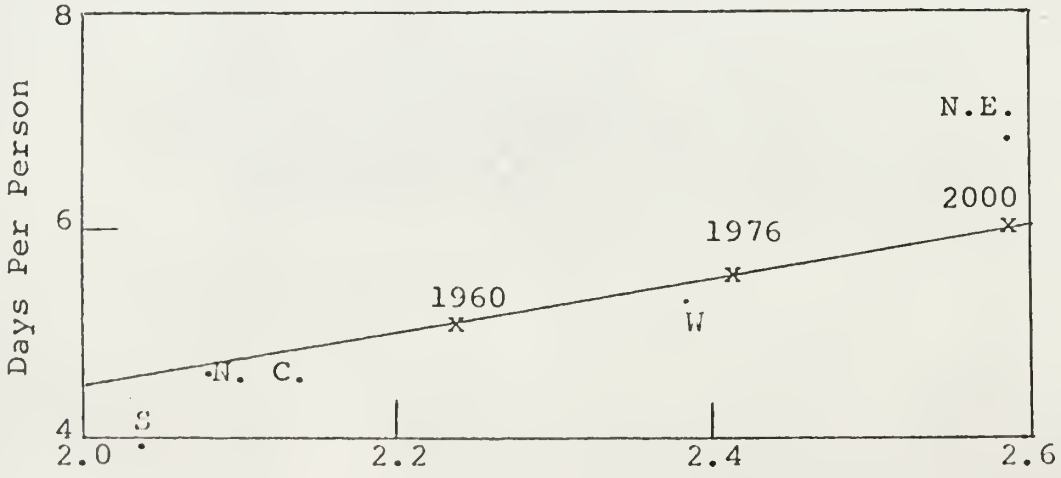
Very similar rates were obtained for 1976 and 2000 from each of the three measures of leisure, not only for swimming but for most other activities as well. For hunting and bicycling, no relationship between leisure and participation was apparent across occupations, and the net leisure effect was taken as zero.

Net Effect of Changes in per Capita Opportunity.

An approach similar to that used for leisure was used to measure the effect of changes in opportunity. The 1960 measures of opportunity employed are from Recreational Opportunity Ratings for 66 Primary Sampling Unit Areas[9] (Appendix F). Days per person rates were plotted against average opportunity scores across regions. Figure 3 shows the results for swimming.

FIGURE 3

Swimming - Relationship between Opportunity and Participation Estimated through Regions



Source: Prospective Demand for Outdoor Recreation, ORRRC Study Report 26, p.18

A line is drawn to describe the apparent net relationship through the 1960 averages on these charts. It was then assumed that changes in opportunity would result in movement of the U.S. average along this line in the direction of the best region. Such considerations were taken into account in making a judgment decision about how far, relative to the best region, to move the average for 2000 (1976 being taken as halfway in all cases).

(4) Composite Effect of Factors on Participation Rates.

The composite effect of all seven factors acting together was then estimated from these net effects to secure projected rates of participation for each activity.The effect of factors on swimming participation rates is used below as the example.

TABLE 12

Composite Effect of Factors on Swimming Participation Rates

Factor	Net Effects of Changes in Factors (Percent Change in Participation Rate)	
	1960-76	1960-2000
Net Effects:		
1. Family Income	14.0	22.7
2. Education	6.2	12.3
3. Occupation	.7	1.4
4. Place of Residence	.8	2.2
5. Age-sex	.8	3.5
6. Leisure	7.9	18.6
7. Opportunity	8.3	16.5
Composite Effect Factors:		
1 through 6	33.7	75.3
1 through 7	44.8	104.2

Applying the above effects to swimming participation rates and projections of the population:

TABLE 13

Projections of the Population of Swimming Participation

Factor	Actual Nrs 1960	Projected 1976	Projected 2000
June-August Occasions Per Person:			
6 Factors	5.15	6.89	9.03
7 Factors	5.15	7.46	10.52
Population 12 Years and Over (millions)	130.5	171.5	255.5
Number of June-August Occasions (millions):			
Without Opportunity Factor	672	1182	2307
With Opportunity Factor	672	1279	2688

Source: Prospective Demand for Outdoor Recreation, ORRRC Study Report 26, P. 17

The same procedures were then applied to total population estimates to arrive at the total number of recreation occasions during 1960 and projections for the year 1976 and 2000.

TABLE 14

Number of Occasions (millions) by Persons 12 Years and Over in Selected Activities 1960, 1976, and 2000

Occasion	1960	Without Opportunity Factor		With Opportunity Factor	
		1976	2000	1976	2000
All Activities	4,377	6,926	12,449	7,444	14,371
Driving for Leisure	872	1,341	2,215	1,420	2,476
Swimming	672	1,182	2,307	1,279	2,688
Walking for Leisure	566	856	1,569	-----	-----
Playing Outdoor Games or Sports	474	825	1,666	861	1,804
Sightseeing	287	456	825	597	1,359
Picnicking	279	418	700	468	864
Fishing	260	350	521	---	---
Bicycling	228	297	452	---	---
Attending Outdoor Sports Events	172	252	416	266	465
Boating Other than Sailing or Canoeing	159	285	557	312	664
Nature Walks	98	153	263	---	---
Hunting	95	123	174	127	181
Camping	60	113	235	149	388
Horseback Riding	55	82	143	---	---
Water Skiing	39	84	189	93	225
Hiking	34	63	125	84	207
Attend Outdoor Concerts, Drama, etc.	27	46	92	50	102

Source: Prospective Demand for Outdoor Recreation, ORRRC Study Report 26, p. 22

Limitations of ORRRC Approach. There are some Limitations on use of this approach.[10](1) This is suitable only for a nationwide plan. But more than that is needed at the state and local level in making decisions about establishing and developing selected areas from a range of possible sites.For example, Daiute indicates that for local planners, service areas must be identified, specific local rates of activity measured, relative benefits, and cost measured, and programs adapted continuously to specific changes in local recreation and population characteristics. (2) With families engaging in recreation activity as families, some serious errors in the magnitude of measured demand can result, with respect to the age group of 12 years and over. (3) It is not proper to limit conscious attention to only a few outdoor recreation activities. (4) Assumptions should be revised from time-to-time when events require it. Projections should be revised and modified in light of other types of planning information as well.

Gravity Model

The concept of gravity as developed by Isaac Newton in 1686 is adapted by the Gravity Model. This model is based on the assumption that trip interchange between zones is directly proportional to the relative attraction of each zone and inversely proportional to some function of the spatial separation between zones.[11] It is simple to understand and apply and is

well documented. Thus, it has been widely used and successfully applied to several social phenomena.[12] However, the successful use of models in the recreation field has not yet beocme widespread, despite frequent appeals. Michigan Outdoor Recreation Demand Study is an example of developing the gravity model for spatial recreational analysis.[13]

Mathematically, the Gravity Model is stated as follows:

$$T_{ij} = P_i \frac{A_j K_{ij}}{\sum_{j=1}^{n} A_j F_{ij} K_{ij}}$$

Where

T_{ij} = predicated visitors from zone i to recreation area j

P_i = population of zone i

A_j = attraction index of recreation area j

F_{ij} = empirically derived travel time or distance factor which expresses the average areawide effect of spatial separation on trip interchange between zones which are t_{ij} apart.

K_{ij} = a specific zone-to-zone adjustment factor to allow for the incorportation of the effect on travel patterns of factors not otherwise accounted for in the gravity model formulation

Calibration of the Gravity Model consists essentially of four steps:[14]

(1) Assume a set of travel time factors (F_{ij}) to express the average areawide effect of spatial separation on trip interchange between zones. After each iteration, new F-factors were calibrated by:

$$F_{adjusted} = F_{used} \cdot \frac{O\text{-}D\ \%}{GM\ \%}$$

The adjusted values are plotted and a smooth curve drawn through the points. Values for the next iteration are taken from the curve.

(2) Adjust zonal trip attraction values to assure that the trips attracted to each zone by the Gravity Model agree with the zonal control data obtained by the O-D survey. This is accomplished by adjusting the attraction of each zone as follows:[15]

$$A_{revised} = \frac{A_{OD}}{\sum_{x=1}^{n} T_{(x-1)}} \cdot A_{OD}$$

The necessity for this phase would vary from city to city. It would require larger adjustments in larger metropolitan areas with a great deal of decentralization of employment and shopping facilities.

(3) Account for topographical or geographical barriers (i.e., mountains, rivers, large open space) which tend to bias modal result.

(4) Account for social and economic factors which affect travel patterns but are not otherwise considered by the model. The Washington D.C. Study expressed this zone-to-zone adjustment factors as follows:[16]

$$K_{ij} = R_{ij} \frac{1 - X_i}{1 - X_i R_{ij}}$$

Where

K_{ij} = adjustment factor to be applied to movements between zone i and recreation area j

R_{ij} = ratio of O-D survey results to the Gravity Model results for the movement between zone i and recreation area j

X_{ij} = ration of O-D trip from zone i to recreation area j to total O-D trips leaving zone i

Limitations of Gravity Model. The Gravity Model is sensitive not only to changes in travel time between zones but also to competition between land use. It is relatively inexpensive and easy to understand and apply. But there are many weakness in this model: (1) Average travel patterns cannot be applied to all zones within the urban area, since there is considerable variation in the social and economic characteristices of each zone population. (2) The exponent of distance is not necessarily constant from place to place or from time to time, because trip length distribution does not remain constant through the urban area. (3) The changing nature of distance (in terms of travel resistance) between zones with time of day makes questionable the use of a single value of travel time,

regardless of the transportation facilities available. (4) As the distance between zonal centroids decreases to zero, the number of trips predicted between two zones becomes infinitely large. (5) The model tends to show only approximate agreement with field data when the zones and cumulative traffic volumes are small. (6) This model requires a considerable manipulation of proportionality factors in order to produce results comparable to observed traffic patterns.

Transportation Planning Method

Many transportation planners have used the opportunity model to estimate trip distribution from a series of zones to a specific park. There are two basic opportunity models: (1) the intervening opportunities model, and (2) the competing opportunities model. Both methods introduce the theory of probability as the theoretical foundation on which the trip distribution is based, and were developed as the result of research undertaken in connection with the Chicago,[17] Pittsburgh,[18] and Penn-Jersey[19] transportation studies.

The competing opportunities model has not to date been fully utilized in a major transportation study nor tested as comprehensively as the other models. Attempts at its use have shown that calibration is quite difficult since uniform time bands are not applicable in many cases and there is no simple procedure for selection of nonuniform time bands.[20] Therefore,

here we will limit detailed discussion to the intervening opportunities model.

Intervening opportunities model was originally proposed by Stouffer[21] in a simple form, assuming that the number of trips from an origin zone to a destination zone is proportional to the number of opportunities at the destination zone, and inversely proportional to the number of intervening opportunities.

In essence,this model can be represented by the following mathematical formulation:

$$T_{ij} = P_i \left(e^{-LA} - e^{-L(A+A_j)} \right)$$

Where

T_{ij} = the number of trip from zone i to recreation area j

P_i = the total trip produced by zone i

A_j = the total trip attracted by recreation area j

e = the base of natural logarithms (2.71828)

L = the measure of probability that a random destination will satisfy the needs of a particular trip

A = trip destinations considered prior to recreation area j

Several methods of calculating the parameter "L" have been used.[22] Because of the difference between urban and outdoor recreation traffic characteristics, these methods proved to be quite difficult to utilize in this research. The following method was used by Bob L. Smith and E. D. Landman[23] for calcu-

lating the value of "L". They used the Sedgwick County and Fall River Reservoir as an example.

Substituting known values into the opportunities model formula, it becomes:

$$1371 = 1882 \left(e^{-L(0)} - e^{-L(0+1954)} \right)$$

Where

T_{ij} = 1371 (trip interchange)

P_i = 1882 (productions in Sedgwick County)

A_j = 1954 (trip ends attracted to Fall River Reservoir)

Since $e^0 = 1$

$$\left(e^{-L(0)} - e^{-L(0+1954)} \right) = 1 - e^{-1954L}$$

$$\text{then } L = \frac{- \text{Log}_e \left(1 - \frac{1371}{1882}\right)}{1954} = 0.000647$$

The trial "L" was used in the opportunities model program for the first iteration. New values of "L" were calculated by:

$$L_{new} = L_{old} \frac{CATL}{ATL}$$

Where

CATL = the average trip length resulting from the distribution using L_{old}

ATL = the average trip length of the interview data

The "L" after the final iteration was 0.000690

Limitations of Opportunity Model. The basic assumption of this model (that a trip prefers to be as short as possible, lengthening only as it fails to find an acceptable destination) is closer to the basic reasons for interzonal travel than the assumptions underlying the Gravity Model. But the disadvantages of this model has been: (1) Difficulty in determining "L" factor. The "L" values have been shown to change with time. (2) The number of trips received at a zone do not necessarily agree with the number provided. (3) Cost inherent with obtaining necessary input data.

Conclusions

Each of these techniques discussed above has some merit under some circumstances, but each has major weaknesses. Each of these approaches requires judgments at numberous steps. Attempts to use any method have shown that the socio-economic factors change with time and there is no simple method accounting for basic change. It is more important to notice that no method is infallible in long-run projection of a highly dynamic phenomeum such as outdoor recreation, especially when the quantitative history is so short.[24] We now turn to an approach which Clawson calls the "judgment approach".[25]

Chapter 3

Judgment Approach

To arrive at a judgment of future demands for outdoor recreation, the following factors seem relevent: (1) the philosophy of leisure, (2) standards, and (3) capacity.

The Philosophy of Leisure

"Only after a study of the needs, motivations, desires and habits of people is it possible to determine how best to utilize physical resources, meet recreation needs, stimulate the economic climate for the functioning of resources, and provide a congenial living environment."[1]

To pursue this problem,one should have some knowledge of the philosophical meaning of leisure. Primitive man does not make the clear distinction between work and leisure that we tend to make in modern society. He faced a struggle for mere physical existence. From warlike Sparta to Cultural Athens to the deteriorated Roman Empire, the importance of recreation pursuits was recognized, but the objectives varied. In the Golden Age of Pericles (500-400 B.C.), the Athenian philosophers believed strongly in the unity of mind and body and in the importance of all forms of human qualities and skills. They recognized the need for leisure and amusement. Aristotle commented that it was necessary to work vigorously and to defend the state in order to secure leisure: "Leisure is preferable to work, it is the aim of all work."[2]

In the Middle Ages, Europe was held together primarily by the unifying influence of the church. Medieval civilization was characterized by class distinctions and a categorized "belonging", which influenced choices of leisure activity. For example, the lord protected the land; the serf or peasant tilled the land; the guildsman worked at a craft; and the clergyman administrated both education and religion. The lords had ample leisure, the serfs had little time for revelry after the fields were tilled, the animals cared for, and the grain pounded. With the strong religious attitude, the church dominated choices of recreation activity, with a noticeable abstinence of physical games and contests or arena spectator-activities of classical times. Such authority had intermittent influence down through the Puritan period in American life.[3] Neverthless, Hulme suggests that life was not all work for the lower classes. There were village feasts and sports, particular joking, throwing weights, cockfighting, bull-baiting, and other robust exercises. Ball games and wrestling, in which men of one village were pitted against men of another, sometimes resulted in bloodshed. On holiday, there was sometimes dancing on the green, miracle and morality plays.[4]

The Renaissance is a term used to designate a time between the Middle Ages and the modern world. During the Renaissance, life became marked by increasingly elaborate forms of amusement. There was increasing interest in plays, both as a form of popular

entertainment for all classes, and as a medium of education. The old identification with caste diminished, and new social, economic, and cultural strata were formed. The aristocracy and the bourgeoise alike presented plays in their leisure. Town planning was characterized to some degree by wide avenues, long approaches, vistas of handsome buildings, and similar monumental features. As the nobility began to acquire sizeable estates and to develop elaborate gardens, some of these were opened to the public. Increasely, cities were equipped with large public squares and courts where gatherings and entertainments might take place.[5]

During the Industrial Revolution, industry was taken out of the home and the small workshop. This had four major effects: it created a new urban society; it established a new, industrial way of life; it gave birth to a strengthened work ethic, which pervaded all social values and beliefs; and, finally, it encouraged more widespread recreational participation.[6] However, Cutten has expressed a negative side of leisure: "the coming of the machine before man was ready for it has forced leisure upon us... The result is calamity... every extra hour of leisure adds in geometrical progression to the danger."[7]

The literature is rich with many more examples of the positive and critical views of leisure in a Post-industrial society. If there is any point of common agreement, it is that leisure will be either a significant social problem or positive

potential, and the choice will depend on the development of a philosophy of the meaning and place of leisure in America.[8]

In contrast to the Western system, the philosophy of leisure within the Soviet Union and Communist China have been closely linked to the promotion of "socialist discipline" and the development of communal solidarity and morality. All forms of recreational activity are used to promote national propaganda and social control. Within all the arts and media of communication, rigid censorship is exerted.[9]

In Asia, except Japan, the mass of people still live in small agricultural communities, where there are frequent festivals and village fairs, where popular events such as dancing, music, folk dramas, and traditional games take place. Recreation has traditionally come through the home, religion, private clubs, and great national festivals. The concept of organized recreation with trained leaders and government responsibility is meeting serious obstacles of vast needs, little money, and lack of government interest.[10]

In Japan, leisure and consumption are considered evil if they are not licensed by the government, either in terms of one's specific station (e.g. women do not have drinking parties) or or in terms of general holidays. They have tended to speak of leisure as the pursuit of selflessness.[11] They still carry on many of their traditional recreational activities while Western activities are quickly achieving popularity. These traditional activities include music, drama, outdoor activities,

crafts, sports, hobbies and art and ritual along with such combative activities as sumo, kendo, and judo.[12] New Western activities include baseball, hockey, basketball, boxing, track and field, tennis, golf, and swimming.

The older countries of Africa have highly developed recreation systems. Blessed with a particularly rich heritage in its natural environment, many of the developing countries are struggling to provide recreation in a changing environment. They are also working to preserve their unsurpassed national resources.[13]

Philosophizing leads one to consider the meaning of patterns in outdoor recreation activity. For example, Jane Jacobs has described the pattern of the activities of city life, such as the practice of children playing on the sidewalk. Given a sidewalk of sufficient width, children can play their games in comparative safety near to their homes and under the observation of thousands of people, even though strangers, each day.[14]

The total metropolitan area is made up of pockets of different neighborhoods and different towns and counties, each with a variety of different needs. The interrelationships of human needs and the interdependence on the same resources within a metropolitan area or region need to be studied. This is an extremely complicated task. No national quantitative guide or standard can uncover the formula for such planning. The following type of approach suggested in Open Space for Human Needs

is highly promising:[15]

What type of an environment is wanted? What types of outlets do people desire? What kinds of recreation activities are liked? What sorts of escapes and challenges do different groups of population seek? Are distant recreational facilities needed if less crowded, more varied, and more accessible close-in facilities are available? Do people "drive for pleasure", for lack of anything better to do, or because they enjoy it for its own sake? Are people afraid of exposure to wild, undeveloped, natural areas? What type of social interactions are wanted which can be fostered by manipulation of spaces and resources? These are some of the questions which need to be asked.

Standards

Standards are another link between supply and demand. Recreational land is very susceptible to quantitative standards. The estimation of space requirements for outdoor recreation areas employ two criteria,[16] one based on population and the other based on site size. The population standards indicates the number of people served per facility, and thus, when used in relation to forecast population of the planning area, provides a rough measure of the number of facilities required. When a minimum site-size standard is applied to the number of facilities thus derived, a crude estimate of the minimum acreage of

space is obtained for each type of facility. Final space requirements are an upgraded version of these minimum needs, with higher standards, in effect, achieved in the course of fitting facilities to particular sites. Table 15 summarizes some of the commonly used standards.

There has been no national effort to classify standards by type, function, orientation or scale. Several authors have attempted partial classifications but no simple source has developed anything comprehensive. There are five major orientations of standards and, within each, a number of variations. These variations of types are summarized in Table 16. The possible combinations and proportionate weights of each type of standards in any given situation could have a bearing on the relative effectiveness of all standards used to plan, develop or manage an area or park system.[17] A more recent advance in the development of standards are those resulting from behavioral research and environmental psychology such as Clare Cooper Marcus' "Children in Residential Areas: Guidelines for Designers."[18]

Various planning agencies have adopted the recreation area standards which were recommended by the National Recreation Association on acreage requirements for outdoor recreation in urban places.[19] Many others exceed those recommended by the NRA or other sources. An abstract of the literature is summarized in Table 17. This table only illustrates the playground, but it is indicative of the similarity in standards for most types of urban facilities.

Standards for Recreational Activities

tandards for Recreational Activities

Type of Recreational Activity	Space Requirements for Activity Per Population	Ideal Size of Space Required for Activity	Recreational Area Wherein Activity May Be Located
ctive Recreation			
1. Children's Play Area (with equipment)	0.5 acre/1,000 pop.	1 acre	Playgrounds-Neighborhood Parks Community Parks, School Playground
2. Field Play Areas for Young Children	1.5 acres/1,000 pop.	3 acres	Playgrounds-Neighborhood Parks Community Parks
3. Older Children-Adult Field Sports Activities	1.5 acres/1,000 pop.	15 acres	Playfield-Community Park District Park
4. Tennis-Outdoor Basketball Other Court Sports	1.0 acres/5,000 pop.	2 acres	Playfield-Community Park
5. Swimming	1 outdoor pool/25,000	Competition size plus wading pool 2 acres	Playfield-Community Park
6. Major Boating Activities	100 acres/50,000	100 acres and over	District Park-Regional Park or Reserve
7. Hiking Camping-Horseback Riding-Nature Study	10 acres/1,000 pop.	500–1,000 acres	Large District Park-Regional Park
8. Golfing	1–18 hole course per 50,000 pop.	120 acres	Community Park-District Park
assive Recreation			
1. Picnicking	4 acres/1,000 pop.	varies	All parks
2. Passive Water Sports Fishing-Rowing-Canoeing	1 Lake or Lagoon per 25,000 pop.	20 acre water area	Community Park Special Regional Reservations
3. Zoos, Arboretums, Botanical Gardens	1 acre/1,000 pop.	100 acres	Large District Park or Special Facility
ther			
1. Parking at Recreational Areas	1 acre/1,000 pop.	varies	Playfields, Community, District & Regional Parks
2. Indoor Recreation Centers	1 acre/10,000 pop.	1–2 acres	Community Parks
3. Outdoor Theaters, Band Shells	1 acre/25,000 pop.	5 acres	District Parks

tandards for Recreation Areas

Type of Area	Acres Per 1000 Population	Size of Site Ideal	Size of Site Minimum	Radius of Area Served
Playgrounds	1.5	4 acres	2 acres	0.5 miles
Neighborhood Parks	2.0	10	5	0.5
Playfields	1.5	15	10	1.5
Community Parks	3.5	100	40	2.0
District Parks	2.0	200	100	3.0
Regional Parks and Reservations	15.0	500–1,000	varies	10.0

TABLE 16

A Classification of Selected Types of Recreation Standards*

General Orientation	*Specific Type*	*Measurement Units*	*Illustrative Examples*
Recreation use	Population ratio	Area/population	1 acre neighborhood park/1000 pop.
	Recreation demand	Area/user group	1 acre playground/600 children
	Percent of area	Area/planning unit	10% of planning unit area
Recreation development	Facility to site	Units/acre	16 picnic tables/acre
	Facility placement	Distance bet. units	Picnic tables 50 ft. apart
	Facility to activity	Units/user group	1 softball diamond/10,000 pop.
	Facility size	Area/facility	3-5 acres neighborhood playground
Carrying capacity	User to resource	Users/site	400 people/mile of trail/hr.
	User to time	Users/time/site	50 people/mile of trail/hr.
Recreation program	Activity to population	Activity/population	1 arboretum/10,000 pop.
	Leadership requirements	Leaders/activity	2 leaders/100 children
Recreation management	Supervision to users	Staff/population	1 supervisor/1000 users
	Maintenance to site	Degree/area	1 laborer/10 acres playground

* Abstracted and adapted from a number of sources listed in the Bibliography.

Source: Gold, Seymour M., Urban Recreation Planning, (Philadelphia: Lea & Febiger, 1973), p. 151.

TABLE 17

A Summary of Recommended Space Standards for Neighborhood Playgrounds

Reference Source	Acres/ Pop.	Maximum Service Radius (Mile)	Minimum Size (Acres)	Max. Pop. Served	Year Published
BOR[a]	1/800	½	4	8,000	1964
NRPA[b]	1/800	½	2.75	8,000	1967
Meyer and Brightbill[c]	1/800	½	3-5	5,000	1964
Butler[d]	1/800	½	3	7,000	1959
Nez[e]	1.5/1000	½	4	variable	1961
Chapin[f]	1/800	½	5	variable	1965
Doell[g]	1/1000	½	6	8,000	1963
FSA[h]	1/800	½	2.75	5,000	1955
APHA[i]	1/800	½	2.75	5,000	1948
Average	1/800	½	3	6,000	1960

[a] BOR, *Guidebook for State Outdoor Recreation Planning*, p. 47.
[b] NRPA, *Outdoor Recreation Space Standards* and other publications.
[c] Meyer and Brightbill, *Community Recreation*, pp. 402-404.
[d] Butler, *Introduction to Community Recreation*, p. 31.
[e] G. Nez, *Urban Land*, May 1961, p. 4
[f] Chapin, *Urban Land Use Planning*, p. 449.
[g] Doell, *Park and Recreation Administration*, p. 16.
[h] Federal Security Agency, *Planning for Recreation in Small Towns and Cities*, 1955.
[i] American Public Health Association, *Planning the Neighborhood*, 1948.

Source: Gold, Seymour M., Urban Recreation Planning, (Philadelphia: Lea & Febiger, 1973), p. 162

It is apparent, however, that the development of quantitative standards to guide outdoor recreation planning does not appear to be feasible or desirable. The amount of land to be designated for outdoor recreation purpose depends on the region's natural features and on regional comprehensive planning objectives. These include what is considered needed in space requirement for given recreation activities, travel distance to recreation site as related to proportion of population that will engage in recreation, the natural drainage patterns in the urban area, the character of the terrain, the aggregate amount of land considered uneconomic to develop for other uses, the financial ability of public agencies with maintenance functions, and so forth.

It can be concluded, therefore, that such standards can serve as only approximations of demand determination and supply-demand relationships.[20]

Capacity

Capacity refers to the number of people an outdoor recreation area can accommodate and maintain at a desirable level of landscape quality for a given recreational experience.[21] It is the link that relates the physical setting to perceptions, preferences, and activities of people engaged in outdoor recreation. It denotes the limits on the ability of the physical environment to meet the desire of people for outdoor recreation.

It connotes the desire and ability of people to use their physical setting for leisure purpose.[22]

The National Environmental Policy Act of 1969 suggested that project plans include consideration of:

(1) The probable impact of the proposed action on the environment, including impact on ecological systems such as wildlife, fish,and marine life.

(2) Any probable adverse environmental effects which cannot be avoided.

(3) Alternative to the proposed action.

(4) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-range productivity.

(5) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

(6) Where appropriate. There should be a discussion of problems and objections raised by other Federal agencies and state and local entities in the review process and the disposition of the issues involved.[23]

An analysis of the capacity of the resources for the region to be planned is the first activity in the recreation planning process. Such analysis would include a study of the quantity and quality, current and potential uses, economic value, recreational functions, and amenities of the resources.

Maps, descriptions, and studies would cover the following:[24]

Water resources: streams, rivers, lakes, ponds, reservoir, ocean;

Land resources: soils, including prime agricultural land, poor development soils, rock substructure, mineral sources, plant patterns, forest, woodland, topography, including steep slope, flood plain;

Water related resources: wet lands, marshes, swamps, underground water supplies, water table;

Air: quality of, movement pattern;

Vegetation and wildlife: locations of, dependence on resources.

Such an analysis demands a multidisciplinary approach by a team of geologists, foresters, hydrologists, botanists, ecologists, geographers, agronomists, and soil scientists, among others. Much information can be obtained from various sources; the U.S. Geological Survey maps, the U.S. Soil Conservation Services soil surveys, aerial photography, as well as in special studies made by federal, state, and regional agencies.

To be useful, the capacity of the resources should be organized, stored, and mapped under some classification systems. Some of the categories and subcategories might be:[25]

Active Recreation Areas (Identifies by ownership-public or private):

Toilots
Playgrounds
Playfield
Special areas (golf courses, marines, beaches,etc.)

Passive Recreation Areas (public or private):

Neighborhood parks
Large parks and reservations
Special parks (parkways, roadside picnic areas, historic park, etc.)

Agricultural Lands: general farming, truck farming, dairy farming, etc.

Resource Lands: forests, mineral areas (such as quarries), water impoundment, etc.

Special Areas: airports, large institutions, military reservations.

Factors in capacity listed above can be regarded as types of guidelines. Ecological and aesthetic guidelines will be discussed first. Both of these criteria for assuring fullest possible capacity are implemented in an identical way. At the same time there is plenty of scope for exercise of discretion in managing the physical setting, within the guidelines. For instance, the "suburban forest" can be managed to moderate summertime temperatures in urban places. Or lakes can be stocked with fish, all the while observing ecological requirements.

Other capacity guidelines must be brought into play to find whether there is the physical facilities available to meet effective demand of the populace to use the facilities. For example, travel patterns in transportation planning methods describe how distance is overcome between place of residence and site of outdoor recreation participation. The demand schedule measures influence of travel, determines benefit and pricing strategies.[26]

Chapter 4

Synthesis

The preceding sections of this report have discussed the methods of determining demand for outdoor recreation, from the quantifying empirical approach through the philosophy of leisure . It reveals that there should be extensions of the aggregative, empirical approaches. The Clawson demand curve gives a strong basis for measuring benefits and introducing economic rationality into outdoor recreation planning. The ORRRC approach establishes an empirical basis for the principal factors of population size, individual taste, and socio-economic factors in aggregate participation in outdoor recreation. Gravity model can be applied to determine recreation travel among zones of an urbanized state like Michigan. The transportation planning approach can be used to identify that portion of a city's population that will visit a system of selected parks.

Empirical techniques can not always be used alone. The aspirations and behavior of populations in regard to outdoor recreation need to be surveyed, recognizing the density of population, social and economic composition, present and projected leisure and income, recreation preference and so on. The quantitative standards can serve as a guide to the preservation of outdoor recreation areas. Capacity is the basic ingredient of a planned system of outdoor recreation areas.

To inventory the existing and potential capacity is one of the first activities in the recreation planning process. It needs to be analyzed in a free and comprehensive way, quantitatively, and qualitatively.

The determination of demand for outdoor recreation needs to concern itself with all facets of outdoor recreation functions and activities.[1] It always begins with human needs, and relates these needs to potential recreational patterns. This requires an analysis of existing and future population-numbers and distribution- and characteristics and habits of this area's population. To these population numbers and groups are applied "standards", gleanings from closely comparable studies, and thus derive measures of present and future deficiencies.[2] These demands when compared to existing facilities yield present and expected, mostly quantitative, deficiencies in outdoor recreation areas. These geographically distributed deficiencies are in turn related to vacant or underdeveloped land and locations, for recreation facilities are determined from these deficiencies.[3]

The process of determining the demand for outdoor recreation is divided into four phases: (1) goals and objectives; (2) inventories; (3) alternative standards; and (4) demand.

Goals and Objectives. "To have meaning, plans should be formulated in terms of goals and objectives."[4] A series of hypothetical goals are listed here to illustrate their possible

application in the planning process. For example, a city might formulate these possible goals; (1) quality of the environment, (2) quality of life, (3) harmony of man with his environment.[5] In terms of priority these goals might be approached in the order listed. To reach these goals, illustrative objectives could include; health, safety, beauty, knowledge, efficiency, convenience, vitality, identification, opportunity and choice.[6] Without realistic accomplishment of these objectives, the city could not achieve its goals. The goal formulation requires a thoughtful, penetrating analysis into the dynamics of the social, economic, and physical factors affecting the urban development process. Gold suggested that the time horizon of objectives should be divided into five planning-action cycles of no longer than two years, each with a requirement of constant updating, review, and revision on a monthly basis.[7]

Inventories. The second phase is to analyze the basic data on resources, people and institutions in a free and comprehensive way, quantitatively, and qualitatively. The inventories establish the necessary basis for planning many programs and facilities in addition to the recreation program. In fact, much of this information will be available from most comprehensive planning agencies.

Alternative Standards. Once the goals and objectives are expressed and formulated, the capacities are analyzed, the recreation standards can be applied to determine needs.

Since standards are only a quantitative statement of some specific system or facility, they are just developed as approximations or guidelines of demand determination.

Demand. The amount of land to remain open for the recreational purpose will be determined when the inventories are synthesized with goals and objectives, and the "rough" standards are "borrowed" to estimate. The decisions are made as an integral part of the regional comprehensive planning process.

Davidoff states: "If the planning process is to encourage democratic urban government then it must operate so as to include rather than exclude citizens from participating in the process. "Inclusion" means not only permitting the citizen to be heard. It also means that he be able to become well informed about the underlying reasons for planning proposals, and be able to respond to them."[8] He also says that planners should be able to engage in the political process as advocates of the interests both of government and of such other groups, organizations, or individuals concerned with proposing policies for the future development of community.[9]

Since the allocation of public resources for outdoor recreation is a direct reflection of resident values, these values are expressed in the opportunities, space standards and priorities selected from alternatives by a representative body of the residents or their advocate,[10] it is best to make decisions which are adapted to the wishes of the majority of the residents or their selected or appointed representatives and advocates.

Transportation methods and demand curves are rationales which should be taken into account, testing and evaluating the demand for outdoor recreation.

Briefly, the best method of determining the demand for outdoor recreation at a specific time is a short-range, goal-oriented, value-directed, plan acceptable to the representatives and/or advocates of the residents, rather than any single planning technique currently available.

Appendix A

Percent of Population by Age Group, Household, Race, Ethnic Background, and Location Distribution, 1940-1970

		1940	1950	1960	1970
Age-Group	Under 5	8.0	10.7	11.3	8.4
	5-17	35.2	20.4	24.5	25.8
	18-24		10.5	8.7	11.7
	25-34	16.2	15.8	12.7	12.3
	35-44	13.9	14.2	13.4	11.4
	45-54	11.8	11.5	11.4	11.4
	55-64	8.0	8.8	8.7	9.1
	65-74	4.8	5.6	6.1	6.1
	75 and Over	2.0	2.6	3.1	3.8
	Average Size of Household	----	3.37	3.33	3.17
RACE	White	89.6	89.4	88.6	87.5
	Negro	9.8	9.9	10.5	11.1
	Other	0.8	0.8	0.9	1.5
ETHNIC	English	9.3	8.2	8.5	7.4
	French	1.0	1.1	1.0	1.1
	German	15.1	14.0	12.7	10.8
	Irish	7.0	7.1	5.2	5.7
	Italian	13.3	13.5	13.3	12.7
	Polish	8.3	8.4	8.2	7.1
	Russian	7.5	7.5	6.7	5.8
	Spanish	4.5	4.7	6.8	11.5
	Other	34.0	35.5	37.6	37.9
LOCATION	New England	6.4	6.2	5.9	5.9
	Middle Atlantic	20.9	20.0	19.1	18.3
	East North Central	20.2	20.1	20.2	19.8
	West North Central	10.3	9.3	8.6	8.1
	South Atlantic	13.5	14.0	14.5	15.1
	East South Central	8.2	7.6	6.8	6.3
	West South Central	9.9	9.6	9.5	9.5
	Mountain	3.2	3.4	3.9	4.1
	Pacific	7.8	10.0	11.9	13.1

Sources: U.S. Bureau of Census, Statistical Abstract of United States, 1973, p. 33, No.38; p.40, No.51; p.29, No.31; p.34, No.41; p.14, No.14.

Appendix B

Participation rates in 17 activities by socio-economic characteristics: Number of activity days during June-August* 1960 per person 12 years and over

Socio-economic characteristic	Fishing	Boating [1]	Swimming	Water skiing	Camping	Hunting*	Bicycling	Horseback riding	Playing Games	Picnicking	Walking for Pleasure	Driving for Pleasure	Sightseeing	Attending Games	Attending Concerts	Hiking	Nature walks
All Classes	1.99	1.22	5.15	.30	.46	.73	1.75	.42	3.63	2.14	4.34	6.68	2.20	1.32	.21	.26	.75
Family Income																	
Less than $1,500	1.50	.14	1.20	.04	.05	.86	.48	.24	.74	.65	5.20	2.82	.69	.66	.07	.01	.31
$1,500 - 2,999	1.00	.52	2.21	.11	.13	.60	1.52	.25	2.67	1.22	4.72	4.01	1.36	.72	.09	.09	.31
3,000 - 4,499	2.57	.97	4.47	.12	.29	.74	2.68	.27	4.05	2.15	4.06	6.95	2.07	1.30	.19	.25	.92
4,500 - 5,999	2.15	1.05	5.02	.21	.44	.65	1.95	.68	3.33	2.42	4.21	6.57	2.44	1.41	.20	.22	.81
6,000 - 7,999	2.16	1.56	6.67	.42	.63	.75	1.83	.55	4.56	2.95	4.31	8.59	2.56	2.09	.33	.22	.84
8,000 - 9,999	2.12	2.06	7.55	.52	.92	.94	1.86	.30	5.11	2.60	3.61	9.05	3.06	1.35	.21	.59	1.08
10,000 - 14,999	1.94	2.29	9.49	.67	1.09	.78	1.36	.49	4.50	2.78	4.07	9.33	3.12	1.30	.36	.68	.60
15,000 and over	1.58	3.16	10.05	1.32	.68	.86	1.18	.75	6.43	2.41	6.66	7.72	3.71	1.68	.45	.31	1.70
Education, age 25 or over	1.59	.90	3.12	.14	.34	.59	.34	.10	1.61	1.85	3.71	5.47	2.07	1.06	.16	.14	.57
4 yrs. or less	1.17	.13	.57	.03	.04	.47	.01	+	.11	.53	3.80	1.75	.49	.49	.05	.01	.02
5 - 7 yrs.	1.26	.49	1.00	.03	.06	.50	.18	.01	.77	.88	3.85	3.97	1.01	.28	.03	.03	.48
8 yrs.	1.39	.45	1.25	+	.29	.56	.19	.05	.47	1.19	3.82	4.44	1.90	.68	.14	.04	.42
H. S. 1 - 3 yrs.	1.93	.91	3.00	.13	.23	.68	.22	.05	1.51	2.12	3.27	5.85	1.82	1.18	.12	.12	.47
4 yrs.	1.54	1.31	4.55	.29	.55	.62	.40	.19	1.93	2.49	3.11	6.63	2.59	1.61	.23	.15	.64
College 1 - 3 yrs.	2.10	1.65	5.22	.28	.46	.65	1.19	.06	3.15	2.55	4.26	7.03	3.14	1.43	.18	.23	1.12
4 yrs. or more	1.77	1.05	5.85	.08	.42	.56	.16	.27	4.31	2.52	5.69	7.22	3.39	1.08	.37	.62	.96
All employed, 14 and over	2.05	1.26	3.84	.32	.45	.89	.62	.24	2.77	2.00	2.90	6.76	2.38	1.37	.20	.20	.61
Professional, technical and kindred workers	1.64	1.46	5.75	.25	.87	.40	.18	.25	4.18	2.47	4.43	8.47	3.35	1.16	.56	.95	.69
Managers, officials and proprietors, except farm	1.79	.95	4.00	.12	.19	.81	.28	.11	2.64	1.42	2.90	5.06	2.66	1.27	.19	.11	.56
Clerical and sales workers (other white collar)	1.47	1.41	4.74	.39	.34	.35	.78	.38	2.74	2.69	3.66	8.63	2.89	1.51	.23	.18	.53
Craftsmen, foremen and kindred workers	3.33	1.67	3.36	.29	.80	.99	.74	.13	2.54	2.34	2.30	6.67	2.58	1.77	.16	.09	.94
Operatives and kindred workers, laborers	2.48	1.13	3.39	.34	.35	1.47	.55	.17	2.90	1.69	2.76	6.75	1.64	1.51	.15	.11	.55
Service workers (including private)	1.36	1.45	3.69	.54	.39	.47	1.21	.22	2.98	1.56	2.50	6.25	2.18	1.00	.16	.13	.31
Farm workers	2.12	.53	1.67	.13	.37	1.93	.27	.39	1.30	1.35	1.36	3.37	1.81	.91	.03	.02	.88
Place of Residence																	
Urban in SMA: over 1 mil.	.97	1.15	5.94	.24	.30	.14	1.37	.17	4.11	2.41	7.12	6.22	2.59	1.23	.25	.31	.92
Urban in SMA: under 1 mil.	1.62	1.45	5.17	.40	.50	.39	1.12	.19	4.11	2.07	4.12	7.78	2.38	1.46	.20	.17	.58
Urban not in SMA	2.38	1.15	4.89	.19	.37	.73	2.77	.57	3.61	1.76	4.98	8.55	2.47	1.77	.27	.41	.61
Rural	2.72	1.16	4.72	.33	.59	1.33	1.96	.65	3.06	2.13	2.39	5.74	1.75	1.15	.18	.21	.77
Male (age in years)	3.04	1.55	5.44	.42	.57	1.43	2.04	.47	5.09	1.98	3.76	6.57	2.03	1.61	.20	.33	.76
12 - 17	6.48	3.74	17.63	1.20	1.31	2.39	1.68	2.38	18.27	3.43	5.08	7.91	2.58	2.57	.53	1.40	2.10
18 - 24	3.89	1.25	6.55	.84	.74	1.99	.65	.42	6.41	2.31	3.31	12.24	2.06	2.07	.15	.09	1.03
25 - 44	2.66	1.61	4.23	.38	.41	1.46	.40	.14	3.42	2.37	2.36	6.04	1.85	1.73	.16	.14	.31
45 - 64	2.10	.96	1.79	.03	.49	.97	.22	.06	1.36	1.07	3.02	5.43	2.08	1.21	.13	.05	.64
65 and over	1.05	.18	.60	+	.11	.60	+	.01	.28	.66	8.60	3.59	1.68	.47	.12	.26	.33
Female (age in years)	1.02	.91	4.89	.19	.36	.10	1.43	.35	2.28	2.28	4.87	6.77	2.35	1.06	.23	.20	.74
12 - 17	.95	2.17	12.83	.65	.83	.05	8.29	1.96	8.91	2.90	9.57	8.77	2.84	2.40	.38	.41	1.16
18 - 24	1.19	.94	5.06	.31	.38	.17	.58	.25	2.32	3.10	6.14	12.40	2.53	1.25	.34	.25	.65
25 - 44	1.17	1.00	5.74	.20	.41	.12	.82	.01	1.93	2.92	4.02	6.17	2.31	1.21	.20	.18	.73
45 - 64	1.16	.43	1.97	+	.22	.11	.03	.24	.49	1.43	4.03	5.13	2.65	.56	.16	.17	.69
65 and over	.22	.31	.28	+	.02	+	.01	+	.02	.91	2.70	4.58	1.11	.10	.18	+	.53
Major Region																	
Northeast	1.76	1.38	6.82	.29	.33	.41	1.47	.29	3.91	2.81	6.46	7.23	2.00	1.15	.33	.28	1.14
North Central	2.05	1.48	4.63	.21	.40	.96	2.00	.32	4.15	2.34	3.66	8.02	2.71	1.61	.25	.21	.60
South	2.20	.86	3.97	.34	.38	.71	1.72	.43	2.95	1.31	3.18	5.52	1.60	1.31	.07	.17	.55
West	1.88	1.08	5.36	.43	1.05	.87	1.84	.88	3.37	2.09	3.88	5.21	2.79	1.03	.22	.49	.69

Source: National Recreation Survey, Commission staff, ORRRC Study Report 19.

* September-November 1960 is used for hunting.

[1] Boating other than sailing or canoeing.

\+ Less than .005 days per person.

Appendix C

Weights equal to proportionate distributions of persons 12 years and over by socio-economic characteristics 1960, 1976 and 2000

Socio-economic characteristic	1960	1976	2000
Family Income*	1.000	1.000	1.000
Less than $1,500	.102	.056	.032
$1,500 - $ 2,999	.133	.065	.041
3,000 - 4,499	.175	.089	.068
4,500 - 5,999	.211	.122	.064
6,000 - 7,999	.166	.166	.104
8,000 - 9,999	.093	.153	.117
10,000 - 14,999	.087	.232	.318
15,000 and over	.032	.116	.251
Education, age 25 or over#	1.000	1.000	n.a.
4 yrs. or less	.081	.048	
5 - 7 yrs.	.133	.088	
8 yrs.	.175	.112	
H.S. 1 - 3 yrs.	.189	.200	
4 yrs.	.264	.351	
College 1 - 3 yrs.	.082	.100	
4 yrs. or more	.076	.101	
All employed, 14 and over+	1.000	1.000	n.a.
Professional, technical and kindred workers	.112	.139	
Managers, officials and proprietors, except farm	.106	.108	
Clerical and sales workers (other white collar)	.213	.224	
Craftsmen, foremen and kindred workers	.128	.134	
Operatives and kindred workers, laborers	.235	.218	
Service workers (including private)	.125	.127	
Farm workers	.081	.050	
Place of Residence+	1.000	1.000	1.000
Urban in SMA: over 1 mil.	.271	.321	.393
Urban in SMA: under 1 mil.	.214	.220	.237
Urban not in SMA	.145	.120	.082
Rural	.370	.338	.289
All+	1.000	1.000	1.000
Male (age in years)			
12 - 17	.073	.072	.078
18 - 24	.053	.082	.080
25 - 44	.166	.160	.172
45 - 64	.134	.120	.111
65 and over	.053	.054	.051
Female (age in years)			
12 - 17	.070	.070	.075
18 - 24	.062	.078	.077
25 - 44	.181	.160	.169
45 - 64	.143	.131	.116
65 and over	.065	.074	.070

* The distributions of persons 12 years and over were estimated as follows: percent of consumer units by consumer unit income size classes in 1959 dollars for the years 1957, 1976 and 2000 are available from, "Economic Projections for the years 1976 and 2000," Part 3, Table 11, National Planning Association, included in ORRRC Study Report No. 23. These proportions were put in cumulative form and plotted against consumer unit income with each of the three years on the same chart. A cumulative distribution for 1960 was interpolated on this chart about one-sixth of the distance from 1957 to 1976. The family income distribution of persons 12 years and over for 1960 is from the NRS 1 sample; this distribution was also put in cumulative form. The consumer unit incomes corresponding to the NRS size class limits for persons 12 years and over were estimated from the interpolated line for 1960 and the cumulative NRS percentages. The corresponding cumulative percentages for 1976 and 2000 were then read from these lines on the chart and translated back to the proportionate distributions shown for those years.

U. S. Department of Commerce, Bureau of the Census Current Population Reports, Series P-20, No. 91. Two projections of educational attainment of the adult population are shown for each of the years 1970 and 1980. The distribution for 1976 was estimated by averaging the high and low projection and the years 1970 and 1980. The 1960 distribution is from the adjusted sample persons included in the June-August 1960 National Recreation Survey, ORRRC Study Report 19

+ Estimated for persons 12 years and over from data in "Estimate of the Decrease in Hours Worked, 1960-2000," U. S. Dept. of Labor, Bureau of Labor Statistics (for occupation) and "Population Projections of the United States for 1976 and 2000," Commission staff (for age-sex and place of residence) both included in Projections to the Years 1976 and 2000, ORRRC Study Report 24.

Source: Prospective Demand for Outdoor Recreation, ORRRC Study Report 26, p. 20

Appendix D

Deviations from average activity scores by socio-economic characteristics: Unadjusted and adjusted through multivariate analysis

Socio-economic characteristic	Deviations from Average: Gross (unadjusted)	Net (Adjusted)	Net ÷ Gross	Socio-economic characteristic	Deviations from Average: Gross (unadjusted)	Net (Adjusted	Net ÷ Gross
Income*				Age of head (years)#			
Less than $3,000	-2.49	-1.06	.43	Male, 18 - 24	2.88	2.71	.94
$3,000 - $4,999	- .12	- .11	.92	25 - 34	2.30	1.77	.77
5,000 - 7,499	1.19	.41	.35	35 - 44	2.04	1.27	.62
7,500 - 9,999	1.79	1.24	.69	45 - 54	.94	.67	.71
10,000 or more	1.44	.46	.32	55 - 64	-1.05	- .06	.06
Range	4.28	2.30	.54	65 and over	-2.62	-1.26	.48
				Range	5.50	3.97	.72
Education - Male							
8 yrs. or less	-1.89	- .75	.40	Female, 18 - 24	.93	1.16	1.24
9 - 11 yrs.	53	- .05	.09	25 - 34	1.40	.95	.68
12 yrs.	1.54	.91	.59	35 - 44	.37	- .36	- .97
13 yrs. or more	1.33	.36	.27	45 - 54	- .70	-1.05	1.50
Range	3.43	1.66	.48	55 - 64	-1.95	-1.43	.73
				65 and over	-3.47	-2.22	.65
Occupation - Male				Range	4.87	3.38	.69
Professional, technical and kindred workers	1.64	.11	.07	Place of residence*			
Managers, officials and proprietors, except farm	1.10	.54	.49	Central cities	- .77	- .58	.75
Clerical and sales (other white collar)	.11	- .92	-8.36	Suburban areas	.61	- .20	- .33
Craftsmen, foremen and kindred workers	.69	.41	.59	Adjacent areas	.33	.49	1.48
Operatives and kindred workers, laborers	- .82	.06	- .07	Outlying areas	0	.49	0
Service workers (including private)	-1.55	-1.36	.88	Range	1.38	.38	.28
Farm workers	- .81	- .27	.33				
Range	3.19	1.47	.46				

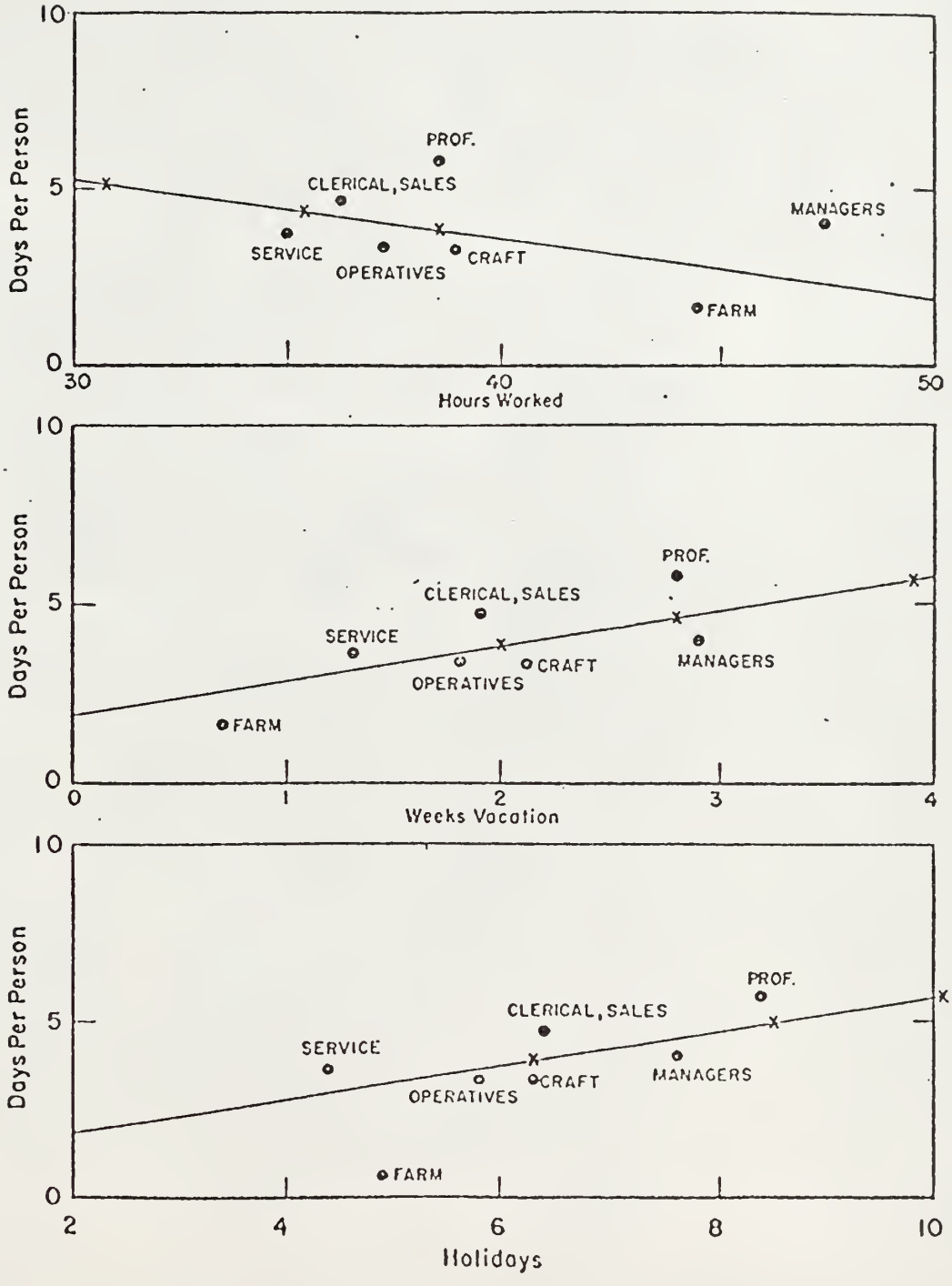
Source: Eva Mueller and Gerald Gurin with the assistance of Margaret Wood (Survey Research Center, the University of Michigan), Participation in Outdoor Recreation, ORRRC Study Report 20, table 22.

Deviations have been measured from the combined average for male and female and combined with simple person weights.

Deviations have been measured from the combined average for male and female.

Appendix E

Swimming – Effect of 3 Measures of Leisure on Participation Rates estimated through Occupation



Source: Prospective Demand for Outdoor Recreation, ORRRC Study Report 26, p. 16

Appendix F

Average Opportunity Indexes by Place of Residence, Major Region and Activity

Activity	"Unweighted" Ave. of 66 location aves.	All	Location averages combined with SRC sample person weights					
			Residence		Region			
			In SMA	Not in SMA	NE	NC	S	W
Driving for pleasure	2.53	2.55	2.59	2.47	2.66	2.40	2.37	2.99
Picnicking	2.48	2.49	2.52	2.42	2.49	2.56	2.22	2.84
Nature walks	2.51	2.44	2.35	2.62	2.30	2.53	2.41	2.55
Boating	....	2.36	2.60	1.94	2.59	2.29	2.22	2.46
Canoeing	1.62	1.51	1.53	1.48	1.47	1.76	1.52	1.11
Sailing	1.77	1.97	2.31	1.31	2.25	1.78	1.67	2.44
Power	2.31	2.44	2.68	2.00	2.68	2.35	2.30	2.54
Hiking	2.42	2.35	2.31	2.43	2.28	2.44	2.08	2.79
Swimming	2.15	2.24	2.38	1.98	2.59	2.08	2.04	2.39
Horseback riding	2.10	2.11	2.08	2.15	2.25	2.05	1.90	2.37
Fishing	....	2.08	2.05	2.13	2.02	2.12	2.14	2.00
Fresh water	2.40	2.30	2.17	2.55	2.14	2.46	2.44	1.99
Salt or Great Lakes	1.00	1.32	1.65	.68	1.59	.94	1.09	2.03
Camping	2.08	2.07	2.04	2.11	1.92	1.87	1.95	2.86
Hunting	....	1.97	1.73	2.40	1.74	2.02	2.07	2.00
Small game	2.40	2.25	2.04	2.66	1.94	2.47	2.48	1.91
Waterfowl	1.82	1.81	1.71	1.98	1.73	1.92	1.68	1.96
Big game	1.58	1.45	1.15	2.00	1.35	1.18	1.39	2.20
Skiing, etc.	1.10	1.11	1.17	1.00	1.63	1.21	.13	1.99

Source: Prospective Demand for Outdoor Recreation, ORRRC Study Report 26, Appendix A, Table 5, p. 46.

FOOTNOTES

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