WEEKEND RECREATIONAL TRAVEL

Development of a Concept

Puget Sound Governmental Conference
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CREDITS

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TABLE OF CONTENTS

Page

LIST OF TABLES AND FIGURES v

SUMMARY AND CONCLUSION 1

1. The Problem 1
2. A Planning Concept for Weekend Recreation Travel 2
3. Conclusion 3
4. Suggestions for Further Research 4

CHAPTER

I. THE PROBLEM AND STUDY STRUCTURE . . . 5

1. Delineating the Problem 5
2. A Brief Literature Review 7
3. The Study Structure 9

II. FACTORS INFLUENCING RECREATION DEMAND, SUPPLY AND TRANSPORTATION 15

1. Recreation Demand 15
2. Recreation Supply 30
3. Transportation 32

III. DEVELOPMENT OF A PLANNING CONCEPT 39

1. Demand Allocation 39
2. Demand Distribution 53

IV. DETERMINATION OF TRANSPORTATION FACILITIES 69

1. Characteristics of Recreational Travel . . . 69
2. Trip Purpose 70
3. Mode of Travel 72
4. Auto Occupancy and Traffic Assignment . . . 73
5. Design Hour Volume 74

BIBLIOGRAPHY . . . . . .

APPENDIX A 79

APPENDIX B 93

APPENDIX C 104

LIST OF TABLES AND FIGURES

Page

TABLE

1. Relative Importance of Factors Influencing Recreation Demand 29

2. Significant Independent Variables Functioning as Regulators for the Skiing Demand 52

3. Data for Gravity Example 65

FIGURE

1. Demand Projection with Constant Participation Rate . 16

2. Typical Demand-Supply Prediction Curve 20

3. Relation of Income to Participation in Outdoor Recreation 23

4. Recreation Travel Planning Concept. 40

5. Typical Recreation Demand, Supply and Transportation Curve for a Recreation Activity 42

6. Effect of Staggered Weekly Worktime on Skiing Supply Capacity 48

7. Demand-Price and Adverse Social Effect Relation for Public Recreation Land 49

8. Distribution of Recreation Sites, Urban Areas and Transportation Network 54

9. Demand Distribution Process 55

10. Annual per Capita Visits by Distance to Park . . . 62

11. Gravity Model Example 64

SUMMARY AND CONCLUSION

1. The Problem

The growth of population in metropolitan areas and the increasing affluence and leisure time of that population is exerting ever-increasing pressure on recreational resources and the transportation facilities connecting the metropolitan areas with the recreation areas. Historically, travel for recreational purposes has grown more rapidly than that for other purposes and if forecasted increases in real income and leisure time materialize this trend will continue.

There is increasing concern that proper attention has not been given to recreational travel as a factor in transportation planning either at the state or urban area level. Recreational travel occurs primarily on weekends and holidays whereas the urban transportation studies, almost without exception, are concerned with weekday travel.

Recreational travel serves both as a means to an end and as an end in itself. Access to a variety of recreational activities is an important human need and is presumed to be an agreed-upon objective of public policy. In addition travel has an intrinsic recreational value, the extent of which depends on place and circumstances.

This study proposes a concept for long-range planning of transportation facilities needed to serve the weekend travel demands of a metropolitan area. The planning concept is proposed as a means of achieving more effective utilization of resources in providing for recreational needs.

Where data have been used in this study to support conclusions, they have been extracted from surveys conducted by agencies in the state of Washington and from selected studies undertaken elsewhere. Despite the limited availability of certain data, the method of analysis and the planning process presented in this report are considered to have general applicability.

2. A Planning Concept for Weekend Recreational Travel

Traditionally, the process of facility planning has given major emphasis to the need for accommodating demand, with demand derived independently of any constraints which might occur from resource limitations. The concept presented in this report recognizes the existence of resource limitations affecting both the provision of additional recreational facilities capacity and the access to such facilities. The concept consists of three phases as follows:

Phase I of the planning process determines weekend recreation demands. This demand is seen as a function of such variables as: distribution of free time, attractiveness and accessibility of recreation opportunities, socio-economic factors, and recreational preference and skills. The holding capacity of recreation areas within the weekend travel region is then compared with demand.

Phase II distributes the demand for any weekend recreation activity among possible locations. Not all recreation sites of a particular type are used to the same extent; popular sites are frequently overcrowded while others are only scarcely used. Therefore, the task of this phase is regulating the demand flow through manipulation of certain variables to reach a balanced utilization of recreation capacities. Attractiveness, accessibility, user cost, and user information have been identified as effective demand regulators.

Phase III transforms demand flow from an urban center to the individual recreation area into transportation facilities capable of adequately handling the traffic demand. This phase includes the determination of trip purposes and mode of travel, assignment of auto trips to the highway network, and the determination of the design volume.

The methods suggested for application within each of the three phases have been partially tested by other researchers with data involving similar problems. These traffic assignment techniques are common in the field of transportation and highway planning and include the regression method,

the gravity model, the intervening opportunity model, the geographical prediction model, and the system theory model. Linear or non-linear mathematical programming, although untested in this field, has potential in solving multiple-objective problems.

3. Conclusion

The study suggests that the weekend recreational travel problem cannot be solved by policies primarily directed toward providing more and more transportation capacity where there is an obvious transportation demand. The suggested public policies by which some regulation of recreational travel demand can be effected.

Agencies responsible for the development and implementation of recreation facilities (and those charged with the custodianship of natural resources) will need to coordinate their policies and planning with agencies responsible for the development and operation of transportation facilities. The process must provide for the insight of a multi-disciplined approach. Recreation and transportation planners gain meaningful demand projections to be used in facility planning; others concerned with man's urban environment gain insight into the weekend needs of urbanites and can plan for a livable and enjoyable urban environment. But such cooperation faces jurisdictional and other difficulties. Parks and natural resources agencies create jurisdictional subdivisions on quite different criteria than do transportation agencies: for the purpose of cooperative planning, however, the prime consideration has to be that of serving the residents of the urban areas.

4. Suggestions for Further Research

As is usually the case, the development of this planning concept uncovered many areas requiring further research. The question of the relative attractiveness of recreation areas needs further attention. Throughout this research holding capacity and recreation quality standards have been assumed as given; it is realized, however, that these issues need refinement.

Demand influencing factors have been suggested with sometimes little or no quantitative basis. The impact of smog, the four-day work week, educational programs influencing participation and others need to be quantified in order to predict activity participation. Regulation of demand requires more knowledge about the effectiveness of different regulators, the circumstances under which they can be applied, and the side effects created.

Park agencies, planning agencies, and highway departments have already collected substantial data, which is supplemented by behavioral data gathered by sociologists. In addition, there are census data available related to some of the issues of concern. However, many of the influencing factors mentioned in the planning concept have not yet been measured statistically. Further more, the time and area over which to measure them need to be identified. Data collection techniques also need to be selected.

The task following development of this concept should then be to refine the quantitative measurement of weekend recreational trips, the attractiveness of recreational areas, and the transportation service. Data collection techniques need to be considered, study areas selected, and existing data analysed. Methodological procedures can then be developed on the basis of the established data base.

CHAPTER 1

THE PROBLEM AND STUDY STRUCTURE

1. Delineating the Problem

Most urban residents experience travel congestion when they leave for a weekend trip or come home from such an excursion. To enjoy rural nature in recreational pursuits, the urbanite must leave the city, thus creating recreational travel. The urban working industrial time-table regulates the amount of free time and leaves mainly the weekend for recreation outside the metropolitan area.

Daily free time also creates recreational travel which mainly utilizes the transportation network provided to serve the work and work-related traffic. Other than for scheduled events which draw large numbers of people, like ball games, this type of travel does not cause a traffic problem.

Another type of free time is the annual vacation. Vacation travel expands all over the globe, creating congestion mainly at transportation terminal facilities and distinct tourist attractions, especially when it occurs on the weekend.

Three major causes for weekend recreational travel congestion are:

(1) The demand for recreation outside the everyday environment. This demand depends on such factors as available free time, age of participant, participation cost, disposable income, possession of skills to participate, available recreation opportunities, mobility, taste, and many others.

(2) The supply of recreation opportunities. The level of satisfaction that can be achieved in recreation depends on the individual and the amenities offered by the area. Amenities, geographical location and popularity of a recreation area make up its attractiveness, which is a prime factor influencing the recreational demand flow.

(3) The transportation system. The duality of its function creates a peculiar situation. By providing additional transportation

capacity to serve the demand, new demand is generated which requires additional capacity, and creates a chain reaction resulting in overcrowding and impairment of the recreation experience.

The interplay of the three components-demand, supply, and transportation, is governed by a socio-economic value system expressed in certain goals and policies. If these goals and policies are maintained, three different approaches to the solution of the weekend recreational travel problem are possible:

(1) Ignoring recreational travel as a factor in obtaining transportation needs. Weekday travel demand would be the primary determination for transportation facility design and that recreational travel would have to adapt to the resulting transportation capacity.

(2) Responding to recreational travel demand and consequently expanding transportation capacity with increasing travel demand. This policy would improve and ease the accessibility of popular recreation areas and thereby increase the danger of overcrowding. Recreational overuse tends to result in increased maintenance or even damage to the area and also in a depreiation of the recreational experience.

(3) Influencing and directing recreational travel in order to satisfy a maximum of objectives. These objectives should include at least those of the recreation traveler, the supplier of recreation facilities, the supplier of transportation, the general public's welfare, and economic and ecological interests.

The third policy, that of influencing recreational travel, has the greatest potential to satisfy the multiplicity of objectives involved despite the inherent controversy. Manipulation of people's behavior in an activity to which the freedom of choice is essential is a controversial issue. Govern-

ment-controlled educational programs would lead, or even force, people toward certain free-time activities.

On the other hand, no regulation at all leads to overcrowding and finally defeats the original purpose of recreation in a quality environment, damaging nature by over-using it. Urban man's freedom of choice in a recreation will have to be restricted if he shall continue to enjoy the natural environment according to today's quality standards and gain satisfaction from his recreation experience. Since the policy of regulating demand is alien to present policies in transportation planning, its application may be difficult.

2. A Brief Literature Review

A review of what has been published about weekend recreational travel will form a starting base for this work. It will prevent duplicating efforts and will indicate areas of needed research.

A brief literature survey reveals that a substantial number of researchers have already tackled the general problem of recreation and leisure[1] and some attempts have been made to identify the weekend recreational travel problem[2]. Social scientists have concerned themselves with the question of who does what and when[3]. They have demonstrated relationships between personality and participation in certain types of free-time pursuits[4], the influence of man's cultural background and taste[5], and the correlation between socio-economic variables and participation rates[6].

The efforts of these different studies have not been well coordinated, however. This does not result from the researcher's inability to see the total problem, but rather from the difficulty in measuring personality, cultural background and taste on the same scale as socio-economic variables. Development of measuring techniques and of a common scale to include such variables as personality, culture, and taste in the statistical analysis is an area where further research is needed but is not pursued in this study.

Social scientists have established correlations between socio-economic characteristics and participation in recreation activities. These relationships are used by recreation planners to determine recreation demand and the facilities needed to satisfy this demand[7]. The Outdoor Recreation Resources Review Commission (ORRRC) has calculated participation rates for a number of different recreation activities on a national basis[8]. These rates have then frequently been used by statewide outdoor recreation studies[9]. This is a dangerous practice because the composition of population changes from area to area, as do recreation opportunities. Furthermore, the idea seems to prevail among planners that a multiplication of some participation rates and projected population figures result in demand[10]. The participation rate method neglects influences such as distribution of free time, climate, weather and season, government recreation policies, business interests, location, limitation and cost of recreation supply and transportation services[11]. It is necessary then to determine all significant influences on recreation demand in order to reasonable predict the effects of proposed alternative actions; this study performs that task.

Economists have raised the question of recreation costs and benefits. They see man's recreation behavior in a demand-supply framework by prices[12] and they are concerned with the allocation of financial resources for acquiring and developing recreation areas[13]. Fees for use of public recreation facilities are seen as a means of paying for operation; and in the case of privately owned and operated recreation areas, for initial investment. Fees can also regulate demand so that it does not exceed the supply of individual recreation areas. The social side effects of user fees are also recognized. Little attention has been given so far to the impact of investments in recreation facilities on expenditures for transportation facilities and vice versa. The trade-off that exists here is dealt with in this study.

Highway administration is confronted with the problem of traffic congestion on recreational roads[14]. They have initiated studies dealing with inventories of recreational travel patterns and the distribution of trips between urban areas and major parks[16]. The problem of trip production and attraction has received little attention, as has the question of size and number of zones to be used in a recreational travel study. The production has often been assumed to be mainly a function of personal income, which is an oversimplification. Some efforts have been made to determine the relative attractiveness of recreation areas[17]. Simulations of trip distribution have so far considered point-to-point travel only. Travel to linear attractions and scenic routes have not yet been the subject of serious modeling efforts. This is regrettable, since driving for pleasure and sightseeing rank first on the scale of recreational participation[18] and account for 20 to 25 percent of all recreational trips[19]. The planning concept developed here will consider travel to point attractions, as well as to linear attractions.

This brief literature review indicates that a rational planning concept for recreational travel, giving proper consideration to the interrelations of demand, supply, and transportation does not yet exist, but needs to be developed.

3. The Study Structure

The study is structured to reflect the necessary steps to be taken in developing a rational concept for the determination of weekend recreation travel patterns and traffic volumes.

Chapter II discusses the components, demand, supply, and transportation. Demand is the most important since it is the cause for the phenomena under consideration; a major part of this study's effort is devoted to it. All factors influencing recreation demand will be discussed, but since there are obviously too many of them to be considered in the interaction process, and since all factors do not exert an equal influence, important ones have been selected by a panel of experts.

The time period within which the factors are significant will have to be distinguished since individual influences are often not equally powerful within short and long-range time frames. Considered under supply will be location, capacity, quality, and user fees; under transportation, accessibility, different modes, combinations of modes, and new technology. This chapter will survey the literature and offer observations from recreation experts and the author.

Chapter III deals with the planning concept, i.e., the interrelationships of the three components, demand, supply, and transportation. This interplay will be demonstrated through the practical example of skiing in the weekend recreation region of the Seattle Metropolitan Area. The demand flexibility of winter sport activities and the problems inherent in restraining an activity demand to a certain level as set by ecological and budgetary considerations will be discussed. Regulators capable of restraining the total demand for an activity as well as the traffic flow to individual recreation areas will be considered. The gravity model will be applied to demonstrate its ability to simulate the impact of regulators on the use of individual areas and the traffic flow.

Chapter IV, Determination of Transportation Facilities pertains to transforming travel demand to individual recreation areas into transportation facilities. The characteristics of recreational travel will be discussed as a basis for determining trip purposes and travel modes acceptable to the recreationer. The assignment of vehicle trips to different routes will consider common techniques and criteria such as: travel time, travel cost, and route amenities. The difference between trips to point and linear attractions will be shown. Finally, the question of design hourly volume will be discussed, as this is essential to adequate transportation for weekend recreational travel.

FOOTNOTES
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CHAPTER II

FACTORS INFLUENCING RECREATIONAL DEMAND SUPPLY, AND TRANSPORTATION

Recreation demand, the supply of recreation areas, and the transportation network linking demand and supply locations are strongly interrelated. These interrelationships need to be understood before the problem of recreational travel can be solved. A first step towards such a solution is the identification of influencing factors.

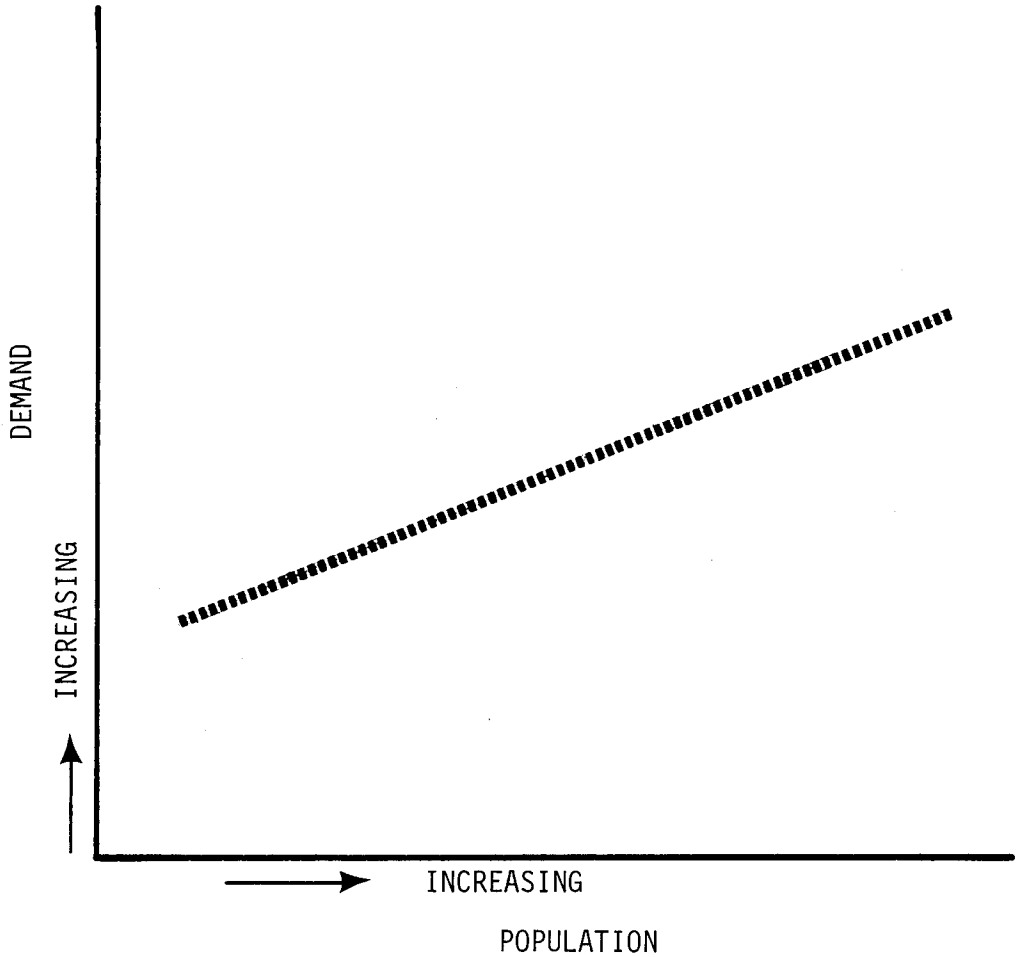
1. Recreation Demand

Recreation demand studies have been undertaken to gain knowledge of the magnitude of the problem faced by recreation-providers in years to come. These attempts have been led by the Outdoor Recreation Resources Review Commission[1] (ORRRC) reports and are followed by nearly all of the 50 states in their recreation studies. Participation rates developed by ORRRC relate participation in outdoor recreation to socio-economic and educational characteristics of the population. This creates a straight line projection for recreation demand with increasing population (as shown in Figure 1 on the following page), with the slope of the curve depending on the components of the participation rate. The resulting demand from such a projection frequently exceeds the supply of outdoor recreation facilities, which is limited by the availability of natural resources as well as budgetary and ecological consideration. It is therefore essential for the demand determination process to consider all significant influences. This is attempted in the following sections.

Human Factors - Personality and cultural background are closely related to free-time pursuits, as shown by Max Kaplan in a social study on leisure in America[2]. He observed that people in the same town, but with different cultural background (Jews and Negroes) selected quite difference free-time activities. While Jews tended to participate frequently in reading, music, and other intellectual activities, Negroes spent a great amount of

FIGURE 1

DEMAND PROJECTION WITH CONSTANT PARTICIPATION RATE



SOURCE: WASHINGTON STATEWIDE COMPREHENSIVE OUTDOOR RECREATION AND OPEN SPACE PLAN, DEVELOPMENT NEEDS, July 1, 1969

free time chatting in front of the house or at the neighborhood hangout[3]. Kaplan further investigated the leisure behavior of individuals and came to the conclusion that the following correlation exists[4]:

1. Those (persons) who are people-oriented are most in need of activities in which consensus dominates, that is, sociability and association.
2. Those who are object-oriented are most in need of and will most likely choose leisure activities in which hierarchy and exclusiveness dominate, that is, games and association.
3. Those who are expressive-oriented are most in need of and will most likely choose leisure activities in which knowledge dominates, that is, art.

A more analytical attempt has been made to determine relations between personality and leisure attitudes by Neulinger and Breit, who used factor analysis to identify leisure attitudes[5]. The result of this study is a quantitative ranking of attitudes, which constitutes an important step towards measuring personality impacts on recreation behavior.

Participation in a particular recreation activity is strongly influenced by taste. However, taste is inconstant and, as Arnold Green says, recreation engagement is unpredictable[6]. Taste will remain an unknown quantity in our attempt to predict recreation demand.

Another influence is the participant's age. There exist distinct differences in this respect, especially when it comes to activities outside the immediate vicinity of the house (see Appendix A, Table 1). The young seem to prefer more active pursuits, while older people tend to prefer the passive ones[7]. The matter of active versus passive pursuit is, however, not merely a question of age, but also of skills required for participation, although both factors are somewhat interrelated. For example, a young person is more likely than an older person to acquire the necessary skills for skiing. Age in respect to access to transportation is another factor

influencing participation; the elderly without a car at their disposal and the young below driving age (except the very young who depend still largely on their parents) are less involved in activities requiring extensive use of an automobile[8].

Social Influences - I. Albrecht, in a study of weekend recreational travel in Hamburg, Germany, found that mostly the same people (a subculture) engage in outdoor recreation, be it in visiting neighborhood parks or unique natural areas[9]. However, with the increasing influence of mass media consumer behavior tends to conform within all social and cultural classes in industrial societies and subcultural differences seem to diminish.

Another social factor in selecting recreation activities is group preference. If playing tennis is "the thing to do", many people join the tennis club. If attending cultural events is what everybody in the neighborhood does during free time, one may find oneself soon doing the same, because an immediate neighborhood usually has a common social background. This can be observed in outdoor recreation as well; in the great movement to the outdoors, "the thing to do" is a factor with many people[10]. An observation from Germany confirms that, in the 1920's, the "Wandervogel" movement was popular with young people, and almost all of them joined it. Hiking and singing of folk songs were the prominent activities; the natural environment was discovered for the enjoyment of man. Nature has not changed much since then, nor has its recreational potential. The behavior of young people has changed, however; there is no more "Wandervogel" and far less hiking today.

The family as a basic unit within the social system plays an important role in the creation of recreational patterns. These patterns will be heavily influenced by the head of the household, his occupation, income, time off work, etc. They will further be influenced by the size of the family, age structure, and sex of the family members. All these social as well as economic characteristics have been used by many studies[11]

to establish predicting equations for recreation participation and travel. A typical example of such predicting curve is shown in Figure 2 on the following page. From a statistical point of view, the correlations reached were satisfactory; the question arises, however, whether these correlations will be stable over the forecasting period. Considering changing preferences and demand limiting factors, it seems likely they will fluctuate. Housing may be related to family recreation. The study by I. Albrecht showed that poor housing is most likely occupied by economically deprived people who participate least in outdoor recreation[12]. The potential of housing as a factor in recreation is demonstrated in new housing developments such as garden apartments, new towns, etc.

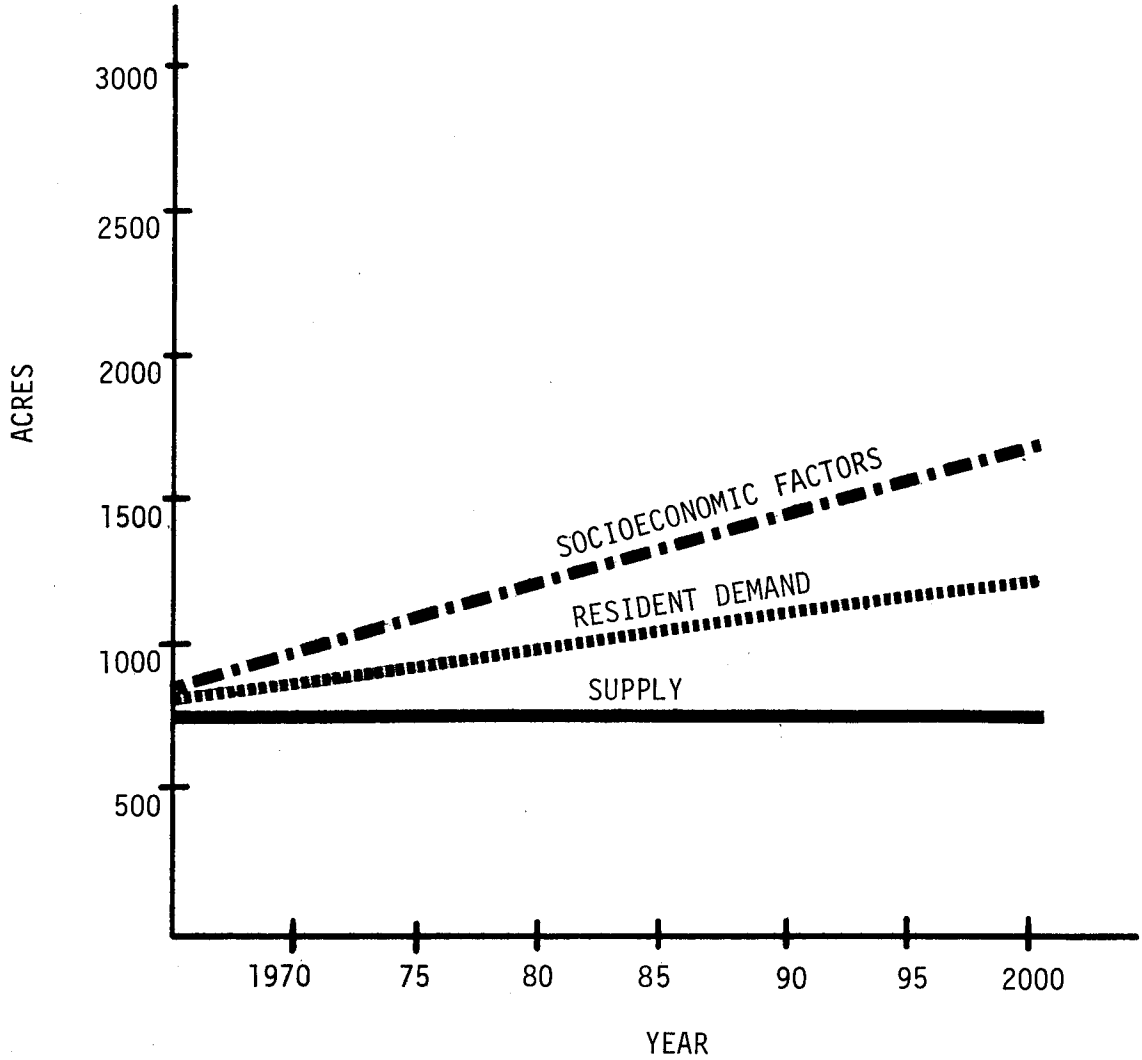
The size of metropolitan areas and the residential density also have an influence on recreation participation, with suburbanites participating more frequently than do city dwellers[13]. This impact is not so much on the type of activity but rather on total participation. Data from Southern California indicates that the per capita participation increases with the size of the urban area[14]. But this correlation has not yet been studied intensively and the data can reflect many other factors such as age composition, smog intensity, etc.

Government Policies - Naturally, government has an interest in the way its people spend their free time, since recreation is essential to their well-being. Government can basically promote recreation activities through financial subsidy, educational efforts, and distribution of free time. An extreme example of these forms of promotion is found in totalitarian regimes where the government forces people into certain free-time activities which are in the government's political interest. Of course, such forced participation is no longer recreation, because the freedom of choice which is essential to recreation[15] no longer exists.

Financial subsidies for acquiring and developing recreation areas as well as increasing their accessibility can enlarge an area's attractiveness and increase tourist travel. Since the financial resources are usually

FIGURE 2

TYPICAL DEMAND - SUPPLY PREDICTION CURVE



SOURCE: WASHINGTON STATEWIDE COMPREHENSIVE OUTDOOR RECREATION AND OPEN SPACE PLAN, DEVELOPMENT NEEDS, July 1, 1969

scarce, priorities for subsidizing different projects have to be set. For this purpose it is of extreme importance to determine the impact of subsidies on the recreation demand as well as on the society and economy of the population to be served.

Government can also influence free-time spending through education. Young people are the prime target in this case, since school programs can affect recreation participation, e.g., a ski program can contribute substantially to the growing number of skiers[16]. Education, by itself, can also be seen as free-time activity, such as evening courses or continuing education during long vacation periods as de Grazia sees it[17].

Government also influences the distribution of free time. The proposal of "holiday weekends" in which all but a few holidays will be celebrated on a Monday or Friday[18], creates several three-day weekends. This will increase the number of recreationists on these weekends because more continuous free time is available - a demand-increasing factor shown by many studies[19]. Beyond this short-range increase, there is "forced free time", or unemployment, as a result of automation and increase per capita productivity. This can be handled by the "flexible work year", a proposal for three workers sharing two jobs[20]. If appropriate government policies are enacted[17], "forced free time" can then be used for education benefiting the individual and society.

The Economic Environment - Recreation cost and personal income are the recreationist's basic economic considerations. ORRRC identified correlations between income and participation in recreation[21] which have subsequently been used in almost all state outdoor recreation plans and in many recreation travel studies[22]. Most of these works use a linear relation between income and recreation participation - a relation true only for activities involving high cost, like skiing, boating, etc. The National Recreation and Park Association indicates that for the majority of outdoor activities a linear correlation between income and participation exists only up to the lower-middle income class bracket[23]. Higher income groups tend to

participate less, as shown in Figure 3 on the following page.

Directly related to income is the cost of participation. Low-income people cannot afford high transportation costs. User fees depend on the type of activity and the ownership of recreation areas. Publicly owned recreation land is usually offered at low cost or free, while private facilities operate at market price, e.g., freshwater shorelands.

Another economic consideration is consumption of recreational goods and services. The importance of the tourist business to local and state economics is increasing (see Appendix A, Table 2). Consequently, there are many economic studies concerned with tourist expenditures and their impact on the economy[24]. From an overall economic viewpoint, growing tourism can be seen as a means of increasing the Gross National Product and the standard of living. From an industrial or business point of view, increased recreation expenditures mean an opportunity for more business and more profit. Advertising is an important tool employed by industry and business to achieve this increase.

Time - Time is important to recreation demand in (1) the amount available and (2) when it is available. The amount of free time at the recreationist's disposal and its use can be broken up into three distinct groups:

(1) Daily free time: it is the remainder of a seven-to-eight hour workday, about the same amount of sleep and four to five hours of personal care and miscellaneous house work. The daily free time amounts to four to six hours which usually occur in the late afternoon and evening. The possible activities are limited and can be described as:

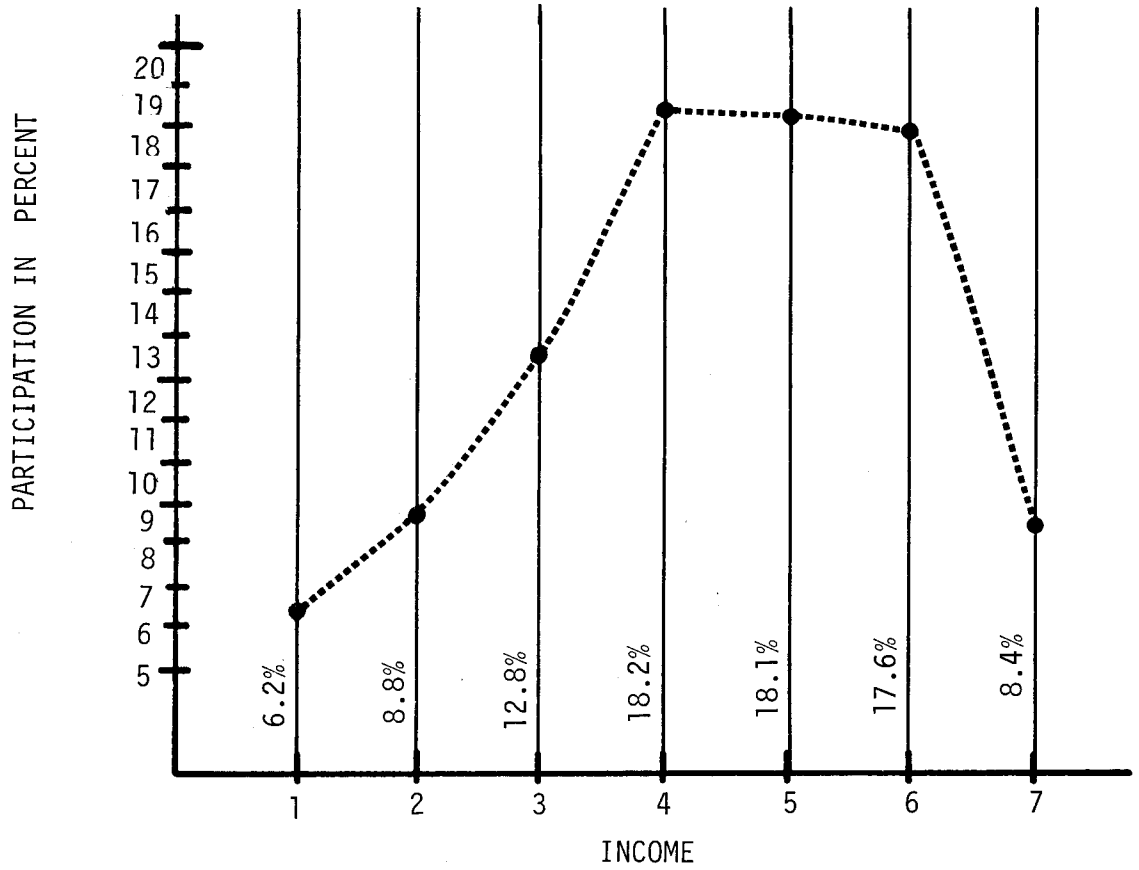
   (a) Around-the-house activities - gardening, reading, watching TV, entertaining, etc.,

   (b) Indoor activities--going to the movies, sports events, visiting friends, etc., and

   (c) Outdoor activities - picnicking, visiting parks, golfing, etc.

FIGURE 3

RELATION OF INCOME TO PARTICIPATION IN OUTDOOR RECREATION



LEGEND

1. Under $2,000
2. $2,000 - $3,999
3. $4,000 - $5,999
4. $6,000 - $7,999
5. $8,000 - $9,999
6. $10,000 - $14,999
7. $15,000 - Or More

SOURCE: WASHINGTON STATEWIDE OUTDOOR RECREATION DEMAND SURVEY, April, 1967 - March, 1968

While activities under category (a) do not produce recreational travel, categories (b) and (c) product trips which are limited to about a two-hour round trip. The mode of travel is mainly the car and occasionally a bus or train. Daily recreational travel utilizes basically the same transportation network as provided for work travel. Since recreational travel does not have the extreme peaking condition as work travel, the transportation network is generally adequate for handling recreation trips. Exceptions occur at public events like ball games, when large numbers of spectators arrive and leave within a very short time. Planning for such events is usually done on site.

(2) The weekend: it is a succession of two work-free days and is dominated by outdoor recreation activities. This creates a problem on Sunday evenings when most recreationers return home. Regardless of when people leave for a weekend trip, they seem to use the free time to the "last minute", and most of them return on Sunday night, causing the main weekend travel peak.

(3) The yearly vacation: this is a period of two or more weeks of continuous free time which is often taken in summer when schools also have their summer recess; the consequence is congestion at recreation areas and on transportation routes. The peaking occurs usually at the beginning and at the end of the school vacation period and is increased when it coincides with regular weekend travel. The amount of free time available within each of the three groups will probably change in the future as work time decreases. The increased off work can be added to the daily free time, thereby scattering it over the whole week. This could extend the the limits of the area in which daily recreational travel would normally occur. Since this free time would probably be limited to not more than half a day, many outdoor activities demands, like hiking and camping, could not be satisfied. Increased daily free time could also be used to satisfy many of the non-recreation requirements for free time, leaving the weekend free for recreation. A shorter workday could therefore result in a slight increase of weekend demand.

Increased yearly vacations could be taken as bulk free time, or in several shorter periods. Bulk free time could be used for education, as de Grazia suggests[17], putting the pressure of increased demand for outdoor recreation mainly on the weekend. Many shorter vacation periods, on the other hand, can satisfy much of the outdoor demand, thereby releasing the pressure from the weekend.

Adding the extra free time to a weekend will lengthen it. It can be used for recreational as well as non-recreational purposes and will probably enable more people to enjoy one to two consecutive days for outdoor recreation. With no major changes in the daily and annual free time schedule, the majority of the increased outdoor recreation demand will occur on weekends.

The type of free time available is the second consideration which influences demand. This question has already been partially answered with the separation into daily, weekend, and vacation time. But there is another aspect to this question, the distribution of work time. So, far only normal work time (from morning to afternoon and from Monday to Friday) has been considered. School vacation was assumed to be during the summer months. This distribution may change in the future and indications are that the change has already begun, as shown by a survey of national policies on the subject[25] (see Appendix A, Table 3). Automation and the trend to better use of equipment and buildings, as well as the demand for personal services (food stores, gas stations, etc.) outside the normal work time are increasing the prevalence of part time "second" jobs. This trend conflicts with religious traditions of observing Sunday as a holiday[26]. The individual may also feel uneasy because his freedom of socializing in his free time is threatened. But the staggering of work time has a great potential in not only decreasing weekend peak traffic volumes, but also in stretching the recreation supply by a more efficient use of supple facilities.

The seasonal recreation travel peak in summer can be reduced in a similar way as weekend travel peaks. Here a four-quarter school year which

requires only three fourths of the students and faculty to be in school in each quarter would have the effect of spreading the vacation load from the summer into the other three seasons. Such shifts benefit travel and recreation areas as with shifting the weekend peak.

Climate and Atmospheric Influences - Climate and recreation activities are interrelated; skiing is only possible where it snows, and the length of a swimming season depends on the number of sunny days. The type and amount of seasonal participation depends very much on climatic conditions, as can be seen, for example, in Washington[27] and Nebraska[28]. In Washington the summer shows the highest participation since the largest variety of activities can be pursued this season. The summer in Nebraska is hot and particularly humid and not too attractive for outdoor recreation; the main outdoor recreation season is fall.

The impact of weather on recreation participation is obvious, especially on weekends. The longer the planning period, the less influential the weather on the determination of recreation demand. For park operation, weather conditions at the recreationer's home and at the recreation area are important, as shown in a recreation travel study in Germany[29].

Smog, a result of air pollution, is experienced in different intensities by all metropolitan areas today. The Los Angeles Times once stated that residents of the Los Angeles Metropolitan Area are leaving their nicely landscaped yards and swimming pools on weekends to escape the smog for a few hours. Data developed by the Southern California Research Council for 1960 indicates a relation between size of urban area and rate of participation in outdoor recreation activities[14] with the largest area having the highest participation. The "intensity" of the smog problem follows apparently the same ranking order. This could mean that there is a correlation between outdoor recreation participation and smog "intensity". But the problem has not been studied yet and this is more an assumption than a hypothesis.

Recreation Opportunities and Transportation - Demand for recreation participation is a function of opportunities for recreation and their accessiblity.

This means that if there is no beach within the weekend region of a metropolitan area, there is no measurable demand for weekend beach activities, even though a latent demand may exist.

Quality and quantity of individual recreation areas enhance their power to attract, which again influences demand. These influences have been used by recreation travel studies as a measure of attractiveness in simulating traffic flow to individual recreation areas[30]. In general, the more service that is offered and the "higher" the quality of the natural environment, the more people are stimulated to use the area. Transportation service offered between demand and supply locations has a similar effect on the recreationer: demand grows with increasing accessibility.

Determination of Importance of Influencing Factors - After discussing different influencing factors, the question arises whether each one exercises an equal amount of influence on recreation demand and within what time period each is effective. Two time period groups will be considered here: the short range and long range time frame. The short range time frame, within which weather conditions would have a significance, are concerned with predictions on a weekend-to-weekend basis. The long range time frame, under which the development of recreational skills can have a significant effect, will include a period of about 20 years.

To reduce the subjectivity in the determination of influencing factors, the judgment of a panel of experts was sought. The panel was selected from Washington State agencies dealing with recreation and transportation. The general method utilizing expert opinion is shown as the Delphi Technique[31]. In this case, a variation of this method was applied, the Profile Identification Method[32]. Panel members were asked to compare 27 influencing factors against each other and to rank their relative importance is a short and long range time frame (see Appendix B). It is argued that reasonable ranking is established when a conformity by individual panel members exists. Naturally, there exists more conformity for the short range than for long range projections, since each member has a different conception of the future.

Table I on the following page summarizes the results of the expert panel survey. It can be seen that the demand over a longer period of time depends mostly on the distribution of free time, the availability and attractiveness of recreation areas, and the accessibility to these areas. Of further importance are available free time, income, participating costs, attempts to increase recreation consumption, urbanization, government recreation policies, and skills required to participate in any recreation activity. Taste is ranked high in the long range time frame. This indicates the panel's opinion that the demand for recreation is predictable only to a limited extent. The short range time frame indicated income, participation costs available free time, attractiveness of recreation areas, accessibility of these areas, and weather conditions as most significant influences on recreation demand. Social factors have, in general, been considered of low importance in both the short and long range time frame.

Before applying factors in an actual demand-predicting process, it is necessary to consider whether they can be forecasted. Another consideration is the geographic area for which demand factors cause forecast, i.e., the area unit for which the demand shall be determined. Traffic analysis zones as used by urban transportation studies are too small for this purpose. It is even questionable if a metropolitan area should be split up into zones or should be considered as a unit. The number of demand producing zones to be established depends on the study area size and the aim of the study.

Demand Prediction - To predict demand as a result of influencing factors, a mathematical model capable of simulating the phenomenon is needed. The most commonly used technique is the multiple regression technique in a linear or non-linear form. It allows for an analysis of each individual factor, as well as a combination of factors and is thereby an excellent tool for determining relative significances. Since a planning model is not only concerned with the determination of a certain state as a result of defined actions and circumstances, but also with the shaping of this state, it is desirable to use a predicting equation capable of optimizing different policy objectives. Linear

Table 1

Relative Importance of Factors Influencing Recreation Demand

Factor	Time Frame of Forecast					
	Short Range			Long Range		
	Relative Importance					
	Low	Medium	High	Low	Medium	High
Human Factors:						
Personality		X		X		
Taste		X				X
Age	X			X		
Skills		X			X	
Social Factors:						
Cultural Background		X		X		
"The Thing To Do"		X		X		
Family		X		X		
Housing	X			X		
Urbanization	X				X	
Gov't Policies & Education:	X				X	
Economic Factors:						
Income			X		X	
Price of Recreation			X		X	
Consumption	X				X	
Time Factors:						
Available Free Time			X		X	
Distribution of Free Time		X				X
Climatic Factors:						
Weather			X	X		
Smog		X		X		
Seasons		X			X	
Supply and Transportation:						
Attractiveness			X			X
Accessibility			X			X

and non-linear programming techniques as developed and used in business administration have a potential that may better serve this aim than the regression method can. Programming techniques optimize a set of goals by solving a number of simultaneous equations. The result is repeated until an acceptable solution is found[33].

2. Recreation Supply

Recreation supply is the component in the demand-supply-transportation interplay which constitutes the demand satisfaction, as well as being a demand influencing factor.

Outdoor recreation areas, the main concern of this study, are by definition found in a natural environment, outside the built-up urban concentrations.

In most parts of the U.S., the recreationist has the out-of-doors at his disposal. Yet there are limitations on choice such as accessibility. Around each urban area a boundary line could be drawn marking the distance that can be reached by different modes of transportation within a certain time limit. Weekday recreation travel zones are those which allow for up to one-hour, one-way travel from the population center. The weekender can get farther away from the city, as he can afford a one-way time of up to four hours, depending on the time he allows for his trip: half day, one day, two days. Within this travel region there are many outdoor recreation opportunities which differ with every urban center. The vacation travel zone opens the full spectrum of supply to the recreationer, as time and transportation technology permits him to travel to any place on earth.

The type of outdoor recreational supply available within the weekend travel region of a metropolitan area depends mainly on the geographic environment. However, many activities involve not only the physical environment, but also man-made facilities - ski lifts, campsites, picnic tables, etc. There are two major types of recreation areas: 1) Those with emphasis on nature as in national and state parks. 2) Those with emphasis on the

use and development of areas which provide the most recreational benefits for a certain investment. An example is the "urban national park" proposal[34] which brings the park to the people, rather than the people to the park.

Public versus privately owned and operated recreation areas has already been mentioned. The main question is how the development is financed: through public subsidy - (all pay for the enjoyment of a few) - or through user fees.

The natural quality of recreation areas is a subjective matter. Recently an attempt has been made to quantify the importance of natural quality[35]. The size of a recreation development and the service provided are measurable, in contrast to the natural quality. The quality of a development depends among other things on a financial investment, maintenance, and management, which are frequently used as a measure to calculate the drawing power of different recreation areas[30].

Year-round utilization of an area is important to the operator, who gains more economic stability, and a factor in demand stimulation. Ski areas are of little attraction in the no-snow seasons, since the natural slopes and ground cover have been destroyed to form ski slopes. New types of recreation vehicles such as snowmobiles, trail bikes and four-wheel drive vehicles, allow the recreationer to intrude further and more easily into the natural environment, thereby increasing the attractiveness of the area. On the other hand, this intrusion often disturbs a quiet environment sought by so many recreationers.

Lastly, conservationist's concerns with nature have an effect on recreation supply. The ability of natural areas to absorb users is limited, as shown in a study by Alan J. Wagar[36], and conservationists fear that natural areas, exposed to heavy use, may be damaged in the long run. Such damage is caused not only by trampling down vegetation, but also by littering and polluting the area. Intensive human use also has an adverse effect on wildlife. Man-made facilities, including transportation systems, disturb the natural equilibrium, in varying degrees. The example of ski slope

development with erosion and resulting flood problems, demonstrates the conservationist's point.

3. Transportation

Quite often recreation demand and supply are generated at different spatial locations. To connect them, some form of transportation is needed. Surface transportation - auto, bus, and rail - are the predominant travel modes, with the automobile providing between 95% and 98% of the travel service[27]. The use of mass transit is declining, as shown in a study for Hamburg, Germany, as a result of increased auto-ownership[37]. Individual air transportation is increasing with prosperity, mainly because of the three-dimensional freedom it provides. The number of individual weekend fliers is relatively small compared with total participation in weekend travel, and will probable never reach a substantial number for cost and air control reasons. Mass air transportation is relatively unimportant at this time. Water transportation is rarely used as a means of travel to a recreation area; it has become mainly an activity in itself.

The ability to provide accessibility is the most significant characteristic of transportation. The better the transportation service, the more intense the interchange of demand and supply. Improved accessibility stimulates and creates new participation in outdoor recreation, as demonstrated by E. Ullman[38] for the Meramec Basin. Transportation thus transcends the role of merely serving a certain land use pattern to become an essential component and shaping factor in urban land use.

Studies dealing with travel modes clearly disclose the leading role of the automobile[39] (see Appendix A, Table 6). Automobiles allow for personal flexibility in the timing of recreational trips and the selection of location. They provide the convenience of carrying large amounts of baggage and equipment from "door-to-door" with the least trouble to the recreationist. Historically, the automobile, or horseless carriage, was used as a means of recreation[40]. Yet, from the beginning, its limitations were apparent. Since it carries only a few people, many cars are needed to get all the recreationers

out of the cities. In turn, multilane highways must be provided which, unfortunately, do not always blend well into the natural environment. Huge unattractive parking lots are required at the recreation site. Finally, automobile congestion can interface with the recreation experience. Restriction of automobile use is proposed for Yellowstone National Park and others.

Mass transportation could solve part of this problem; it would require fewer facilities to carry the same number of people and would not create difficult parking problems. A disadvantage is that it limits the freedom of choice of where and when to go, which is essential to the recreation experience. Furthermore, many riders are needed who want to go to the same place at the same time in order to make the system economically feasible. The study by I. Albrecht[37] confirms this thesis. Mass transit's role in recreational travel is limited to activities involving little equipment and scheduled events.

But mass transportation can play a more important role in recreation travel if it is combined with an individual form for moving people. Autotrain service, similar to the one offered by the European railroads, is one possibility. This service is enjoying an increasing popularity and would be useful in the densely traveled corridors between urban regions and major recreation attractions. The system acts similar to a mass transit system serving commuter peaks: that is, it provides high capacity and high speed in heavily traveled corridors. Walking to and from the station is replaced by driving the individual car, which still provides all the flexibility and convenience at both ends of the rail service. Some highway tunnels through the Swiss Alps operated on the same basis.

Still another form of travel mode combinations on a different scale is practiced by the German railroads and local, regional, and nationwide bus operators. The railroads sell round-trip tickets which can be used for both rail travel and one of the cooperating bus systems. At the railroad destination, the traveler may pick up a bicycle at no extra cost, and ride

the bike on trails across the country to another rail or bus station. He then leaves the bike at the station and takes the mass transportation system back home. Such combinations represent a possibility for the "urban parks" concept[34] where the use of the automobile is discouraged, but frequent and reasonably priced access for large portions of the urban population is available.

FOOTNOTES
CHAPTER II

[1] Outdoor Recreation Resources Review Commission, Outdoor Recreation for America, (Wash. D.C.: U.S. Government Printing Office, 1962) p. 46.

[2] Max Kaplan, Leisure in America, A Social Inquiry, (New York: John Wiley & Sons, Inc., 1960.)

[3] Kaplan, pp. 93-111.

[4] Kaplan, pp. 231-252.

[5] John Neulinger and Miranda Breit, "Attitude Dimensions of Leisure," Journal of Leisure Research, Vol. 1, No. 3, The National Recreation and Park Association, (Wash. D.C.: Summer, 1969.)

[6] Arnold W. Green: Recreation, Leisure and Politics, (McGraw-Hill Book Co.: 1964) p. 52.

[7] Outdoor Recreation for America, ORRRC Study Report, (U.S. Government Printing Office: 1962) p. 36. More recent unpublished studies indicate, however, that the degree of activity is not directly related to age of participant.

[8] Washington Statewide Outdoor Recreation Demand Survey 1967 & 1968, State of Washington, Interagency Committee for Outdoor Recreation, (Olympia, Washington.)

[9] Ingrid Albrecht, Untersuchungen zum Wochenendverkehr der Hamburger Bevölkerung, p. 72.

[10] The impact of group preference on the participation in specific activities seems obvious and has been suggested by many experts in the field. However, no quantitative studies of the subject can be cited.

[11] The Outdoor Recreation Resources Review Commission, National Recreation Survey, 1962, Report No. 19, Outdoor Recreation Outlook to 1980, (State of California, Department of Parks and Recreation, 1966) many other state outdoor recreation studies also quantified the relation of socio-economic, educational, and race characteristics to recreation participation.
Recreational travel studies developing similar correlations have been performed by Alan M. Voorhees & Associates, Inc. for the State of Connecticut and the Baltimore region; Bob L. Smith and E.D. Landman, Kansas State University, for recreational traffic to federal reservoirs in Kansas; R.L. Wolf, Department of Highways, Ontario, Canada, for recreational travel in Ontario; and others.

[12] Ingrid Albrecht, op. cit., pp. 70-74.

[13] Outdoor Recreation for America, ORRRC Study Report, (1962).

[14] Southern California Research Council, The Challenge of Leisure, A Southern California Case Study, (1967) p. 91, Table 25.

[15] Arnold W. Green, Recreation, Leisure and Politics, McGraw-Hill Book Co., (New York: 1964). p. 56.

[16] This is a suggestion from Washington State Recreation Planners who observed the growing skiiing demand in the Cascades. No quantitative study exists yet on the case.

[17] Sebastian DeGrazia, "The Problems and Promise of Leisure," Environment and Policy, Ed. by W. R. Ewald, Jr. (1967) pp. 113-133.

[18] U. S. Public Law No. 90-363. This law states that most national holidays shall fall on a Friday or Monday from 1971 on. Excluded are: Christmas, New Year, Thanksgiving, and the Fourth of July.

[19] Ingrid Albrecht, Southern California Research Council, The Challenge of Leisure, A Southern California Case Study, (Claremont, California: Pomona College, 1967)

[20] Benjamin Graham, The Flexible Work Year - An Answer to Unemployment, Center for the Study of Democratic Institutions, (Santa Barbara: 1964).

[21] Outdoor Recreation for America, pp. 30-31 and pp. 214-215, Table 6, 7, 8.

[22] Alan M. Voorhees and Associates, Inc. A Model Framework for Recreation Planning in Connecticut, the Connecticut Interregional Planning Program (October, 1966).
Andreas Ungar, Outdoor Recreation in the Baltimore Region, Regional Planning Council, Baltimore, Maryland (July, 1967).
"Traffic Attraction of Rural Outdoor Recreation Areas," National Cooperative Highway Research Program Report 44, (1967), Highway Research Board, Washington, D. C.
Bob L. Smith and E. D. Landman, Recreational Traffic to Federal Reservoirs in Kansas. Engineering Experiment Station, (Civil Engineering Experiment Station), Civil Engineering Department, Kansas State University, (August, 1965).

[23] National Recreation and Park Association indicated poor correlation between income and participation, but no particular study could be suggested.

[24] Arthur D. Little, Tourism and Recreation, U. S. Department of Commerce, (Government Printing Office, 1967).
Dean L. Hendrickson and Roy E. Huhs, Jr., Travel Activity in Washington State. State of Washington, Department of Commerce and Economic Development, (July, 1969).

[25] International Labor Organization, Labor and Automation Bulletin 4, 6, 7, Manpower Adjustment Programs I. (Geneva: 1967).

[26] Georg Kugler, Kirche and Wochenende: Aus der Praxis für die Praxis, Mitarbeiter-Hilfe des Volksmissionarischen Amtes, (February, 1969).

[27] Washington State Planning and Community Affairs Agency, Washington Statewide Outdoor Recreation Demand Survey, April 1967 - March 1968.

[28] "Fishing and hunting are the main outdoor recreation activities taking place in spring, summer and fall, with fall being the main season."
This citation is taken from Outdoor Recreation for Nebraska, Nebraska Game, Forestation and Parks Commission, (1965) p. 70.

[29] Zählungen zum Wochenendverkehr im Ahrtal, 1964, durchgeführt vom Ing. Buro A. Wagner, München, für den Landschaftsverband Rheinland, Strassenbauverwaltung, Köln. This study showed the effect of different weather conditions on trip making at the place of trip origins - the urban area. Even though the weather condition at the main recreation area was poor, good weather at home caused many people to start a trip to this area. Poor weather at home, no matter what kind of weather at the recreation area, caused fewer trips.

[30] The following studies among others have quantified this relation:
Bob L. Smith and E. D. Landman, Recreational Traffic to Federal Reservoirs in Kansas, Kansas State University, (1965).
Andreas Ungar, Traffic Attraction of Rural Outdoor Recreation Areas, IIT Research Institute, (1965).
Ingrid Albrecht, Untersuchungen zum Wochenendverkehr der Hamburger Bevölkerung, Institut für Verkehrwissenschaft der Universität Hamburg, 1967;
further studies by S. B. Ellis, R. I. Wolf, R. McDaniel, and G. D. Boggs, Alan M. Voorhees and Associates, Inc.

[31] For documentation and applicability of the Delphi Method see Norman Dalkey and Olaf Helmer, "An Experimental Application of the Delphi Method to the Use of Experts," Management Science, Vol. 9, No. 3 (April, 1963) pp. 458-467.

[32] The Profile Identification Method is described in ASCE Conference Reprint 537, "People, Planning, Engineering and the Political Process," by Norman E. Jackson, F. ASCE, New York ASCE Meeting on Water Resources Engineering, (October, 1967).

[33] William J. Baumol, Economic Theory and Operations Analysis, Prentice-Hall, Inc. (Englewood Cliffs, N. Y.: 1961), p. 64-116.

[34] See A. P. news release from June, 1968, in which the U. S. Secretary of the Interior proposes the "urban national park."

[35] Elwood L. Shafer, John E. Hamilton, Jr., and Elizabeth A. Schmidt, "Natural Landscape Preferences: A Predictive Model," Journal of Leisure Research, Volume 1, No. 1, (Wash. D. C., Winter, 1969).

[36] Alan J. Wagar, "The Carrying Capacity of Wild Lands for Recreation," Forest Science, Monograph I, (1964).

[37] Ingrid Albrecht, op. cit., pp. 64-66.

[38] Edward L. Ullman, Geographical Prediction and Theory, The Measure of Recreat ion Benefits in the Meramec Basin (University of Washington, 1968), pp. 15-19 and Figure 4.

[39] These studies include among others, Outdoor Recreation for America, an ORRRC Study (1962); Travel in Arkansas, Arkansas State Highway Department, (1964); Nevada, Out of State Visitors Survey, Nevada State Highway Board, (1963).

[40] Eldridge Lovelace, "The Automobile and Recreation," Traffic Quarterly, (October, 1966).

CHAPTER III

INTERRELATIONSHIPS OF DEMAND, SUPPLY, AND TRANSPORTATION, DEVELOPMENT OF A PLANNING CONCEPT

The complex interrelationships between the components of demand, supply, and transportation have been broken up into three major parts: 1) Demand allocation, including the determination of demand and supply for individual recreation activities; 2) Distribution of activity demand to competing recreation areas; and 3) Determination of transportation facilities to serve the demand flow (see Figure 4 on the following page).

These interrelationships can be used to evaluate recreation, transportation and finance objectives, and to determine weekend recreation travel demand between demand origins and recreation areas.

1. Demand Allocation

This phase determines demand for recreation activities and expresses it as a function of independent variables. Activity supply is determined by considering the geographic capacity of the weekend travel region as well as budget and conservation constraints. If the demand cannot be satisfied by the supply, regulators will be applied to curtail the demand.

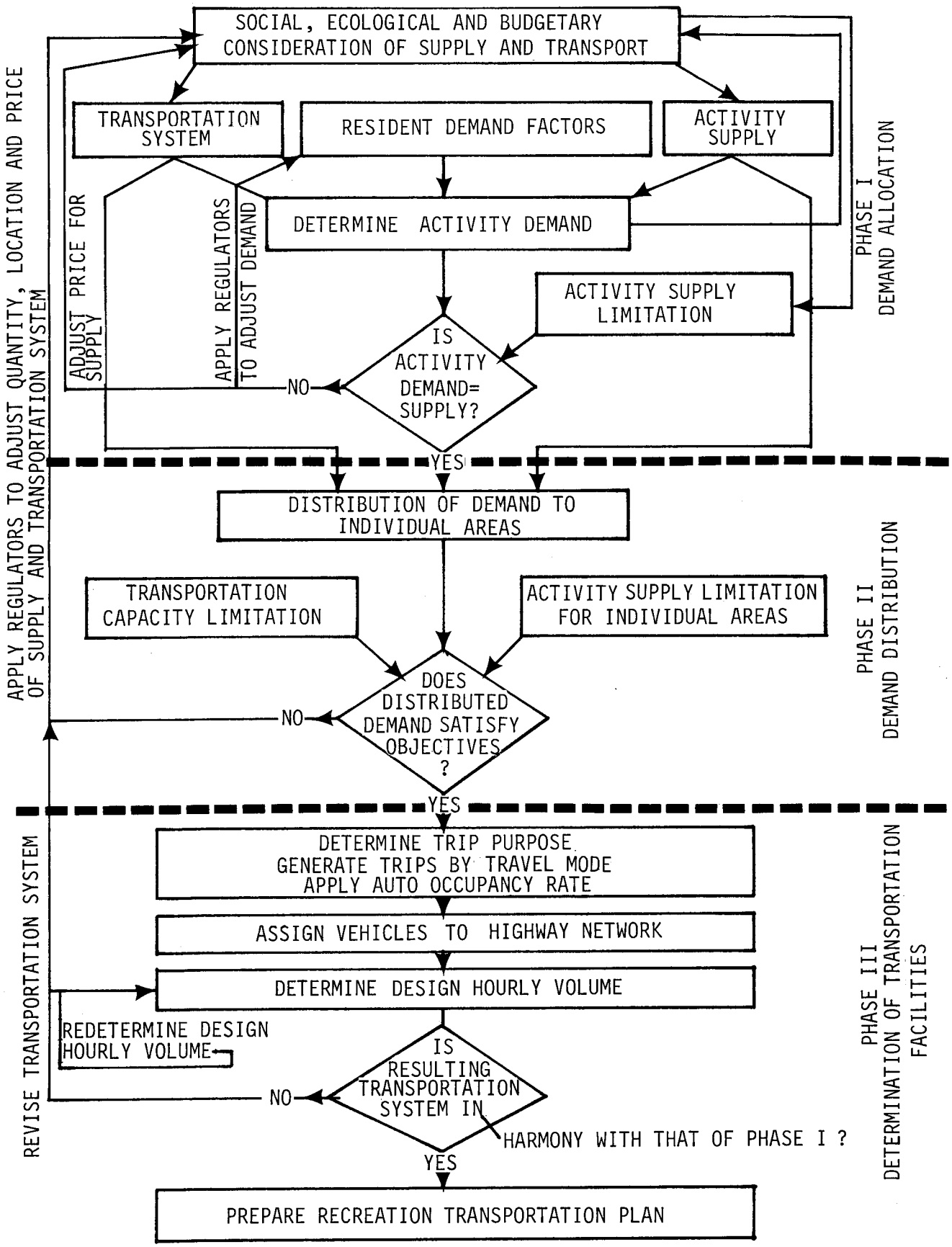
Determination of Demand and Supply - The development of a specific activity demand and the aspects of the corresponding supply will briefly be discussed using the example of skiing in the weekend travel region of the Seattle Metropolitan Area. The author gained some insight into the problems through discussions with Washington State park and planning people and through observation.

Figure 4 (Page 40) shows activity demand resulting from resident demand factors, the transportation system and the supply of recreation facilities. Many of the demand-stimulating factors discussed in the previous chapter contribute to what can be observed winter weekends on the slopes.

Skiing requires skills which are essential to the participation and enjoyment of the activity. To acquire the necessary know-how many skiers are trained by ski schools on the slopes and through high school and college ski training programs. These programs are strong demand-stimulators,

FIGURE 4

RECREATION TRAVEL PLANNING CONCEPT



as has been observed in a small town located 50 miles from a ski area and connected with it by an interstate freeway. The ski area was heavily used, but there were hardly any skiers from the town and it wasn't until a high school ski training program was introduced that young and older people from the town joined the skiers on the nearby slopes.

Recently, skiing has become a very popular sport. In contrast to about 15 to 20 years ago, it is "the thing to do" especially for the young.

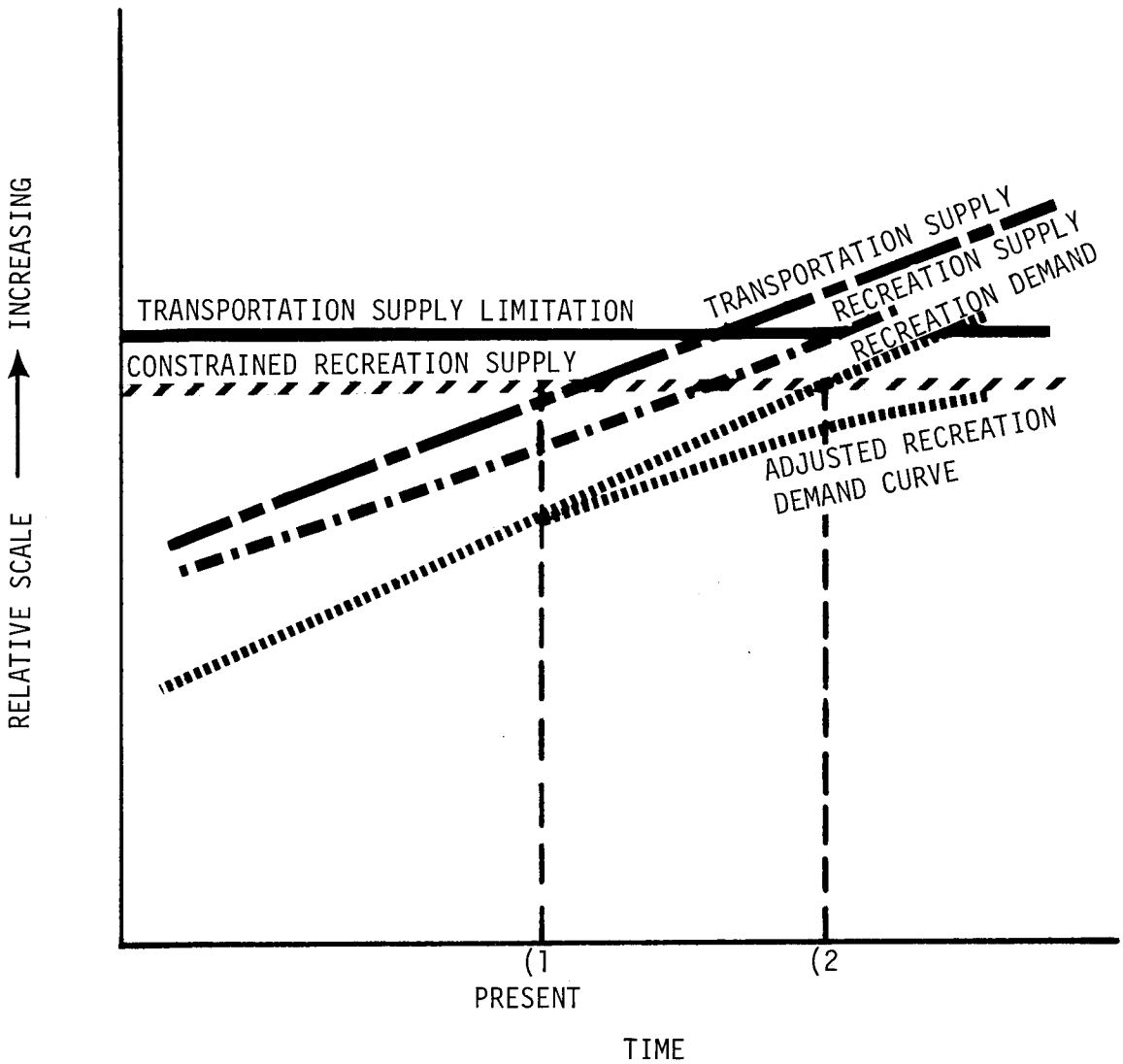
The basic stimuli for skiing demand are the geography, climate and accessibility of the Cascade and Olympic Mountains. Congestion at the ski slopes and highways connecting them with the urban areas are chief factors in limiting demand. The frustration which people experience from congestion leads eventually to a decrease in use of the facility. Little is known to date about this effect, mainly because our concern has not been with limiting demand but rather responding to it and providing more and more facilities.

The skiing demand, "pushed" by different influencing factors, can exceed the supply, restrained by budgetary, ecological and capacity considerations (see Figure 5 on the following page). To provide a balanced demand-supply system, the demand has to be curtailed to the supply level.

Interrelationships between Demands for Different Activities - Figure 5 (page 42), shows the intersection between the demand curve, the supply curve (constrained by budgetary and conservation considerations) and the transportation supply curve. In this figure it has been assumed that adequate transportation capacity can be supplied and that the critical point on the demand curve is reached when it intersects with the constrained supply curve. The next task is to shape the total activity demand to fit the total activity supply. The total recreation demand for a target date is constant, assuming that free time is also constant for the target period, and that recreation demand is demand for all activities that can be pursued during free time, excluding personal service, eating and sleeping. It is further assumed that recreation activities are interchangeable as a means to recuperation and

FIGURE 5

TYPICAL RECREATION DEMAND, SUPPLY, AND TRANSPORTATION CURVE FOR A RECREATIONAL ACTIVITY



THE CURVES SHOW THEORETICAL RELATIONS SINCE NO ACTUAL DATA IS AVAILABLE

change of environment. A demand change in one activity will then affect the demand of at least one other activity. Increasing demand for skiing means, for example, that demand for some other activities pursued during this time will decrease, or when skiing demand is forced to decrease, as indicated in Figure 5, some other activity demands will increase.

The question, then, is; what other activities can be pursued at the same time as skiing? There are many different kinds of indoor activities, as well as outdoor pursuits. It is unlikely that excess demand can be fully satisfied by indoor activities. Once the desire is awakened to pursue an activity out in the snow, an equivalent activity has to be offered as substitute. Other snow activities with ample supply have to be appropriately advertised to take over excess demand from skiing. Such activities could be snow-shoeing, ice skating, or for higher income brackets, snow-mobile riding. In the attempt to make such alternate activities popular, caution must prevail. Each "new" activity can find its market and soon face a similar increase as has skiing. An alternate activity has to be well planned and the regulation of the demand-supply balance cannot be left purely to the subject-oriented economic consideration of private developers and operators. Regulation from a higher level of interest have to be present, i.e., some form of regional organization of recreation suppliers representing the private and public sector, transportation suppliers, and organizations concerned with demand. Such organization needs adequate implementing powers to reach its goal. Besides satisfying regional demand, recreation supply is used also by out-of-region visitors. Projecting for this type of demand can be done by analyzing existing trends and projecting them into the future, as has been done with out-of-state travel[2].

Regulators - Transferring demands between activities, as discussed in the preceding section, does not take place by itself. Demand has to be guided or even "forced" to develop in certain directions. Since change regulators have an impact on human behavior, they need to be critically evaluated, as noted in Chapter I.

Recreation demand is a function of independent variables - the influencing factors and their interactions. These influencing factors have been discussed throughout Chapter II and are tabulated in Table 1 (Page 29). By changing their values, variables can act as regulators. However, not every variable lends itself to the regulating function. The cultural background of a person, for example, is a variable which cannot be manipulated. On the other hand, the cost of participating in an activity can be manipulated and has a strong effect on demand. The most effective regulators are those variables which can be manipulated, forecast, and which have the strongest impact on demand.

Regulators for the long range planning process have been selected from Table 1 (Page 29) and are shown in Table 2 on Page 52. The selection has been made on the basis of an expert opinion survey (see Appendix B) and of predictability of the factor. Besides the regulator's degree of effectiveness, a critique of its social impact is given, assuming that social equality and income redistribution are goals to be pursued. A detailed discussion of the individual regulators is given in the following sections.

Available Free Time - Available free time has been rated low in effectiveness. More free time on weekdays would mainly increase the weekday demand on nearby recreation areas. The demand for one or two days of recreation would hardly be affected. Longer vacation could have the effect of adding out-of-region demand to the existing weekend demand. Three-day weekends increase weekend demand, as they give more people the opportunity to take a day from the weekend engagements at home and enjoy time in the outdoors. It is, however, difficult to determine the magnitude of this increase, since no reliable data is available. Our problem is to determine how many people will seek the outdoors on any one day of a three-day weekend. Do business hours on only one or two of the three days affect the maximum participation day? What influence has church service on the last day of the weekend versus service on the second weekend day? We can only speculate on the

effect of three-day weekends and their influence on the critical weekend demand.

Accessibility - Accessibility has been rated low as a regulator for shaping the total volume of any activity demand.

Theoretically, it can be expected that accessibility has a high influencing power, as it provides the link between recreation demand and supply location. Without transportation recreation is not possible away from home. Furthermore, traffic congestion could influence strongly any recreation participation. When urban man engages in recreation in order to recuperate from work and daily congestions, it seems logical that he would strive to avoid congestion during his leisure time. While this argument is theoretically sound, in reality, almost the opposite behavior is observed. Even during this time, people seek the companionship of others and quite often crowd together in greater numbers by choice than they do during the weekday. As a result, weekend travel congestion is often greater than congestion resulting from work travel. The industrial process and urban way of life have given us free time; but they have also conditioned us to congestion, crowds and noise. Ironically, we are willing to spend our free time on crowded highways and crowded ski slopes.

Another problem in using transportation as a means to curb the demand flow is constraining and limiting transportation capacity. Congested highways are unsafe and public demand to increase safety is justified. Widening highways and eliminating crossings are common means of increasing safety. However, these measures lead to increased capacity, higher travel speeds, and increased accessibility which generates additional traffic.

Transportation has a limited ability to curtail demand, improved accessibility, however, can stimulate recreation participation. Beyond these characteristics, the real utility of transportation as a regulator lies in directing the demand flow to different areas rather than influencing the total demand for a particular recreation activity. Transportation will be considered again in the second phase of the planning concept, the distribution of activity

demand to competing recreation areas.

Government Policies - Government policies have been identified as having a medium influence on recreation participation. This influence rests mainly on the government's control over tax money, its ability to coordinate scattered planning efforts, and its role in defining and implementing educational goals.

Taxing power and control over spending gives government the power to stimulate the development of recreation facilities by private enterprise and undertake such developments itself. Since tax money spent on a particular recreation development does not benefit everybody - not all people have the same recreational interests - it represents a subsidy to users who do not pay the market price for their enjoyment. A service that can be obtained at a lower price than a competitive one is likely to be used more heavily than the latter, thereby influencing the user's choice. Traditionally, government policies have responded to the people's demands rather than initiating them and thus have reduced their effect as regulators.

Educational policies have great potential as demand regulators. Their influence is demonstrated by the example of the ski training program in a small town east of the Cascade Mountains.

Coordination planning efforts at different levels of government and between different interests can be a most effective regulator because it orients many efforts into one direction.

Staggering of Work Time - Staggering of work time over all seven days of the week rather than concentrating most of it between Monday and Friday effects the recreation demand-supply relation. To illustrate this, let us again consider the skiing example. The weekly skiing demand can be broken up into weekday demand, which is satisfied at the nearby slopes during day and night skiing, and the weekend demand which requires one or two work-free days. The highest demand occurs on any one of the two weekend days. If the total weekly demand could be spread evenly over all seven days, the weekend peaking situation would be eliminated. Beyond that, the potential supply would be

increased by a factor of about three, as shown in Figure 6 on the following page. Additional demand, within the limits of the existing supply capacity, can now be accommodated over seven days. The regulative power of the staggered work time does then not affect demand, but rather increases the supply.

The trend toward staggered weekly work time is favored by business and industry as a means to greater efficiency and greater profits. This proposal would appeal to operators of recreation areas and to transportation people because it reduces peak conditions. On the other side, staggered weekends bring up social problems, as discussed in Chapter II. A continuation of the observed trends towards staggered work time can well mean a solution to the congestion problems faced in weekend recreation participation and in corresponding travel.

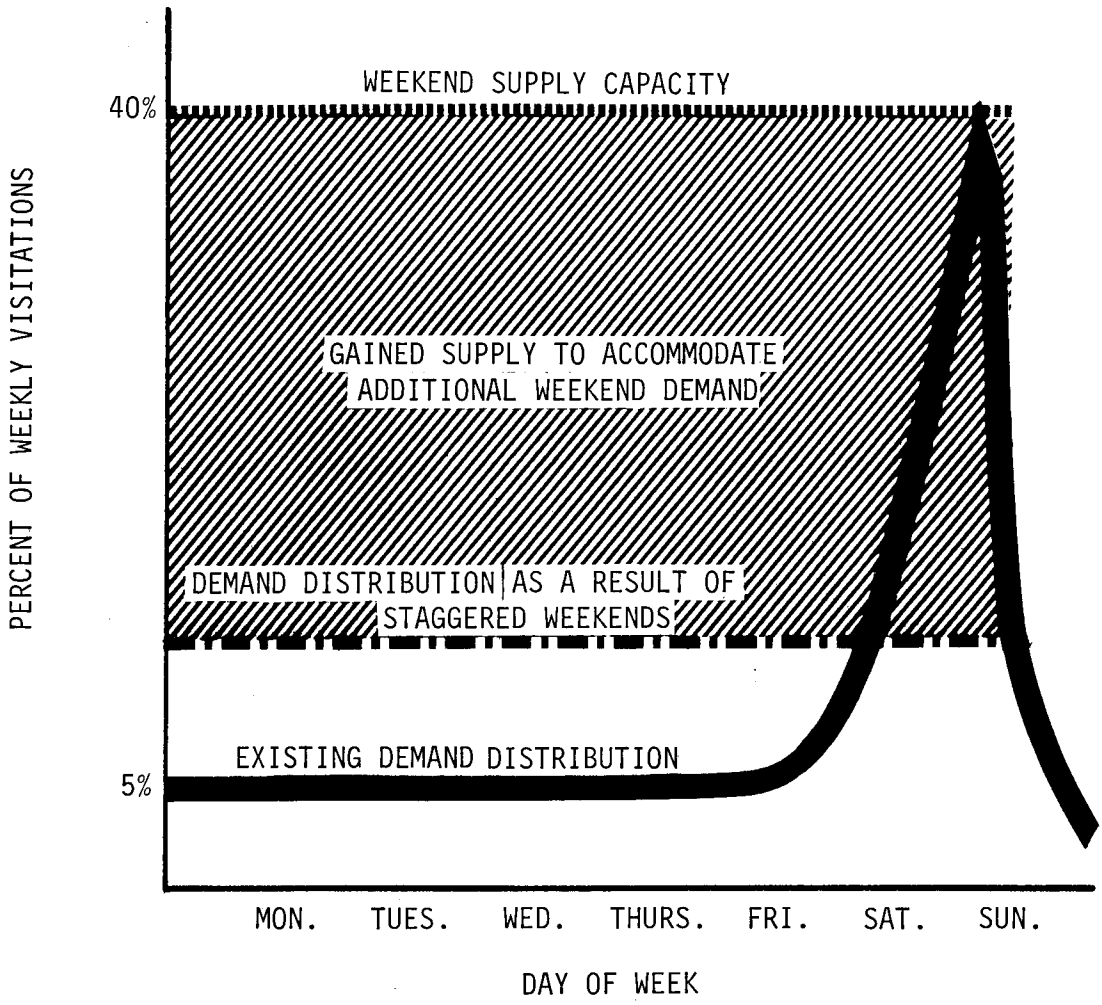
Staggered work hours on a daily basis, i.e., over 24 hours, will not affect the weekend recreation travel demand. They would, however, have a similar impact on the daily demand-supply situation as have staggered weekends on the weekend demand-supply configuration. Vacation travel is subject to the same effect when, for example, school vacations are staggered on a four-quarter basis. This means that any quarter can be taken as vacation, not just summer quarter. It would require that one-fourth of the total student and faculty population be on vacation each quarter. The impact of such practice on weekend demand is minimal.

User Cost - Economists often claim that human behavior can be seen in an economic framework of supply and demand regulated by prices. While this is certainly true, caution should prevail in applying economic measures as regulating factors; they can cause unexpected and undesirable social side effects. In the case of weekend recreation, prices are powerful regulators in the interrelationship of different demands.

As shown in the classical demand-price curve, Figure 7, participation in activities increases as the cost decreases. Snow-mobile riding has fewer participants than skiing which in turn has fewer than pleasure driving. Con-

FIGURE 6

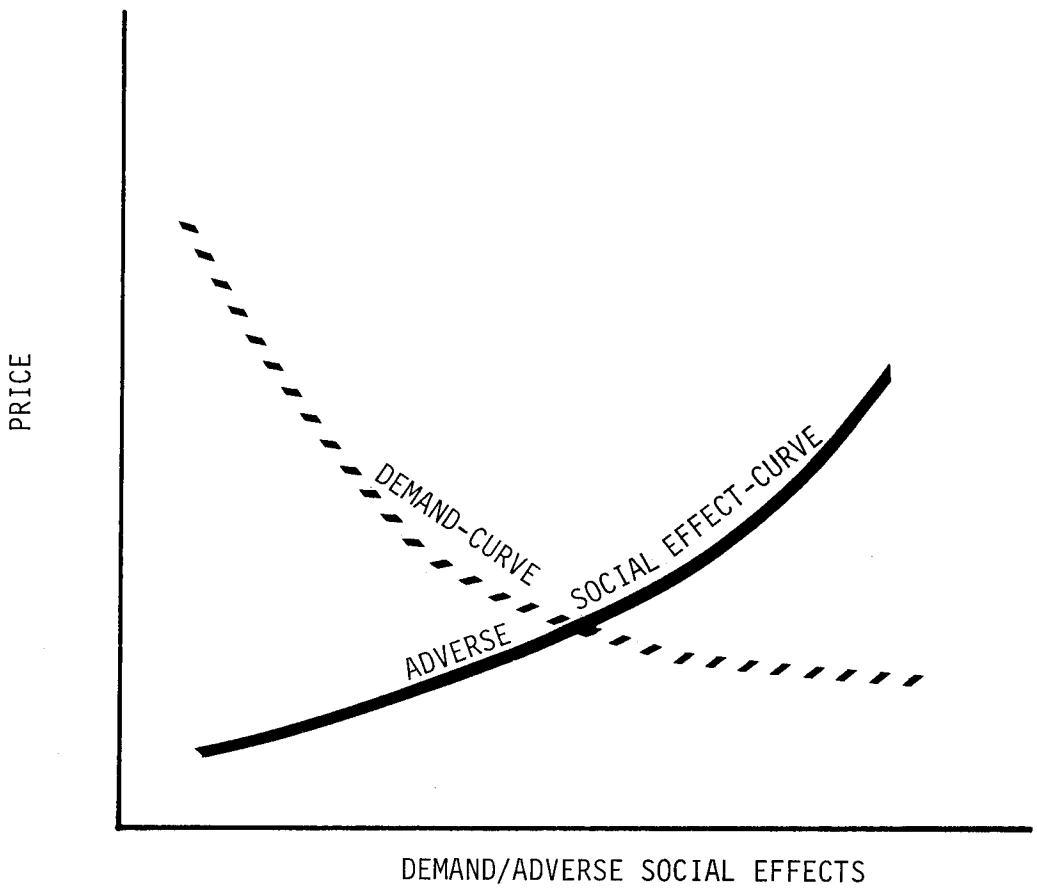
EFFECT OF STAGGERED WEEKLY WORKTIME ON
SKIING SUPPLY CAPACITY



SOURCE: THE WEEKDAY DISTRIBUTION CURVE TAKEN FROM:
VENTURA COUNTY, USE OF RECREATION FACILITIES,
VENTURA COUNTY, DEPARTMENT OF PUBLIC WORKS, 1968

FIGURE 7

DEMAND - PRICE AND ADVERSE SOCIAL EFFECT
RELATION FOR PUBLIC RECREATION LAND



THIS GENERAL FORM OF THE DEMAND CURVE CAN BE FOUND IN: CLAWSON, MARION, METHODS FOR MEASURING THE DEMAND FOR AND VALUE OF OUTDOOR RECREATION, RESOURCES OF THE FUTURE, INC., WASHINGTON, D.C. 1959.

THE SHAPE OF THE ADVERSE SOCIAL EFFECT-CURVE IS PURELY INTUITIVE SINCE NO DATA IS AVAILABLE.

sequently, limited supply could be priced high in order to keep the demand low. This is already done by private recreation suppliers who charge prices sufficiently low to generate demand for their facilities, yet high enough to prevent demand from exceeding supply. Many economists[3] have argued for applying cost as a regulator of recreation on public land which has traditionally been offered free of charge or at negligible prices. A better balanced operational budget of public park agencies and less need for subsidies would result. The counter argument is that public recreation would become financially prohibitive to lower-income people. In addition to entrance fees, the recreationist has to consider transportation costs. Regardless of travel mode, the user who lives closest to an area pays the lowest price. Therefore, few low-income people from New York have ever seen Yellowstone National Park.

Total participation costs are powerful regulators, as they affect the user's recreation budget directly. They do, however, create undesirable social side effect. Economic differences between population groups are one of the basic causes of many social problems experienced today. If recreation is too dependent upon the economic well being of the recreationist, a restriction of participation for lower income groups is the result. This can aggravate existing differences rather than help level them. It has been mentioned earlier that recreation is an essential activity in our urban life. It is important to make its benefits accessible to all people in urban society. Public subsidies may be necessary to accomplish this goal.

Skills - Skills are essential to many recreation activities; without them, these activities cannot be enjoyed or even pursued. Observations indicate that the higher the skill requirements, the lower the participation, i.e., there are more mountain hikers than mountain climbers, more sun bathers than swimmers, more power-boaters than sailors, etc. Skills are significant regulators for activities because they are prerequisities for participation and enjoyment. Efforts to develop specific skills among a large group of people will consequently have a tendency to increase the demand for the correspond-

ing activity. Reducing teaching of a certain activity will not necessarily result in prompt reduction of demand for this activity. The effect can only be observed over a very long time, if at all. In order to fully accomplish the goal of shifting demand from one activity to another, appropriate alternatives must be provided. The alternate activity should be in the same category and within the same price range as the original activity. By enriching the recreationist's skills, his interests become dispersed, thus allowing him to choose from a variety of activities and react quickly to supply limitation.

Summary - Two of the six regulators identified in Table 2 (Page 52) are highly effective. Distribution of free time is a slow but effective means of increasing supply because an existing recreation area could absorb three times the existing demand if it were spread over the whole week. User cost has a great potential in limiting demand. However, it has to be applied with great care to avoid adverse social effects. No individual regulator by itself will accomplish the goal of shaping the demand to match the supply and transportation capacity. To achieve useful results, a combination of all of them is necessary.

Simulation of the Demand-Shaping Process - Demand for recreation is shaped by manipulating independent variables in the demand-generating function. The form of this function and the important variables are described in Chapter II, Section 1. Two mathematical models have been suggested: multiple regression and mathematical programming. Both methods are used in this context as so-called "iterative procedures" resting on a trial-and-error basis. This means that the result is not arrived at directly, but rather by exploratory methods.

The regression technique is a simple and common computer program. In this technique the regulators are altered and the impact of each combination of altered variables on the demand activity is calculated. The planner checks the results after each calculation to determine whether the study objectives are met, and if necessary, initiates an iteration, using a different set of subjectively altered regulators. After a number of iterations, each using a "better" unput than the preceding, he can expect to find a set of regulators yielding

Table 2

Significant Independent Variables Functioning as Regulator for the Skiing Demand

Variable	Degree of Effectiveness			Criticism of Regulator in a Social Context
	Low	Medium	High	
1. Available free time	X			Acceptable
2. Staggering of work time			X	Acceptable; creates, however, social problems
3. Accessibility	X			Acceptable
4. User cost			X	Less acceptable, creates social injustice
5. Government policies		X		Acceptable
6. Skills		X		Acceptable

the desirable study objectives.

If the limitation of the regulators can be written into a mathematical form, mathematical programming can be used to determine the effect of any set of regulators. This method allows a systematic improvement of the variables used in the iterative procedure.

Both methods have the potential of evaluating the effects of different policies on recreation demand and are therefore capable of simulating the demand shaping process.

As a result of the demand manipulations, a balanced demand-supply configuration is achieved for any activity within the weekend travel region of a metropolitan area.

2. Demand Distribution

The next task is to distribute the recreation demand for any activity to individual areas offering corresponding supply. This step has to be performed for all activities whether of not they are affected by the manipulation discussed in former sections.

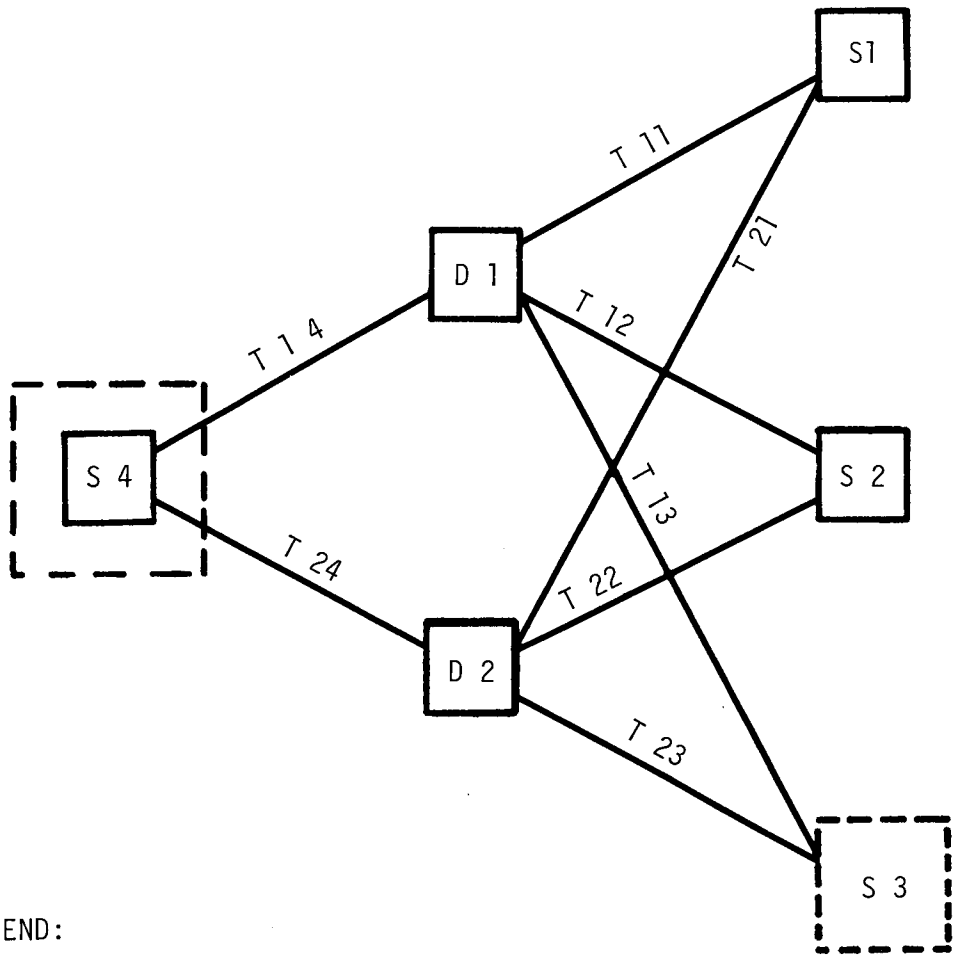
The spatial problem configuration is shown in Figure 8 on the following page. The metropolitan area is subdivided into two major demand generation zones D 1 and D 2. These zones have been formed on the basis of geography, transportation, and criteria of population homogeneity in respect to their recreational demand. Supply areas S 1 are located around the demand centers indicating existing and potential supply capacities. They are linked to the demand centers by straight lines symbolizing an idealized transportation network characterized by travel speed and travel distance.

The Distribution Process - The distribution process utilizes recreation demand, supply, and transportation as input, (See Figure 9 on Page 55). Demand is generated in the metropolitan area as described in Chapter II, and recreation supply is provided at specific locations which are represented by an attraction index.

To determine the attraction index, the question was asked: What causes people to select one area over another, or what constitutes the attractiveness

FIGURE 8

DISTRIBUTION OF
RECREATION SITES, URBAN AREAS, AND TRANSPORTATION NETWORK



LEGEND:

S — EXISTING RECREATION SUPPLY AREA

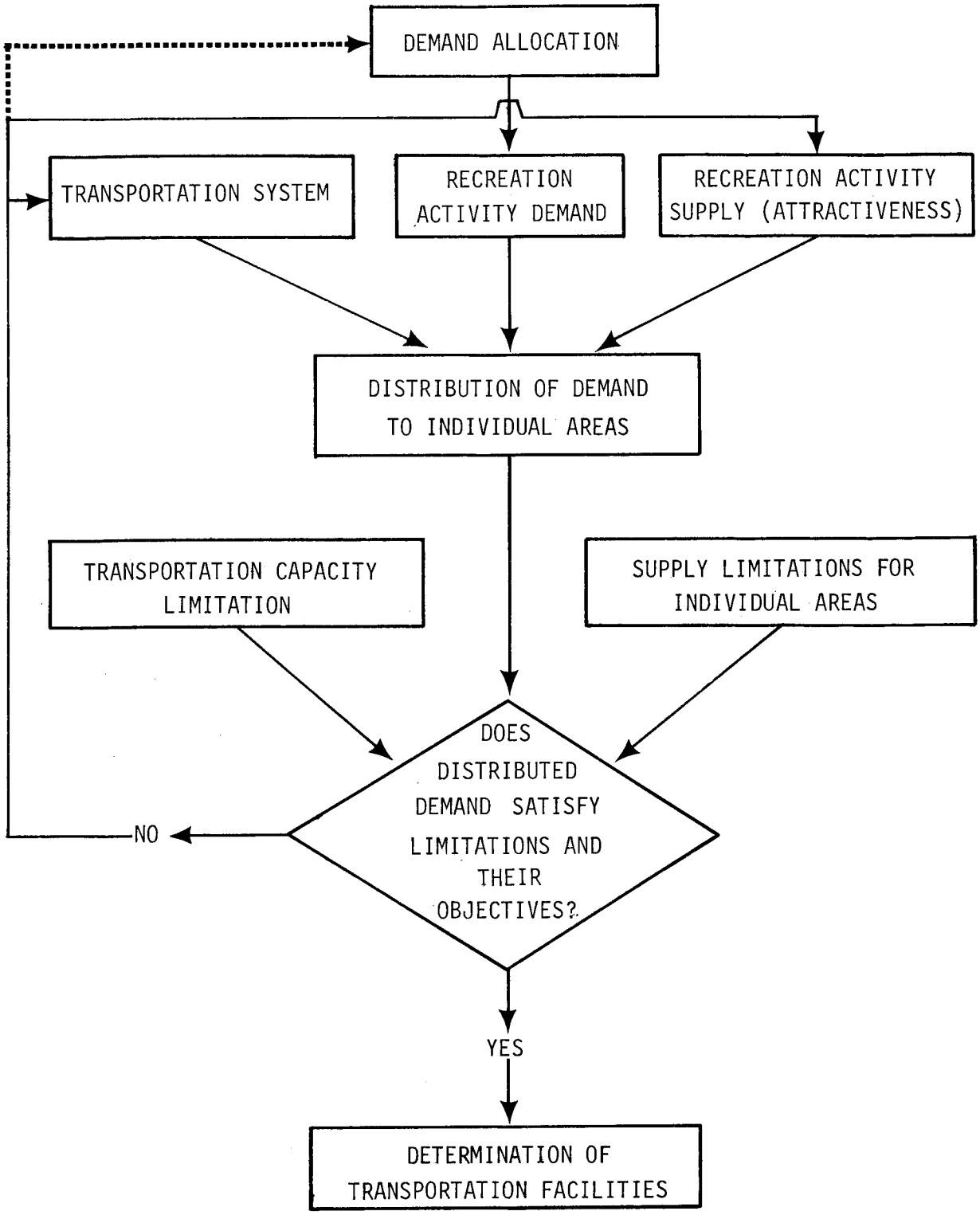
S — POTENTIAL RECREATION SUPPLY AREA

D — RECREATION DEMAND AREA (URBAN CENTERS)

T 1 4 — TRANSPORTATION LINK

FIGURE 9

DEMAND DISTRIBUTION PROCESS



of an area? In Chapter II the basic elements of attractiveness have been pointed out: quantity and quality of facilities, user price, and accessibility. Also, personal and group taste have a significant influence on what areas people select. As far as quantities and qualities of recreation facilities are concerned, there have been many studies[4] to determine the impact of such variables on the use of specific areas. Andreas Ungar, in a study on the attractiveness of Indiana State parks[5], defined 48 variables, measuring qualities like availability of hot showers, flush toilets, etc. Through a step-by-step regression analysis, he determined the 13 most significant variables and reached the following ranking: 1) number of picnic tables, 2) number of campsites, 3) availability of bath houses, 4) availability of fishing, 5) location on a river, 6) availability of electricity, 7) area of lake, 8) acres of park extensively developed, 9) capacity of total living facilties, 10) population within 60 miles of park, 11) area of picnic shelters, 12) number of hiking trails, and, 13) amenities. These measures alone, however, cannot explain area preferences. Besides changing taste, there are other preferences for which a certain regularity has been observed. I. Albrecht[4] mentioned that for a long time the population of Hamburg, Germany, preferred the beaches of the Baltic Sea over those of the North Sea even though the latter are located closer to the city. Differences such as sand beach versus mud flats or tides versus no tides for the two beach areas were cited. This suggests that the analysis of attractions has to identify distinct patterns of human taste and tradition.

Tradition provides mobility and access to recreation areas. Beyond this task, traveling itself has historically been a means of recreation. Travel utilizes differenc modes of transportation, subject to their availability and the specific activity. Such modes are individual transportation (the automobile) and mass transportation (the bus or train.) The automobile is the preferred mode for most weekend recreation activities, as it allows for freedom in timing and selection of spatial destinations and provides unexceeded convenience and comfort. Still, mass transportation has its role, as indicated earlier. For the proposed highway network to serve the recreation areas as shown in Figure 8 (Page 54),

travel distance and travel speed can be determined according to highway type. In case some form of mass transportation is available and applicable, it can also be characterized in terms of travel time and cost, and can be reflected in the network.

The next step introduces limitations for individual recreation areas and transportation link capacities. These limitations reflect the objectives of the prevailing value system discussed in Chapter II. The limitations are used in an evaluation process where they are compared to the calculated distribution results. If the distribution is acceptable, the transportation facilities required to serve the demand flow are determined and a recreation transportation plan is prepared. If the results are not satisfactory, a feedback process is generated, and changes of quality, quantity, location, and cost of recreation supply and transportation are introduced, considering their social, ecological, and budgetary impact. The changes supply and transportation configuration is used as input for the first iteration of the distribution process. If changes in the supply and transportation configuration are drastic and it is shown that they also have affected the activity demand, it becomes necessary to also re-do the demand generation phase. The iterating process is continued until satisfactory distribution results are obtained.

Regulators - Independent variables capable of regulating the demand flow in the demand distribution process are limited mainly to variables of recreation supply and transportation since only these enter the distribution process. Outside these categories, a well-functioning information system could serve as a regulator by notifying recreationists about expected congestion and eventual closure of areas.

Pricing is a powerful regulator and can be applied in form of user fees. A popular campsite with limited supply could theoretically be priced up to its market level to eliminate overcrowding. In addition to the negative social effects of such a policy as noted earlier, there is the difficulty of charging differentiated prices for public recreation land.

Another regulator on the supply side is the attractiveness of the recreation area. Manipulating the quantity and quality of recreation facilities is a successful means of increasing demand. It is, however, a less powerful

regulator for reducing demand, because it is impractical to reduce existing quantities and qualities of recreation facitities. Travel time and travel cost are, for the same reason, poor regulators if applied to the task of reducing travel flow to a certain area. Attractiveness, travel time and cost are more effective when used to develop alternatives to popular recreation areas and congested transportation links.

Demand Distribution Techniques - The demand distribution has been performed utilizing different techniques such as the regression method[7], the intervening opportunity method[8], and the geographical prediction method[11]. All these methods have been applied to the weekend travel problem, and the investigators claim that good simulation of reality has been achieved. Mathematical programming techniques[12] have not yet been applied to the problem of distributing recreation demand.

In the following, a brief description of the individual techniques will be given, pointing out their potential in recreation demand distribution.

The regression technique[7] is known in the form:

$$V_{ij} = a + bP_i + cD_{ij} + dA_j + eOj \qquad (1)$$

where:

V_{ij} = visitors from urban center i to recreation area j.

P_i = estimated demand in center i.

D_{ij} = a measure for travel distance between urban center i and recreation area j.

A_j = a measure of attractiveness of recreation area j.

O_j = a measure to competing recreation opportunities.

a = regression constant

b, c, d, e = regression coefficient for the independent variables

= power to which independent variables are raised.

The regression technique is used frequently as an estimating equation where the relationship between independent and dependent variable in linear and the independent variable is easy to measure. The latter requirement is not completely fulfilled in the case of O_j and D_{ij} which are functions of human

spatial behavior. This behavior is expressed in two other mathematical forms known as intervening opportunity and gravity equation.

The intervening opportunity method[8] has been applied in the form:

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

Where:

V_{ij} = number of trips from urban center i to recreation area j.

P_i = total number of trips produced in center i.

e = the base of natural logarithms (2, 71828)

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

A = sum of destinations that have already been considered.

A_j = total trips attracted to area j.

This model relies on the probability that a trip from one center to a particular recreation area is equal to the probability that an acceptable destination exists, three times the probability that an acceptable destination has not been found. The determination of the parameter L causes considerable problems, and its functional form is difficult to conceive: this probably caused its infrequent use, even though its performance on the recreation problem in Kansas[8] was superior to the gravity model.

The gravity model is the most widely used distribution method and assumes that human behavior follows the law of gravity, i.e., the greater the attraction the heavier the flow from the generator to the attractor, and the further away the attraction, the thinner the flow. This model has been widely used in the form:

$$V_{ij} = P_i \frac{\dfrac{A_j}{D_{ij}^{b}}}{\displaystyle\sum_{x=1}^{n} \frac{A_x}{D_{ix}^{b}}}$$

where:

V_{ij} = number of trips from urban center i to recreation area j.

P_i = total number of trips produced in urban center i.

A_j = a measure of attractiveness of recreation area j.

D_{ij} = a measure of distance between urban center i and recreation area j.

b = exponent expressing the effect that spatial separation exerts on trip interchanges.

n = number of recreation areas attracting trips from population center i.

The difficulty encountered in using the gravity model lies in the determination of the exponent b which may change over time.

Jack Ellis has used an electrical analog to simulate recreational traffic flow and called it "systems theory model"[10]. In this model the origins act like sources of current and the destinations as "ground" with the resistance of the travel link regulating the flow - the less the resistance, the higher the flow. Three equations are written, one for the origins,

$$N_i = bP_i \tag{4}$$

one for the destination,

$$Y_i = A_j X_j \tag{5}$$

and one for the transportation link

$$G_k = D_k X_k \tag{6}$$

where:

N_i = total number of recreational trips from urban center i.

P_i = number of people residing in urban center i.

b = recreation participation rate.

Y_i = total number of trip destinations from center i to recreation area j.

A_j = attraction of area j.

G_k = total number of trips on transport link k.

D_k = a measure of the resistance in link k.

X_j and X_k = "across" variables.

These three equations constitute the "system" which can be solved for the "across" variables as described by J. Ellis[10]. The model's real utility lies in combining the distribution of trips between various origin and destination zones with the assignment of these trips to individual highway routes.

The geographical prediction method as proposed by Ullman[11] is similar to the regression model in which the member of visitors from a population center to any recreation area has been related to air distance between the center and the area. A set of three parallel curves for low, medium, and high attendance rates has been found. The utility of this model is demonstrated is Figure 10 on the following page. If a new recreation area is located in a certain distance from a population center, the per-capita annual visitation from this center to the new site can be determined by the curves. The diversion of visitors from existing areas to the new ones is calculated on the basis of consumer surplus.

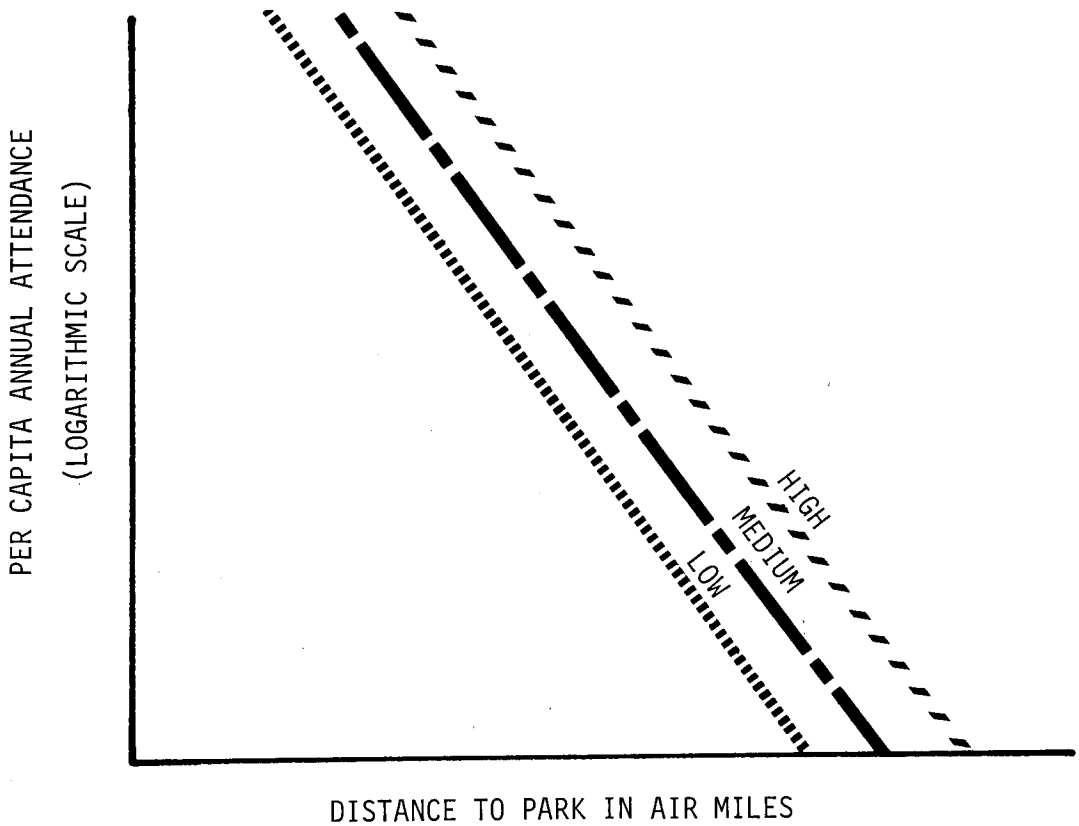
The last method for demand distribution to be listed here is the linear programming technique. This method has already been mentioned in Simulation of the Demand Shaping Process. The utility of linear programming lies in its potential to optimize more than one objective by systematically improving the results in an iterative procedure. Some objectives to be optimized are: low user fees, no over-use and over-short travel time where travel is not essential to the recreation experience, utilization of existing transportation capacities before new facilities are constructed, and allocation of financial resource to obtain for a fixed amount of money the highest gain for the people and the lowest interference with other interests.

Gravity Model Example - The gravity model is enjoying a widespread popularity as a method to simulate human spatial behavior. The model can be expressed in the form of formula (3):

$$V_{ij} = P_i \frac{\dfrac{A_j}{D_{ij}^{b}}}{\sum_{x=1}^{n} \dfrac{A_x}{D_{ix}^{b}}}$$

FIGURE 10

ANNUAL PER CAPITA VISITS BY DISTANCE TO PARK



SOURCE: ULLMAN, EDWARD, L. GEOGRAPHICAL PREDICTION AND THEORY, THE MEASURE OF RECREATION BENEFITS IN THE MERAMEC BASIN, UNIVERSITY OF WASHINGTON, SEATTLE, 1968

Additional criteria can be included in these variables depending on the data avabilable and goals of the analysis. In our simple example the exponent b is assumed to be 2, even though in reality the value for b changes with increments of travel time. This assumption simplifies the calculations but does not disturb the validity of the gravity theory.

The problem is two-fold: First to distribute the recreation demand between the demand zones and the supply zones, not to exceed capacity limitations on transportation and supply. Second, to determine which potential supply to be developed to accomodate the demand, considering costs for supply and transportation improvements. An example of spatial configuration is shown in Figure 11 with two areas of demand generation D_1 and D_2 and four supply areas S_1 to S_4. The total demand is 150 units and does not exceed the exisitng and potential supply. The recreation areas are located aroung the population centers. A distinction has been made between existing supply and potential supply. The supply quality for the outlying recreation areas S_1, S_2, and S_3 shall be equal; the quality of area S_4 is assumed to be lower than the former. The demand zones are linked with the supply areas by highways, whereby these links represent the transportation system characterized by the transport index, D_{ix}, a function of travel time, cost, and congestion. Initial data and results from the gravity model calculation are listed in Table 3 (Page). Column 2, 4, 6, 7, 8, and 11 show initial input data. Using these input data in the gravity model, formula (3), visitor volumes on each transportation link between each demand zone and every recreation area V_{ix} are calculated and shown in Column 3. The sum of V_{ix}'s for every recreation area represents the capacity needed in each area to satisfy the demand as shown in Column 9.

In the evaluation stage, Column 3 and 4, transportation demand and capacity limitations, as well as 6, 7, and 9, supply needs at recreation areas and supply limitations, are compared. In our case, we find transport link 2 and 6, and recreation area S_2 overload. Highway links 2 and 6 connect the two urban centers with recreation area S_2. An improvement on these links

FIGURE 11

GRAVITY MODEL EXAMPLE

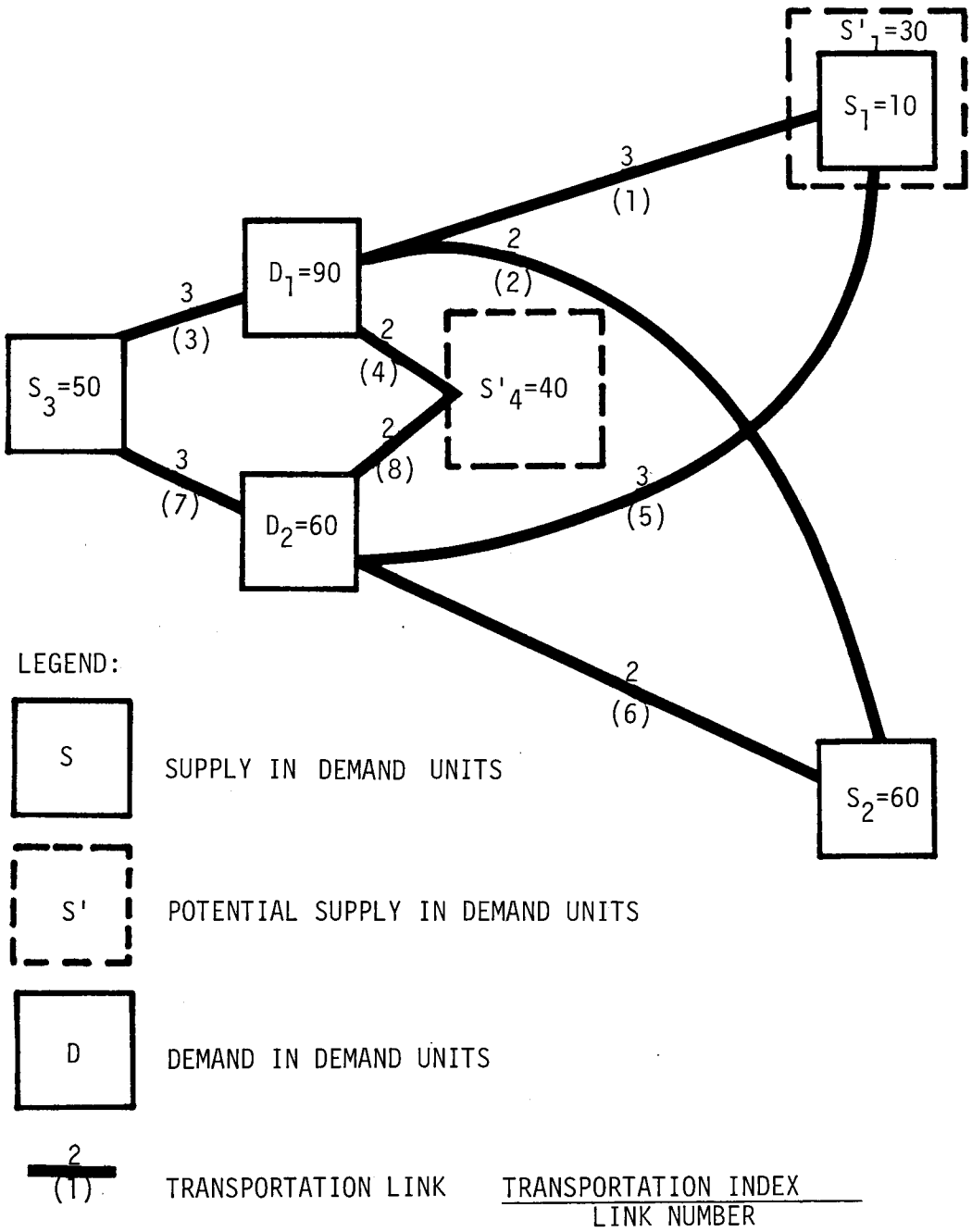


Table 3

Data for Gravity Example

1	2	3	4
Transport Link Nr	Transport Index Dix	Transport Demand in Demand Units Vix	Transport Limitation in Demand Units
1	3	11.5	15
2	2	45.0	25
3	3	14.2	25
4	2	19.3	30
5	3	7.6	15
6	2	30.0	25
7	3	9.5	25
8	2	12.9	20

5	6	7	8	9
Recreation Area	Existing Supply Capacity in Demand Units	Potential Supply Capacity in Demand Units	Attraction Index Ax	Capacity Needed in Demand Units
S_1	10	30	4	19.1
S_2	60	10	7	75.0
S_3	50		5	23.7
S_4		40	3	32.2

10	11
Area of Demand Generation	Generated Demand in Units Pi
D_1	90
D_2	60

to satisfy the excess capacity is not meaningful because S_2 is already over-used; it is the preferred and most attractive recreation area in this example.

To achieve a demand distribution that does not overload any transport or supply capacity, variables representing the transportation network and the recreation areas have to be changed and re-entered into the gravity model. The iterative process continues until the objectives are satisfied.

Any change in the transport of supply variables to correct the demand-flow requires expenditures. These costs can occur in improving highways, or in improving recreation facilities. These cost considerations lead to the second part of the problem. Where is the best area to invest, to distribute demand in a desirable pattern? The gravity model can again be applied by expressing transportation and recreation capacity limitations in cost units. Changing one variable at a time and leaving all others unchanges produces a cerating demand-flow pattern. The difference of this pattern from the original flow in then the result of the changed variable. If this improvement cost can be expressed in dollar values, the difference in visits to particular areas can be expressed in visits per dollar improvement.

In practice, there exist more than the simplified objectives stated here. The planner working with the gravity model has to make subjective decisions on what variable to change and for what amount to improve the results of the following iteration. This is a time-consuming and cumbersome task.

FOOTNOTES
CHAPTER III

[1]An example of such costly programs to reestablish a balanced natural setting can be seen in Bavaria, Germany, where farmers in mountain areas have found it financially more efficient to serve tourists than to serve the land. They have reduced the amount of Alpine pasture-grazing drastically as well as careful maintenance of their forest lands to keep their man-power free for tourist service. As a result the flood damage after strong rain storms have increased since the surface vegetation has been disturbed by no more grazing, etc. The flood water damage occur often in further downstream towns and cities and, therefore, are not realized to their full extent by the villagers in the mountains. Government programs have subsequently been initiated to "correct" the situation and re-establish the old balance. The cost for these programs exceeds by far the gain the mountain villages have had so far by shifting their economy from farming to tourism.

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CHAPTER IV

DETERMINATION OF TRANSPORTATION FACILITIES

Transforming the recreation demand flow into requirements for transportation facilities capable of adequately handling recreational traffic involves many transportation engineering considerations. The demand flow represents persons desiring recreational travel. Trip demand needs to be converted into recreational travel by an acceptable mode. Most weekend recreation travel today is by automobile. After the portion of automobile travel is determined, auto occupancy rates will be applied to determine the number of cars to be accommodated. Frequently there is more than one route the recreation seeker can take to reach his destination. The traffic assignment process simulates the recreationist's selection of a particular route. When the demand volumes on individual highways are determined, there is the question of what volumes to use as design criteria, the 30th highest hourly volume of the year, the 50th highest hour, the ADT, etc. Before approaching any one of these questions, the characteristics of recreational travel will be discussed.

1. Characteristics of Recreational Travel

Work trips and recreational trips can be compared to bring out some of the basic characteristics of weekend recreational travel. Weekday traffic peaks are caused by work trips. An outstanding characteristic of work trips is that almost every household produces at least one such trip per day for economic survival. The travel patterns are determined by business, industrial and residential locations as well as the beginning and ending of the daily work-time. Contrary to the work trip, the recreational trip is optional: the trip is not essential for the person's survival. Furthermore, the recreationist has a variety of opportunities in pursuing recuperation from work, not all of which require travel. Essential to the recreation experience is the freedom of selecting the activity, location, and time. The time framework within which the recreationist operates is the weekend. Trips start at any time between Friday night and Sunday afternoon, with the great majority of

returning on Sunday night. Beyond this, certain definite time patterns on an hourly, daily, and seasonal basis can be observed for many recreation areas, depending on the specific activities pursued and on their spatial location relative to the recreationist's home[1,2].

The spatial distribution of trips is characterized by the location of the recreationist's home and the location of the recreation attractions. The place of production is essentially the recreationer's home, the place of attraction is usually defined as the recreation area. The exception to this is pleasure driving, with no single point of attraction, but rather a linear attraction. The travel distance and trip length are governed by the time available and cannot extend above a certain maximum. According to the speed of the ground transportation network, a weekend travel zone around an urban area is established with a one-way driving time of two to four hours.

2. Trip Purpose

Trip purposes are used in transportation studies to describe distinct travel patterns. The finer the distinction is between travel patterns, (the more trip purposes) the more realistic and "accurate" will be the prediction of total traffic volumes which consists of a summation of all individual trip purposes. The upper limit to the distinction between trip purposes is governed by the level of fineness at which the basic characteristics of trip purposes can be forecasted.

In urban transportation planning the number of trip purposes is determined by corresponding size of the urban area, travel patterns, trip volumes, the stability of volumes, trip length characteristics, and the predictability of the trip purposes[4]. In recreation travel, recreation activity is added to the criteria for trip purpose. Outdoor Recreation Resources Review Commission Studies[5] identified 24 recreation activities, classified into six major groups: passive pursuits, physically active recreation, water sports, winter sports, back country recreation, and miscellaneous (see Appendix A, Table 4). Most statewide recreation studies have consequently used the same or very similar recreation activities and group of activities. The Washington Statewide Com-

prehensive Recreation and Open Space Plan[6] introduce the concept of area types (Appendix A, Table 5). Basically, these area types are descriptions of environments corresponding with outdoor recreation activities and natural settings at different recreation areas. They are grouped into three major categories: user areas, conservation areas, and user-conservation areas. In an economic study of recreation, Marion Clawson[7] classifies recreation areas into three groups: user areas located close to where the users live; intermediate areas designed primarily for day-long recreation and suited best for weekend use; and unique natural areas, generally located several travel days from the user's home and suited best for vacation use.

The question of trip purpose has been approached differently by recreational travel studies. Alan M. Voorhees and Associates in a study for the State of Connecticut[8] cites as recreational-trip purposes: (1) boating, (2) swimming (saltwater), (3) swimming (fresh water), (4) picnicking, (5) exploring. The Baltimore Region Plan[9] lists four recreation-travel purposes which correspond with recreation activities. It is stated that these four purposes can be expanded to include ultimately all recreation activities. Other recreation travel studies[10] use just one trip-purpose or lump all trips to certain types of recreation areas such as reservoirs, parks, or cabins into one trip purpose.

In this study three criteria for the selection of trip purposes are essential: location criteria, travel patterns, and ability to predict travel patterns. The location of attractions relative to the urban area, implies travel of different lengths. This results in the first distinction of trip purposes: short trips to attractions inside the urban area with a one-way travel time of up to one hour, and long trips to attractions ourside the urban area with a one-way travel time of up to four hours or more.

A further distinction of trip purposes can be made according to recreation activities. It can go so far as to created a purpose for every activity. This approach encounters difficulties in the generation of trips, because participation rates in single activities, developed on a national and state level

are not reliable if applied to small geographic areas. On the other extreme, all weekend recreation activities can be found in one trip purpose. Here the problem is that the fineness of different travel patterns is lost. Predictions are then very general and do not respond adequately to changes which affect only a portion of the total volume. Furthermore, there is a difficulty is distributing this one trip purpose to different attraction; every recreation area would be an attraction for a produced trip, whereas, in reality this is not so - a skiing trip is not attracted by the beach, etc.

Whatever approach is taken, it has to be remembered that there are two major categories of recreational activities involving travel. First, there are activities the recreationist engages in at the end of the trip - skiing, boating, etc. These activities are confined to distinct recreation areas. Second, there are activities during the trip, namely, driving for pleasure and sightseeing. These two activity categories are often combined.

A further distinction of trip purposes should be made according to seasons. Depending on climate and recreational activities, there are different travel patterns in repsect to trip length[11] and traffic volumes during a particular season. Therefore, it is desirable to consider each recreation trip purposes separately within each of the four seasons. Appendix C gives an example for the development of recreation trip purposes. The ability to predict travel patterns is a function of defining the travel characteristics. Since these characteristics have been defined, the resulting travel patterns are reasonably predictable.

3. Mode of Travel

The selection of the travel mode rests, like the selection of trip purposes, on the trip characteristics. Observations indicate clearly that the automobile is used for most weekend recreational trips; it offers the most freedom in timing a trip and in selecting any destination within the weekend region, and provides the highest degree of comfort as well. Even in Europe, where relatively good public transportation is offered, the decline of weekend transit patronage is being noticed[12].

The acceptance of mass transportation, then, depends on different criteria: Timing of the trip is an important one, since mass transportation is operated on a fixed schedule. This is usually acceptable for attending major sports events, and other schedule bound activities or activities confined to a limited area such as ski areas, swimming pools, etc. Another criteria is the convenience of carrying equipment. Unless the equipment is packed in a way that it can be easily carried, mass transportation is not the most appropriate mode. Such easily carried equipment is the hiker's and backpacker's outfit. A hiker might prefer taking the bus or train to avoid making round trips to get back to his car. Instead, he can hike between two points. The recreation activity is then also a criteria in the selection of travel mode. Sightseeing, for example, lends itself to mass transportation. Sightseeing tours in cities are well known and are also found to a limited extent in areas of unique natural beauty. Such tours draw their clientele from those who are tired of driving. They can further be used to expose large numbers of young city people to nature, if organized by schools and other youth-oriented institutions. Finally, such tours could be subsidized and directed toward less popular areas, thereby spreading the demand geographically and giving the economically deprived and those with no car a chance to see and enjoy more distant areas of natural beauty.

The modal split procedure would then be best accommodated within the generation process, i.e., a trip end split, rather than applying a trip interchange split[13].

4. Auto Occupancy and Traffic Assignment

To determine the number of cars to be accommodated, the portion of demand using the automobile has to be divided by an auto occupancy rate. Even though this is a fairly simple process, the rate in itself is of crucial importance to the determination of needed highway and parking facilities. The usual way of determining this rate is through observation or questioning the recreationer, then applying such base year rates to a projected future demand. But it is advisable to consider the circumstances under which the

occupancy rates have been determined and the life style prevailing at that time. The family life style, for example, can change and even younger children may no longer travel with their parents on weekend outings. Both working husbands and wives could be involved in separate weekend recreation activities as a result of diverse day-to-day interests. These and similar events could have an impact on auto occupancy.

Between origin and destination, the recreation traveler often has a choice between different routes. In urban transportation planning, it is assumed that the person making the decision acts rationally in respect to time and cost, i.e., he selects the cheapest and shortest route. This assumption is correct, so long as minimizing travel is an objective. In recreational travel, however, this assumption is not always true. The trip itself, expecially the trip to the recreation area, is often leisurely and the route is selected according to different natural and man-made amenities. In this case of driving for pleasure, the route and the surrounding area are the attraction and the above assumption does not hold at all. To make a meaningful assignment, it is then necessary to identify assignment criteria beyond travel time and cost and apply them in an appropriate method. In driving for pleasure, a combination of trip distribution and trip assignment seems desirable since the assignment of traffic to different routes constitutes, in essence, a distribution of trips to attractions. A method capable of performing this function, although not yet completely tested, is the systems theory model[14]. For all other purposes, existing assignment techniques, such as capacity restraint or diversion curves[15], can be used if adequate assignment criteria can be determined and introduced to these methods.

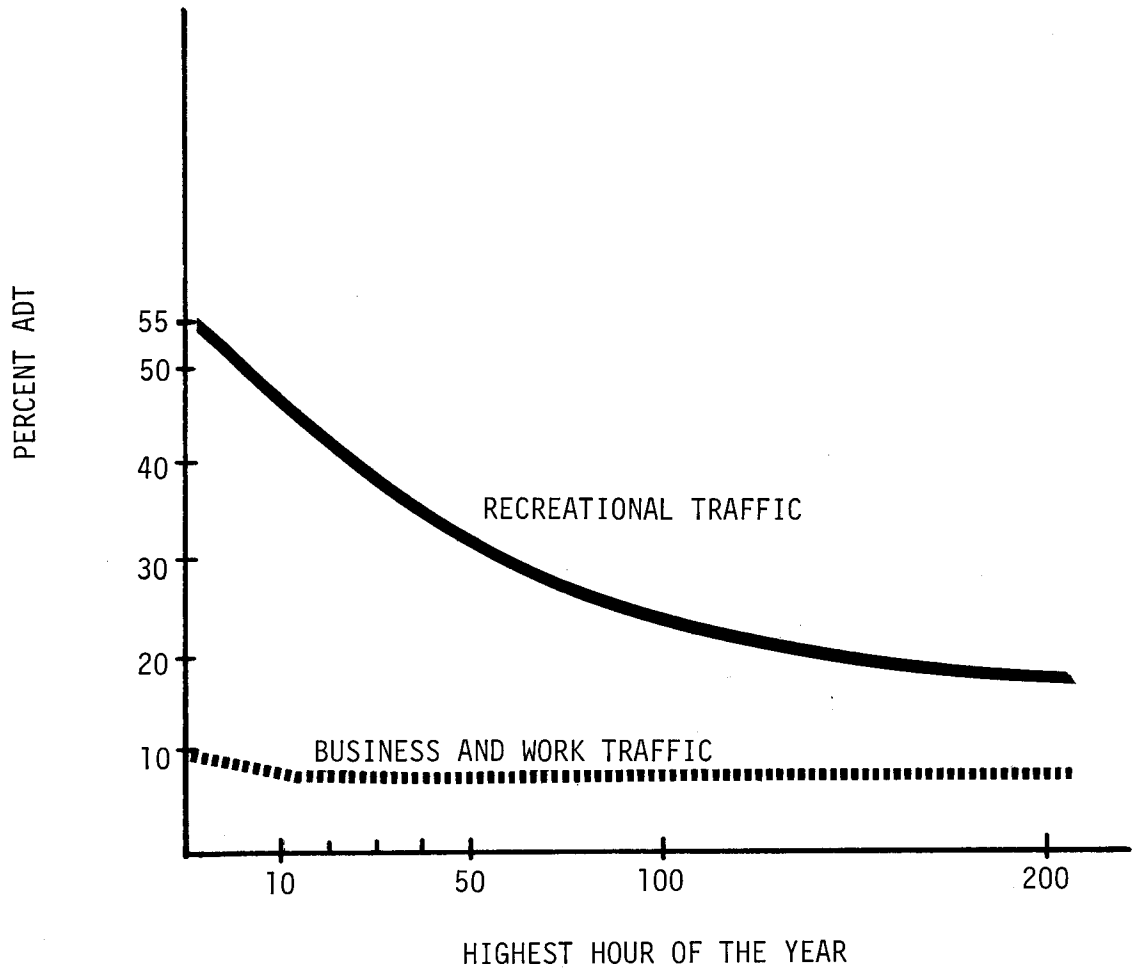
5. Design Hour Volume

Once the peak period and the traffic volume on different routes for the weekend are determined, the highway designer becomes involved with the program. His task is to design a facility that is capable of handling the traffic volume considering different engineering, environmental, and economic aspects. Economic aspects are of prime importance since they are used in

determining the design volume. For business and work-related travel, the volume occurring on 30 hours or more during a year is commonly used as design hour. This is economically justifiable, since the corresponding traffic volume diminishes very slowly over the rest of the hours during the year. Consequently, the capacity provided for the 30th highest hour will be utilized during many more hours of the year (see Figure 12 on the following page). The recreational traffic curve in Figure 12 is much steeper than the one for business traffic. Providing highway capacity for the 30th or even 50th highest hour would therefore result in a capacity which is mostly unused. To provide an adequate service on the same economic base as for work and business travel is then practically impossible. To design for anything less than the 50th highest hour would mean neglecting the weekend peak which is the problem we want to solve, since there are only 52 weekends in a year, not all of which can be used for recreation. Climatic and weather factors drop this number further down - skiing in the Seattle area takes place on an average of only 20 to 25 weekends. The question of what highway capacity shall be provided involves consideration of the socio-economic value system and the price society is willing to pay - in form of subsidies - for recreation travel.

FIGURE 12

TYPICAL HOURLY VOLUMES FOR RECREATIONAL, BUSINESS AND WORK TRAFFIC



SOURCE: TRAFFIC ENGINEERING HANDBOOK 1965,
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FOOTNOTES
CHAPTER IV

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APPENDIX A

APPENDIX A

Table 1

PERCENT OF POPULATION ENGAGING IN VARIOUS LEISURE ACTIVITIES

			Years of Age					
Rank	Activity	Percent of all Respondents	15-19	20-29	30-39	40-49	50-59	60 and Over
1	Watching Television	57	56	57	56	61	56	53
2	Visiting with Friends or Relatives	38	46	41	40	36	33	37
3	Working Around Yard and Garden	33	20	24	33	39	38	42
4	Reading Magazines	27	31	29	25	25	23	27
5	Reading Books	18	21	19	17	15	15	21
6	Going Pleasure Driving	17	25	21	18	14	11	11
7	Listening to Records	14	35	16	14	10	6	6
8	Going to Meetings or Other Organization Activities	11	11	9	10	11	11	12
9	Special Hobbies (woodworking, knitting, etc.)	10	11	9	10	10	12	11
10	Going Out to Dinner	8	7	10	8	8	8	6
11	Participating in Sports	8	26	8	8	7	3	2
12	Playing Cards, Checkers, etc.	7	12	7	6	7	5	6
13	None of Those Listed	7	3	7	8	7	8	9
14	Spending Time at Drugstore, etc.	6	20	7	5	5	3	1
15	Singing or Playing Musical Instruments	5	10	5	5	5	3	3
16	Going to See Sports Events	4	7	4	4	4	4	2
17	Going to Movies in Regular Theater	3	9	4	3	3	2	1
18	Going to Drive-In Movies	2	6	4	1	1	1	0
19	Going to Dances	2	8	4	1	1	1	0
20	Going to Plays, Concerts or Opera	1	1	2	1	1	0	1
21	Going to Lectures or Adult School	1	1	1	0	2	1	1

Source: "The Public Appraises Movies," Opinion Research Corporation, Princeton, N. J., December, 1957, Vol. II.

APPENDIX A

Table 2

INCREASING PER CAPITA CONSUMPTION IN THE UNITED STATES

Year	Total Population in Thousands	Total Personal Consumption Expenditures in Billions of 1960 $	Consumption Per Capita in 1960 $
1900	76,094	12.9	170
1910	92,407	24.1	261
1920	106,466	54.9	515
1930	123,188	71.0	576
1940	132,122	71.9	544
1945	139,928	121.7	864
1950	151,683	195.0	1,285
1955	165,270	256.9	1,555
1957	171,229	284.4	1,660

Source: "Historical Statistics of the United States, Colonial Times to 1957," U. S. Department of Commerce, Bureau of the Census, 1960, p. 142.

APPENDIX A

Table 3

Different industrial countries state their policies and status as a result of agreements between labor unions and employers to the subject of shift work, weekend work and annual vacation.

Country	Shift Work	Weekend Work	Vacation
France:	Industries using shift work increased from 8.7 percent in 1957 to 11.2 percent in 1959 as a result of economic necessity for the maximum utilization of costly equipment. Similar shift work is appearing in offices as a result of the introduction of electronic data processing.	At least one day must be free of work	
Italy:	To utilize the growing capital investment per worker, shift work is becoming widely adopted. Shift workers enjoy a shorter work week than regular hour workers. This shorter work week often results in three weekend days rather than one or two.		

APPENDIX A
Table 3 (cont.)

Country	Shift Work	Weekend Work	Vacation
Japan:	Shift work is usual in many undertakings.	An increasing number of undertakings have adopted the two-day weekend.	
Sweden:	The Workers Protection Act provides all workers with free time to rest at night, special provision allows, however, undertakings to operate plants continuously as a result of technological changes.	A two-day weekend is common.	As a result of technological changes (higher production rate per worker) shorter work time permits longer vacation. To utilize the high capital investment in equipment year round, a spreading of vacation over a longer period of the year is thought. Workers receive financial inducements to take annual leave outside the peak vacation season.
United Kingdom:	Shift work in industry and offices as a result of automation is increasing.	Resistance of mine workers to work on weekends as they fear interference with their social life.	
U.S.A.:	In continuous-process operation the need for 24-hour day, seven-day week plant schedule is readily apparent.		

APPENDIX A
Table 3 (cont.)

Country	Shift Work	Weekend Work	Vacation
U.S.A. (cont.):	since shutting down would entail considerable expense, time and effort. Shift work has also entered the office as a result of the installation of computers. Employees are, however, reluctant to work unusual hours and receive better pay for it.		
U.S.S.R.:	The Labor Code requires managers of undertakings to organize work so it can be performed within the legal hours of work and avoid overtime.		

Source: Labor and Automation Bulletin, Manpower Adjustment Programs I, International Labor Organization, Geneva, 1967, Bulletin, 4, 6, 7.

APPENDIX A
Table 4
DEFINITIONS OF OUTDOOR RECREATION ACTIVITIES

PASSIVE OUTDOOR PURSUITS

Walking for pleasure: Any walks where the primary purpose is pleasure, which have not been included under hiking or nature walks, and which lasted thirty minutes or more.

Driving for pleasure: Driving or riding in an automobile but only when the purpose is primarily for pleasure.

Sight-seeing: The viewing of an historical, scenic, or other specific attraction. An important qualification is that sight-seeing must involve the prior intention on the part of the respondent of viewing the attraction.

Picnicking: An outdoor activity where the primary purpose is the preparation or eating of a meal out-of-doors. This would include cookouts and barbecues in neighbor's yards but not in one's own yard.

Nature walks: Walks for the specific purpose of observing plants, birds or animals, and often including the collection of specimens (butterflies, rocks, seashells, etc.).

Attending outdoor sports events: The attendance at any outdoor sports event as a spectator rather than as a participant, official, etc.

Attending outdoor concerts, dramas: The attendance at musical, dramatic, artistic, or other non-sporting events which are carried on out-of-doors but excluding drive-in movies.

PHYSICALLY ACTIVE RECREATION

Playing outdoor games or sports: This includes games and sports where there is competition against other persons (such as tennis, softball, badminton, etc.) or against the clock or a record (speedboat racing, auto rallies, etc.).

Bicycling: Any bicycle riding done only for pleasure but not including riding to work or school.

Horseback riding: Any riding on horseback which is done for recreation only and not part of one's job--as for example, a mounted policeman.

Definitions of Outdoor Recreation Activities (cont.)

WATER SPORTS

Swimming: Swimming in a lake, river, ocean, or outdoor swimming pool (with filter system) and including playing in the surf, surfing, skin diving, scuba diving, and sunbathing at any of the above places.

Water skiing: Any of the various sports where the person is towed behind a boat on water skis, aquaplanes, etc.

Sailing: The recreational use of any vessel primarily intended to be propelled by wind and sail including sailboats with auxiliary engines.

Canoeing: The recreational use of a canoe or narrow light boat moved with paddles, not oars.

Boating other than sailing, canoeing: The recreational use of any boat other than canoes or sailboats such as rowboats, outboard and inboard motorboats, etc.

WINTER SPORTS

Sledding: The recreation use of a sled, toboggan, bobsled, or other vehicle designed for sliding over snow or ice but not including vehicles drawn by a horse or propelled mechanically.

Ice skating: Any recreational ice skating which is carried on out-of-doors and is not competitive. Thus, ice skating on indoor rinks should not be included. Ice hockey, figure skating contests, etc., should be considered "playing outdoor games or sports."

Snow skiing: Any non-competitive recreational use of skis on snow. Amateur competitive skiing should be included under "playing outdoor games or sports."

BACK-COUNTRY RECREATION

Fishing: The catching of fish for non-commercial purposes.

Hunting: The search for or stalking of animals in order to kill them with bullets, arrows, etc., but excluding commercial hunting and the trapping of animals.

Hiking: Walking of a substantial nature in which a pack containing provisions and/or shelter is carried by some member (s) of the party.

Mountain climbing: The climbing of mountains or rocks with the use of gear such as a rope, ice axes, crampons, spiked shoes, etc.

Definitions of Outdoor Recreation Activities (cont.)

BACK-COUNTRY RECREATION (cont.)

Camping: Living out-of-doors overnight using for shelter a bedroll, sleeping bag, trailer, tent, or a hut open on one or more sides if the person takes his bedding cooking equipment, and food with him. This does not include formal camps for teenagers such as Boy Scout camps or formal family camps such as church camps.

MISCELLANEOUS

Source: "Outdoor Recreation Outlook to 1980", State of California, Department of Parks and Recreation, 1966.

APPENDIX A
Table 5
DEFINITIONS OF AREA TYPES

AREA TYPE - An environment which is suitable and desirable for outdoor recreation activities, or is necessary to provide esthetics, or protect and conserve the natural setting or ecological balance. Definitions of the area types are presented below.

Small urban recreation areas: Small open areas in close proximity to the users and serving community wide population groups or less. The areas are oriented to day use needs of recreationists for short duration leisure time.

Large urban recreation areas: Large park areas capable of accommodating large numbers of people and providing opportunities for a wide variety of day use activities. Located within or near urbanized areas.

Regional recreation areas: Areas which serve a multi-county or statewide population with a wide range of recreation activities associated with the natural environment. These areas are normally available for both day use and overnight use.

Winter sports recreation areas: Mountain areas having suitable topography and snow cover to support a variety of winter sports activities. Must also have year-round access by road and sufficient development to identify it as a winter use area.

Golf course areas: Areas obtained and developed primarily for use in the activity of golf.

Spectator sports areas: Areas which are serving the needs of persons who attend spectator events.

Field sports practice areas: Open areas of variable size developed for activities generally related to hunting. Usually located near urban centers of population.

Outstanding natural areas: Lands which contain such unique qualities that they should be forever conserved and maintained for public enjoyment. They may be nationwide, statewide or local in scope.

Interpretative areas: Historical, geological, or biological areas which have been developed or conserved to depict unique natural features or historic happenings. They may be nationwide, statewide, or local in scope.

Key ecological areas: Land needed to maintain ecological balance or to protect an endangered species of plant or animal life.

Definitions of Area Types (cont.)

Scenic roads: Roads which traverse areas having such scenic or cultural values that their development for safe and pleasant recreation motoring is justified. Includes the right-of-way and the "visual" scenic area traversed.

Urban greenbelts and parkways: Urban areas which are not usually designed for active recreation uses but serve as open spaces in the urban environment. Generally designed to parallel streets or to take advantage of topographic features such as ravines, steep slopes or certain soil conditions.

Urban malls and squares: Areas designed primarily to improve and maintain urban environmental quality. These areas are not related to a demand determined by use.

Boating areas: Land and water needed for boating access, launching areas, and ancillary facilities. May be found on any saltwater and freshwater bodies feasible for boating.

Freshwater shorelands and access: Land and water needed for a variety of activities that relate to water, such as fishing and swimming or are enhanced by water such as picnicking and camping. Also includes the land necessary for ancillary facilities. Areas are located on freshwater lakes and streams,

Saltwater beach areas: Shorelands and tidelands needed for a variety of activities that relate to saltwater such as clamming, fishing and beachcombing or activities that are enhanced by saltwater such as picnicking. Includes the land necessary for ancillary facilities such as parking.

Forest areas: Identified primarily by its vegetative cover which usually is large tracts of tree covered land. Because of size some tracts may often have streams, lakes, meadows, and other geographical features within them.

Mountain areas: Alpine areas above timberline for which no development or year-round access has been provided.

Range areas: Lands with a primary vegetative cover of grasses. Not used for agricultural purposes except grazing.

Wetlands: Tracts of low, wet, soft lands. Include marshes, swamps, bogs and similar areas.

Source: Washington Statewide Comprehensive Outdoor Recreation and Open Space Plan Review Draft, July 1, 1969.

APPENDIX A
Table 6

MODES OF TRANSPORTATION IN OUTDOOR RECREATION TRAVEL

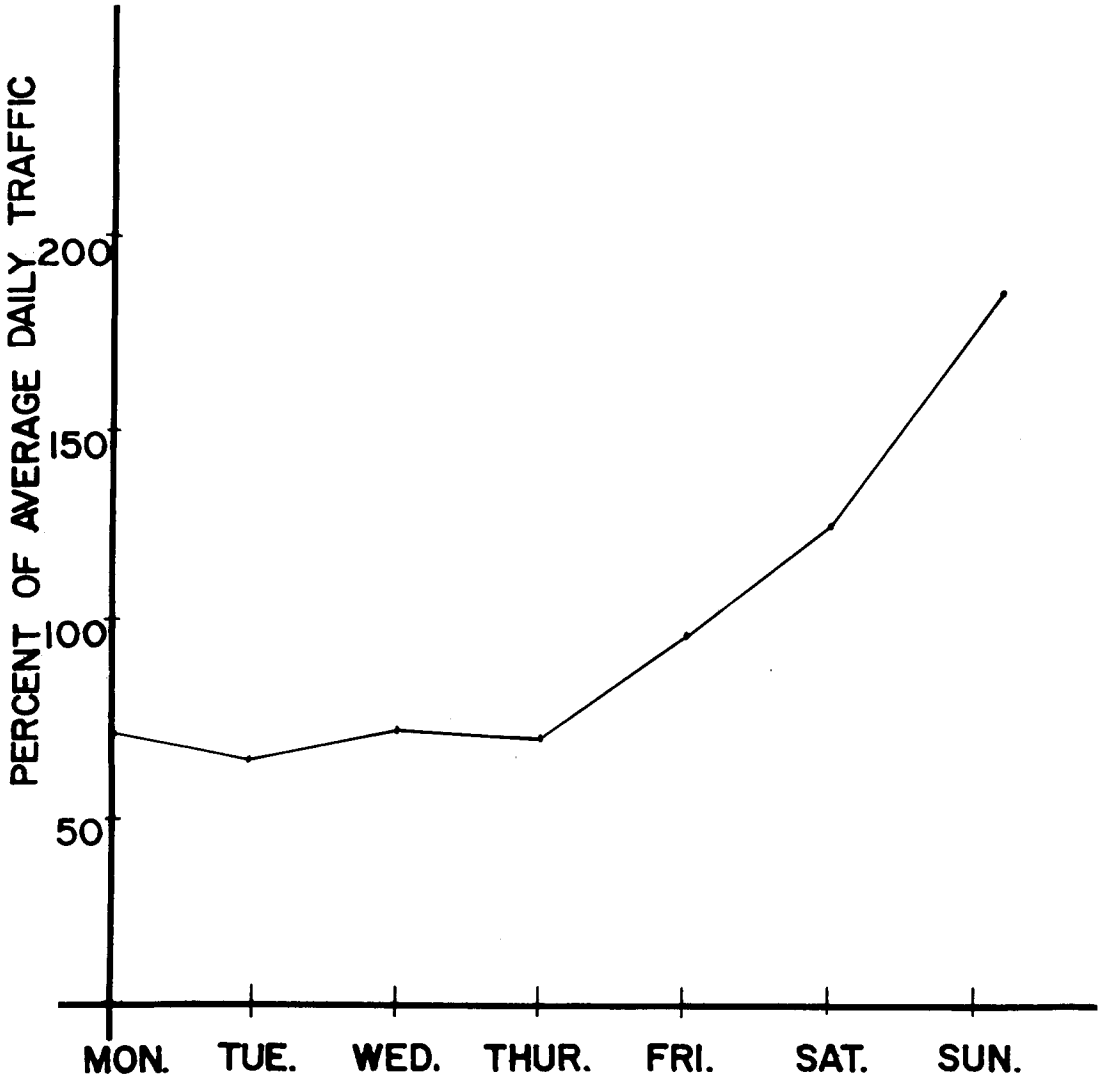
	Spring		Summer		Fall		Winter		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
1. Auto	8,051,651	97.5	12,074,962	97.2	3,921,809	97.2	5,110,137	95.9	29,158,559	97.0
2. Truck	153,268	1.8	278,636	2.2	54,025	1.3	136,143	2.6	622,072	2.0
3. Bus	44,020	0.5	43,989	0.4	42,448	1.1	64,403	1.2	194,860	0.7
6. Train	2,445	-	4,630	-	1,543	-	- 0 -	-	8,618	-
7. Airplane	13,042	0.2	29,326	0.2	14,663	0.4	14,673	0.3	71,704	0.3
Total	8,264,426	100.0	12,431,543	100.0	4,034,488	100.0	5,325,356	100.0	30,055,813	100.0

Source: Washington Statewide Outdoor Recreation Demand Survey
April, 1967 - March, 1968

APPENDIX A

FIGURE 1

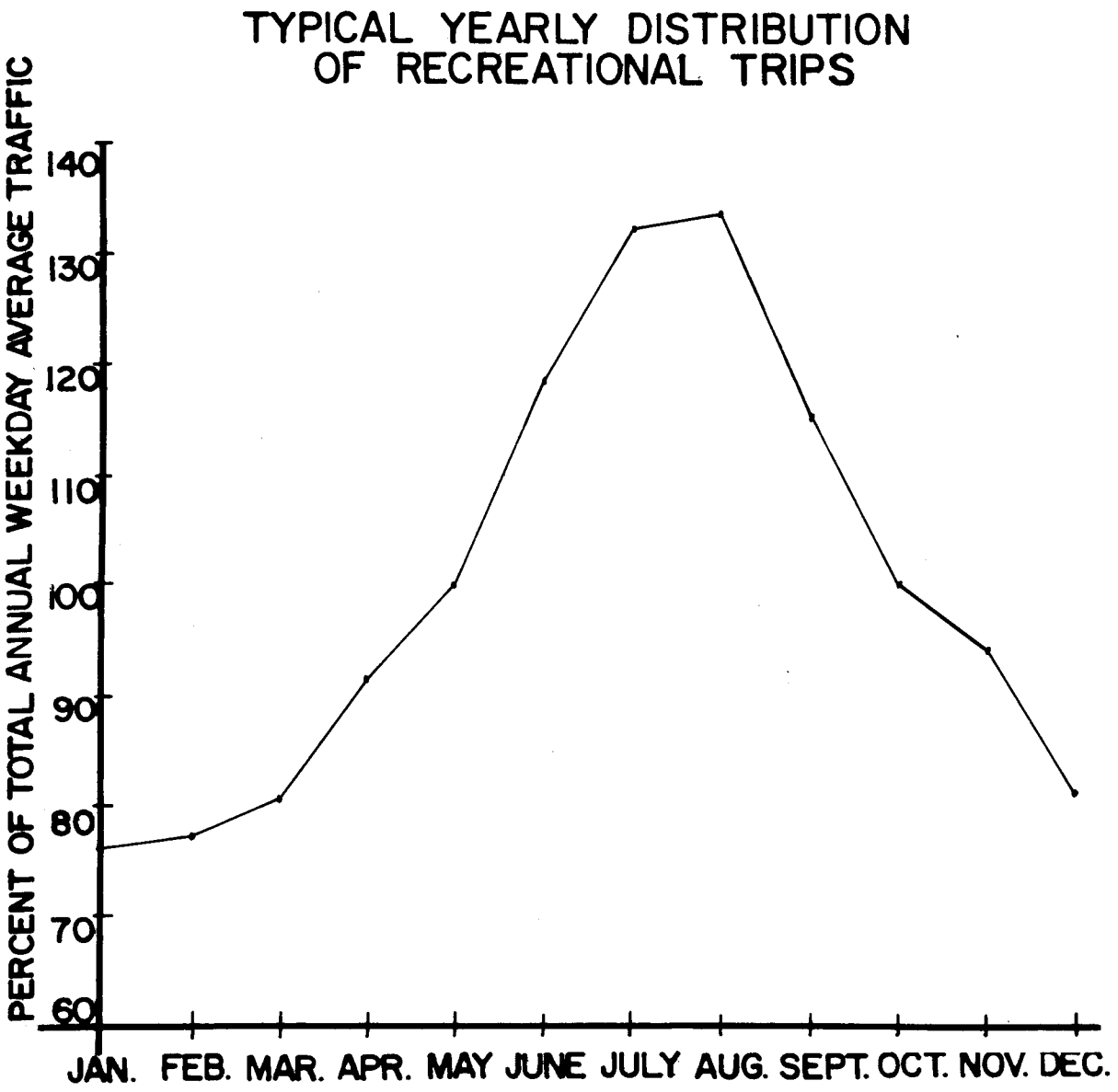
TYPICAL WEEKLY DISTRIBUTION OF RECREATIONAL TRAVEL



SOURCE: TRAFFIC ENGINEERING HANDBOOK, INSTITUTE OF TRAFFIC ENGINEERS, WASHINGTON DC. 1965, P. 145.

APPENDIX A

FIGURE 2



SOURCE: TRAFFIC ENGINEERING HANDBOOK, INSTITUTE OF TRAFFIC ENGINEERS, WASHINGTON DC. 1965, P. 143.

APPENDIX B

APPENDIX B

DEFINING THE RELATIVE SIGNIFICANCE OF FACTORS INFLUENCING RECREATIONAL DEMAND

The method for identifying relative significance of influencing factors proposed herewith is known as the Profile Identification Method. It is applied to nonquantifiable factors or factors not yet quantified and rests on a subjective and independent ranking of factors by experts in the field and a comparison of the results. If the individual rankings reached in this way show conformity on some factors it is argued that this represents a reasonable ranking for the individual factor.

Listed on the following page are 27 factors influencing recreation demand. The expert's task is to compare each factor against every other factor in a way that allows him to determine subjectively how each factor rates in reference to its influence on recreational demand. This rating of the influencing factors shall further be done for the short-range time frame (a weekend-to-weekend projection) and for the long-range time frame (a 20 year projection). The numbers and tabulations on page 5 and 6 provide a procedure for comparing each factor with every other factor. The Figure "1" stands for the factor "Man's personality." Figure "2" immediately below it is "Man's cultural background." Circle the number representing that factor you regard as having the greater significance. Do that right across each horizontal line. When finished down to the lower right-hand corner go back and count the number of times you have circled Figure "1". Enter that figure under TABULATION in column "B" opposite 1. "A" stands for the factor and "B" for the number of times it has been circled. Do that for the remaining numbers. When the numbers total 351 the tabulation

has been completed correctly as there are 351 comparative decisions to be made.

Pages 9 and 10 show a graph upon which your profile for the short-range and long-range time frame shall be plotted. Factors are numbered vertically. The number of times that a given proposal was circled is plotted horizontally. Plot these points and connect them to derive your individual profile.

Time required: about 60 minutes.

FACTORS INFLUENCING RECREATIONAL DEMAND

1. Man's personality
2. Man's cultural background
3. Man's individual taste
4. Man's age
5. Man's race
6. Income of household
7. Man's education and occupation
8. Available free time
9. Family size and life cycle
10. "The thing to do," the taste of a social group or society
11. Housing condition
12. Residential density
13. Government policies in respect to free time activities and free time spending
14. Tourist and recreation industries strive for more and better business
15. Increasing importance of consumption as a means to gain a higher living standard
16. Government promotion of recreation areas
17. Decreasing work time

18. Work-time distribution (regular work hours and days versus shift work)

19. Weather condition at recreation area and at home

20. Smog level

21. The four seasons

22. Mode of travel available to the individual

23. Combinations of travel modes (air-car etc.)

24. New technology in transportation to the recreation area and within the recreation area

25. Availability of recreation opportunities

26. Geographic characteristics and location of opportunities

27. Accessibility of recreation opportunity

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TABULATION

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LONG-RANGE TIME FRAME

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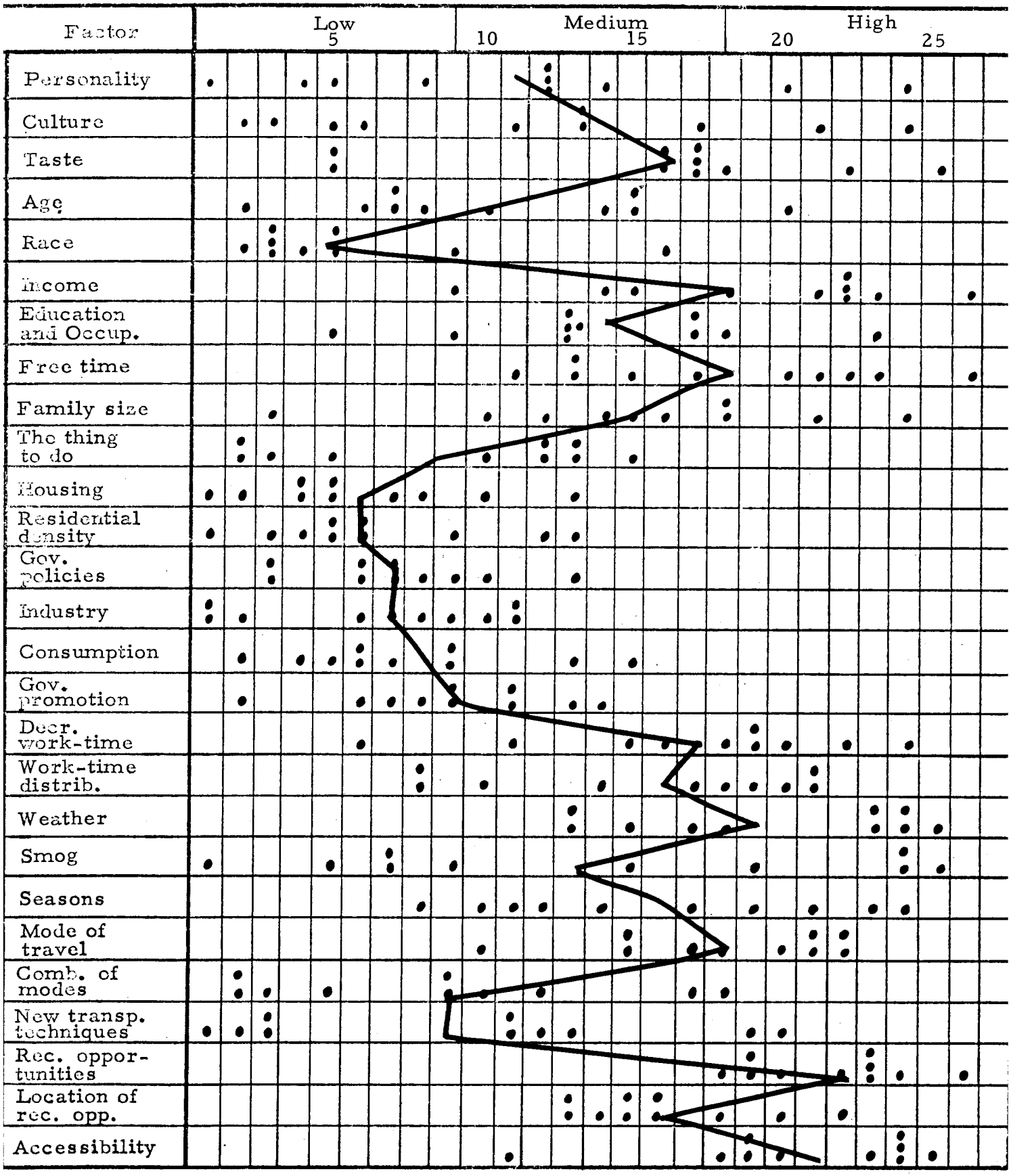
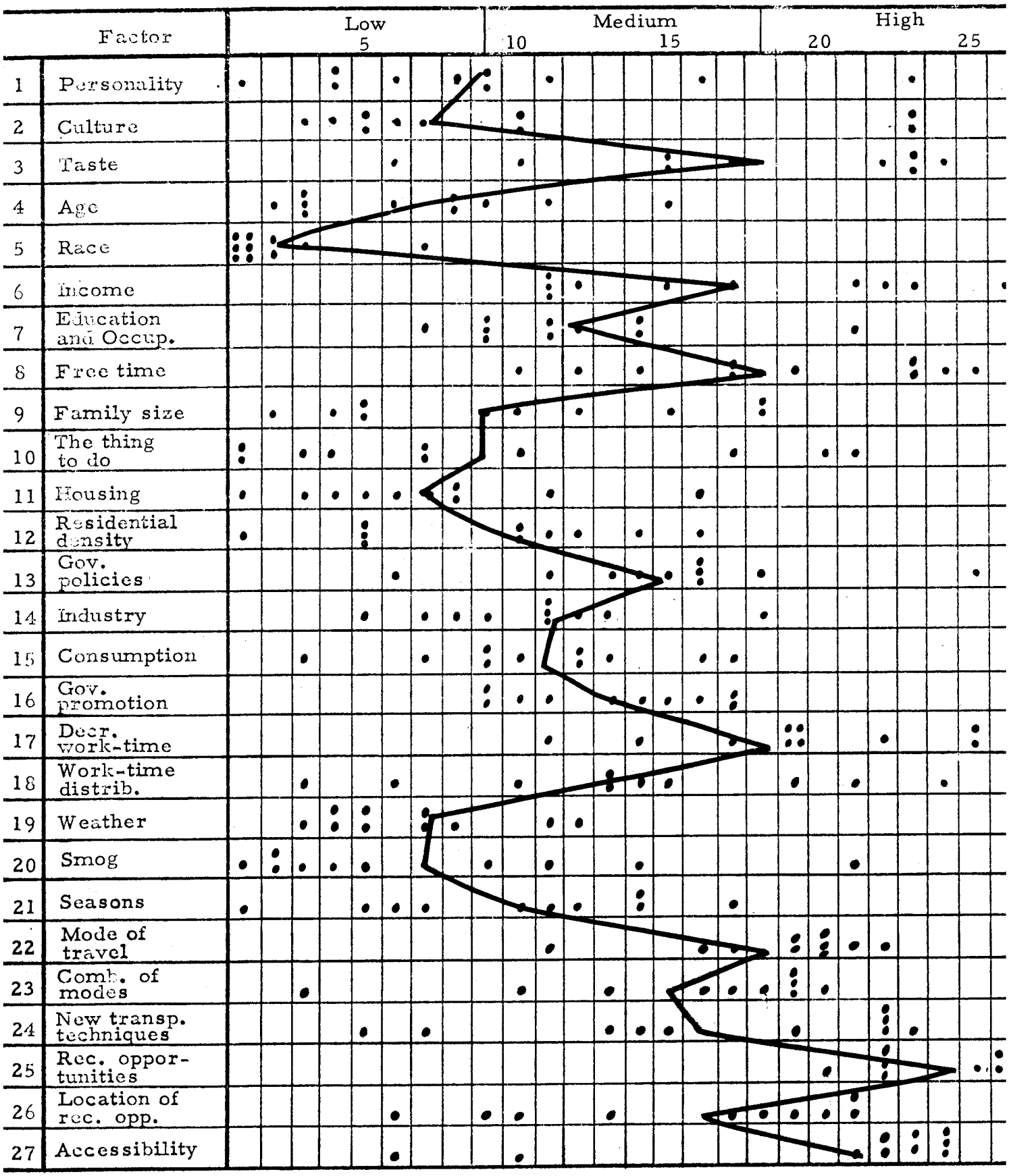
SHORT-RANGE TIME FRAME

INDIVIDUAL PROFILE



LONG-RANGE TIME FRAME

INDIVIDUAL PROFILE



APPENDIX C

In the following an example will be given for the selection of weekend recreational trip purposes for the weekend recreation region of the Seattle Metropolitan Area. The data base for this determination is the Washington State Outdoor Recreation Demand Survey, 1967-1968 whereby the data for King County has been used as a substitute for data for the Seattle Metropolitan Area, as data for this area are not available.

The primary criterion for the selection of the purposes is the location of attractions. It would then seem desirable to define trip purposes according to the characteristics of different recreation areas. A classification of recreation areas and area types corresponding with environmental features and characteristics for multipurpose recreational use has been made by the Washington State Outdoor Recreation and Open Space Plan, and 21 such area types have been defined (see Appendix A, Table 5). Considering the area types under the aspect of forecastability, it is difficult to envision how the production of trips to these different areas can be reasonably forecasted for the weekend recreation region of the metropolitan area. The Washington State Demand Survey established correlations between participation on area types and socioeconomic and educational characteristics of the population, did, however, not use these correlations for demand projections. For the demand projection, the participation rates established by the Outdoor Recreation Resources Review Commission have been used. The inherent danger in the transformation of such national forecasts to a state, and especially to a regional level, has already been mentioned.

Rather than using each area type as a trip purpose, groups of area types can be established according to trip length. A clear distinction of

trips to these groupings (small-urban-areas, large-urban-areas and regional-areas) was found (see Figures 1-4). The approximate average trip length for small-urban-area trips is 0.5 to 2 miles; these are mainly trips to neighborhood parks and quite frequently imply walking as a means of getting there. In the category of large-urban-area trips, the most frequent trip length is up to 20 miles; regional-area trips were found most often in the 20 to 100 mile trip length category. All other area types could be classified into small-urban, large-urban and regional-areas according to their trip length frequency distribution. Small-urban-area trips mainly use the urban transportation system as developed and designed to handle the weekday travel peaks, and, in general, do not create major traffic problems, they are excluded from further consideration. In this way, two trip purpose categories have been established: (1) trips within an urban area (urban trips) with an average trip length of up to 20 miles and (2) trips outside an urban area (regional trips) with an average trip length between 20 and 100 miles.

Recreation trips to attractions outside the urban area can be further broken down. There is a difference in trips to point attractions, i.e., parks, golf courses, boating ramps, etc., and in trips to linear attractions; i.e., scenic roads. It is especially desirable to make this distinction, as the latter category accounts for more than one-fourth of the total trips to attractions outside the urban area. Further reasons for this distinction are inherent to the trip assignment. The recreation area type involved in this trip purpose is driving for pleasure and the average trip length has been found to be between 20 and 100 miles. (See Table 3.)

So far, three trip purposes have been identified; urban recreation, regional recreation and driving for pleasure. A further breakdown of the trip purposes seems necessary if the differences between the four seasons is considered. (See Tables 1 - 3) For urban trips, autumn has the lowest participation and summer has the highest. This trip purpose includes only outdoor recreation trips. Trips to other than outdoor recreation attractions can upset the seasonal distribution and make a breakdown of trip purposes according to seasons meaningless.

The second trip purpose (regional recreation) is composed mainly of trips to outdoor recreation areas. For this trip purpose, considerable differences between the seasons can be noticed (see Table 2 and Figures 1 - 4). These differences rest mainly on the type of activity the recreationer engages in during different seasons; winter sports are mainly pursued during Fall and Winter. It is, therefore, desirable to predict these trips for each season individually, thereby creating four trip purposes to regional attractions.

The trip purpose driving for pleasure indicates a fairly constant distribution over the different seasons with the exception of the summer season which accounts for about 37 percent of the total trips. The other three seasons account for about 20 percent each. It would, therefore, not seem necessary to consider a seasonal split of this trip purpose. However, as driving for pleasure falls in the major category of trips to regional attractions, it is suggested that this trip purpose be also subdivided according to seasons in order to arrive at an equal basis for the trip assignment process as well as the determination of the design volumes. Resulting from this discussion are then three main trip purposes -

urban trips, regional trips and driving for pleasure. The latter two are again subdivided according to the four seasons.

APPENDIX C
Table 1

WEEKEND RECREATIONAL TRIP PURPOSE FOR THE SEATTLE METROPOLITAN AREA

Trip Purpose: Urban Weekend Recreation

Area Type Within This Trip Purpose Category	Approximate Trip Length in Miles	Participation Volume									
		Summer		Fall		Winter		Spring		Total	
		Amount	%	Amount	%	Amount	%	Amount	%	Amount	
Small Urban Areas	0.25-2	487,129	32	45,855	7	264,710	24	428,545	34	1,266,329	28
Large Urban Areas	10	390,903	26	84,945	13	175,996	16	256,840	20	808,684	18
Golf Course	20	122,534	8	46,606	7	57,949	5	87,281	7	314,370	7
Spectator Sports	20	267,621	18	233,791	38	44,356	4	148,809	11	694,577	16
Field Sports	0.25-2	20,297	1	12,778	2	715	-	715	-	34,505	1
Urban Green Belts	5-10	232,288	15	202,217	33	554,462	51	366,302	28	1,355,269	30
Urban Malls											
	Total	1,520,772	100	626,192	100	1,098,188	100	1,288,492	100	4,433,644	100
	%	33%		14%		25%		28%		100%	

Source: Washington Statewide Outdoor Recreation Demand Survey 1967/1968, pages 4 and 6, King County

APPENDIX C
Table 2

WEEKEND RECREATIONAL TRIP PURPOSE FOR THE SEATTLE METROPOLITAN AREA

Trip Purpose: Regional Weekend Recreation

Area Type Within This Trip Purpose Category	Approximate Trip Length in Miles	Participation Volume									
		Summer		Fall		Winter		Spring		Total	
		Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Regional Areas	20-100	191,692	6	16,537	2	52,225	5	154,532	8	415,000+	6
Winter Sport Areas	20-100	3,006	-	128,547	17	173,134	15	37,201	2	342,000+	5
Outstanding Natural Areas	100+	170,644	6	24,054	4	132,353	12	190,304	10	527,000+	8
Interpretive Areas	20-100	46,606	2	7,515	1	45,786	4	22,892	1	123,000+	2
Key Ecological Areas											
Boating	20-100	438,264	15	63,145	9	60,095	5	220,352	12	782,000+	12
Saltwater Beaches	20-100	858,492	29	227,024	30	358,431	32	547,306	30	1,991,000+	30
Freshwater Shorelands	20-100	943,439	33	116,518	15	173,133	15	550,169	30	1,783,000+	27
Forests	20-100	69,158	2	51,869	7	40,063	4	50,794	3	212,000	3
Mountains	20-100	161,623	5	67,655	9	72,973	6	62,957	3	365,000+	5

+ Rounded Numbers

(Continued on next page)

APPENDIX C
Table 2
(Continued)

Area Type Within This Trip Purpose Category	Approximate Trip Length in Miles	Participation Volume									
		Summer		Fall		Winter		Spring		Total	
		Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Range Areas	100+	26,310	1	36,833	5	10,015	1	3,576	1	77,000+	1
Agricultural Areas	20	17,289	1	9,771	1	4,291	1	1,430	-	32,000+	-
Wetlands											
	Total	2,926,000+	100	749,000+	100	1,122,000+	100	1,841,000+	100	6,629,000+	100
	%	44%		11%		17%		28%		100%	

+ Rounded Numbers

Source: Washington Statewide Outdoor Recreation Demand Survey 1967/1968, page 4, King County.

APPENDIX C

Table 3

WEEKEND RECREATIONAL TRIP PURPOSE FOR THE SEATTLE METROPOLITAN AREA

Trip purpose: Weekend Driving for Pleasure

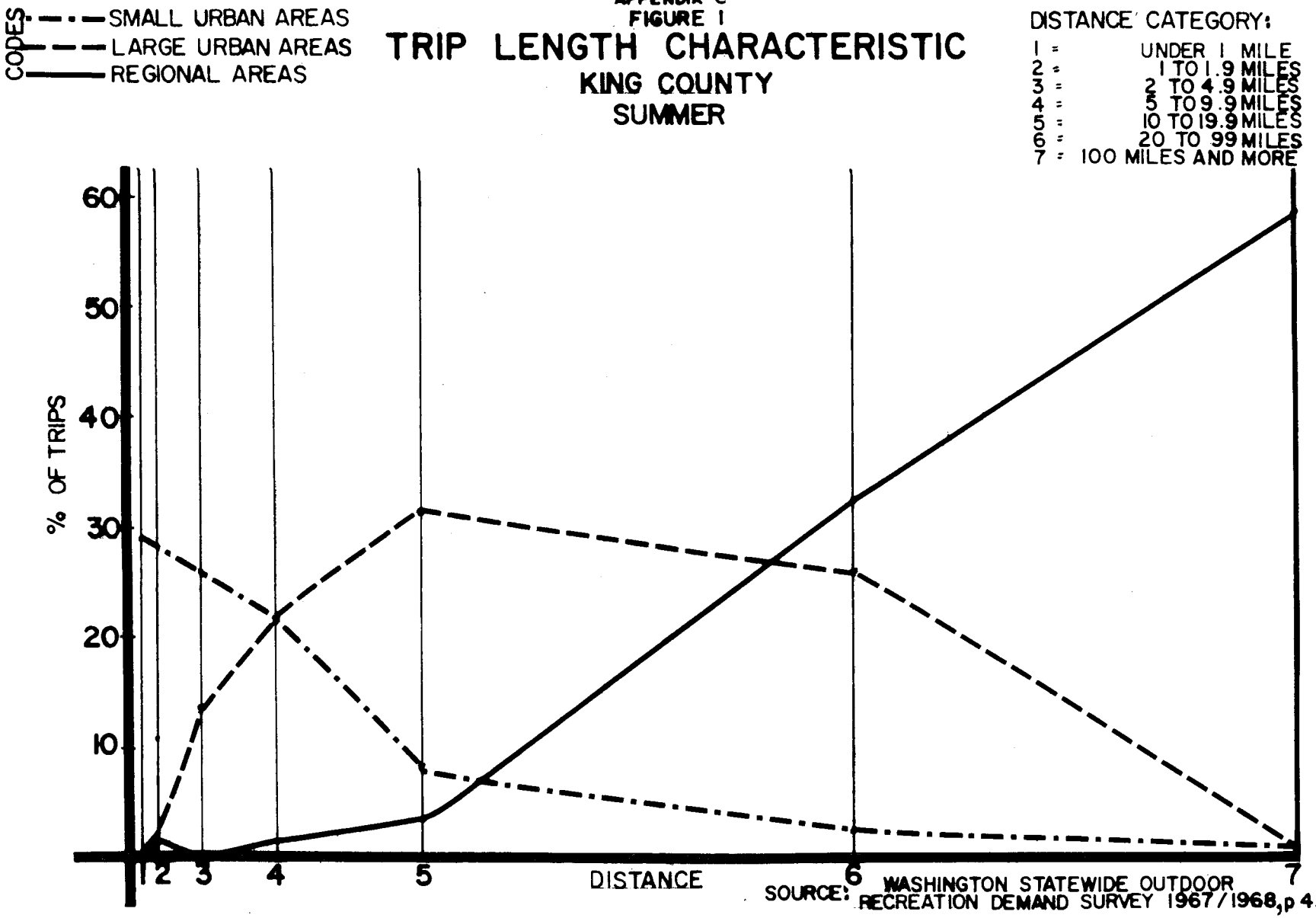
Area Type Within This Trip Purpose Category	Approximate Trip Length in Miles	PARTICIPATION VOLUME									
		Summer		Fall		Winter		Spring		TOTAL	
		Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Scenic Roads	20-100	506,676	59	295,435	65	247,530	49	211,053	48	1,251,000*	56
Outstanding Natural Areas	100+	140,575	16	24,055	6	111,607	22	155,965	35	432,000*	19
Interpretive Areas	20-100	42,848	5	7,516	2	41,495	8	17,170	4	109,000*	5
Saltwater Beaches	20-100	69,911	8	27,814	6	28,616	6	15,023	3	141,000*	6
Freshwater Shorelands	20-100	23,303	3	32,324	7	7,868	2	16,454	4	80,000*	4
Forests	20-100	11,275	1	6,012	1	10,731	2		-	28,000*	1
Mountains	20-100	66,153	8	58,635	13	52,942	10	23,609	6	201,000*	9
Range Areas	100+	2,255	-		-	3,576	1	1,430	-	7,000*	-
Total		863,000*	100	452,000*	100	504,000*	100	441,000*	100	2,249,000*	100
Percent		37%		21%		22%		20%		100%	

*Rounded Numbers

Source: Washington Statewide Outdoor Recreation Demand Survey 1967/1968, pages 4 and 6, King County.

APPENDIX C
FIGURE 1

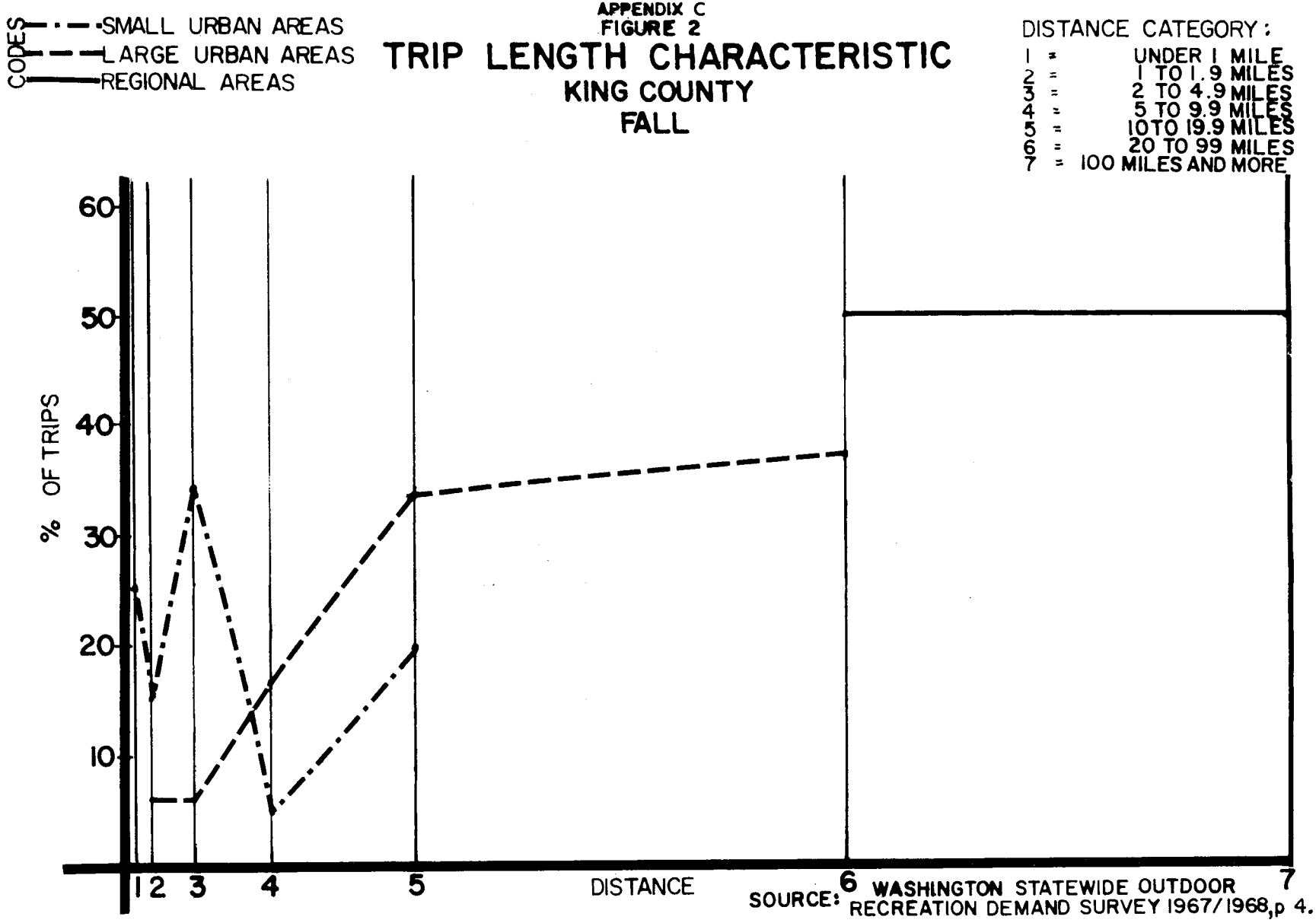
TRIP LENGTH CHARACTERISTIC
KING COUNTY
SUMMER



SOURCE: WASHINGTON STATEWIDE OUTDOOR RECREATION DEMAND SURVEY 1967/1968, p 4.

APPENDIX C
FIGURE 2

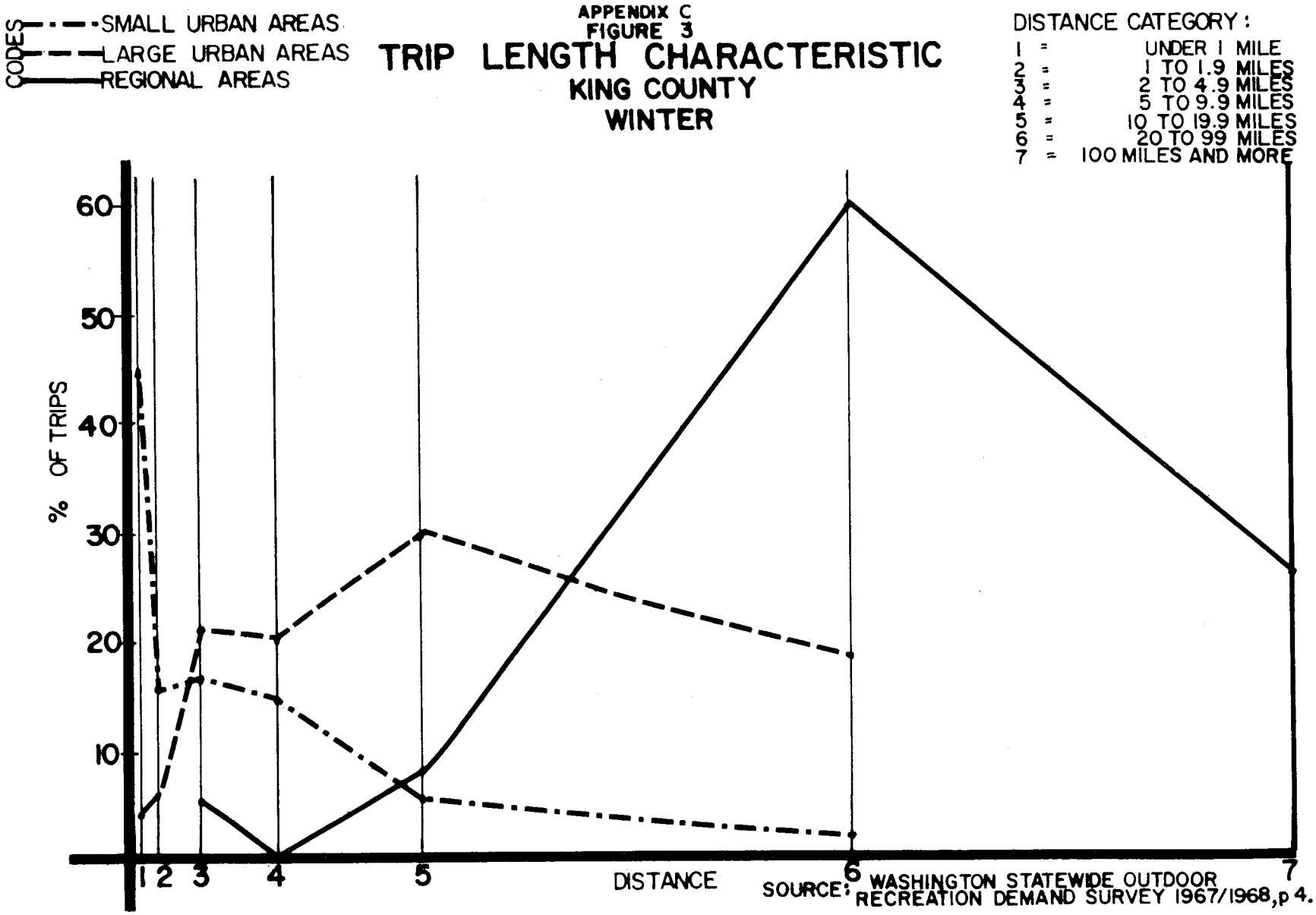
TRIP LENGTH CHARACTERISTIC
KING COUNTY
FALL



SOURCE: WASHINGTON STATEWIDE OUTDOOR RECREATION DEMAND SURVEY 1967/1968, p 4.

APPENDIX C
FIGURE 3

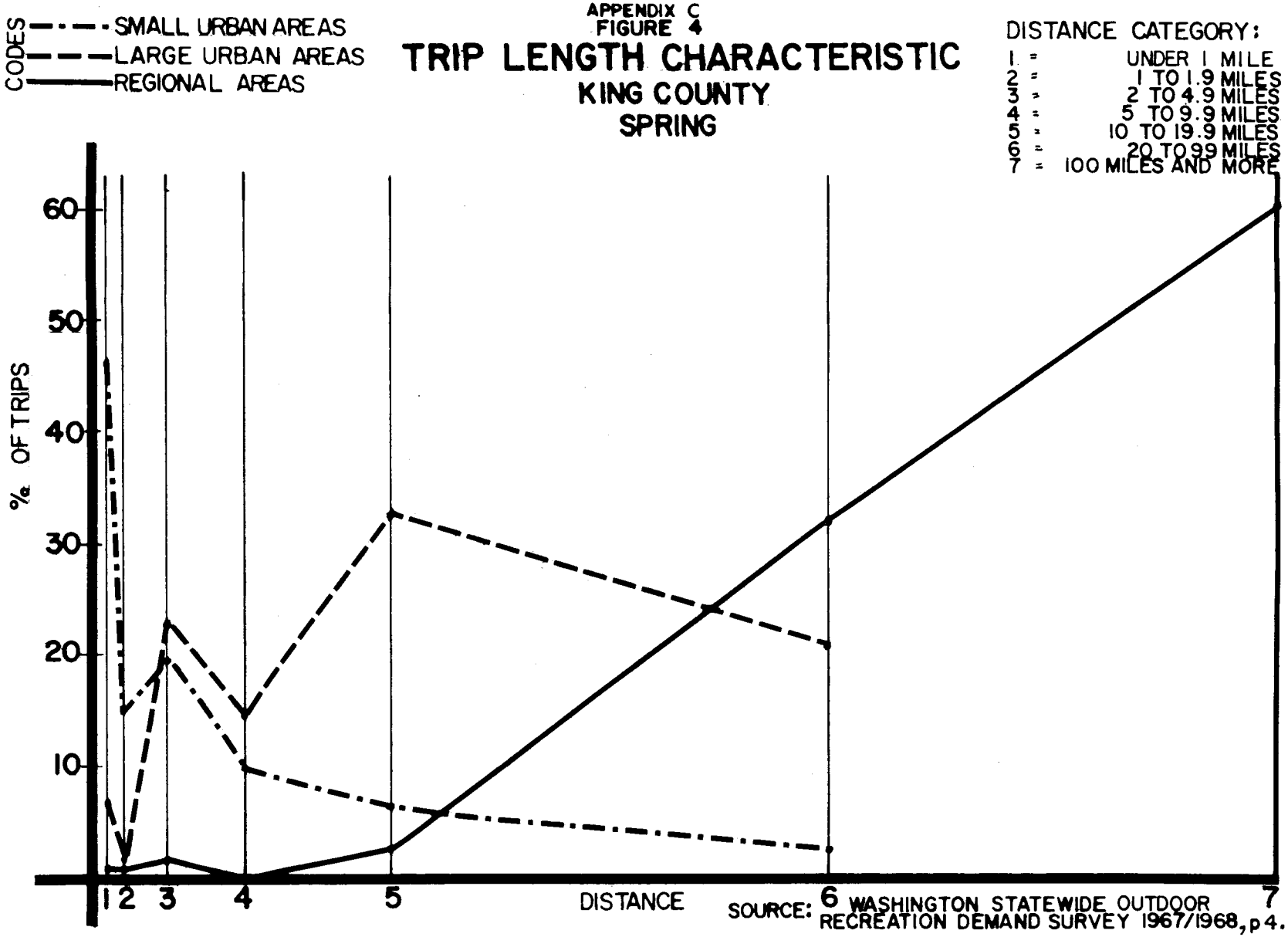
TRIP LENGTH CHARACTERISTIC
KING COUNTY
WINTER



SOURCE: WASHINGTON STATEWIDE OUTDOOR RECREATION DEMAND SURVEY 1967/1968, p 4.

APPENDIX C
FIGURE 4

TRIP LENGTH CHARACTERISTIC
KING COUNTY
SPRING



SOURCE: WASHINGTON STATEWIDE OUTDOOR RECREATION DEMAND SURVEY 1967/1968, p4.