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The University of Michigan, Ph.D., 1975
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HUMAN RESPONSE TO CROWDING: A STUDY OF FISHING BEHAVIOR IN A VACATION ENVIRONMENT

by

John Douglas Wellman

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Natural Resources)
in The University of Michigan
1975

Doctoral Committee:

Professor S. Ross Tocher, Co-Chairman
Associate Professor Robert W. Marans, Co-Chairman
Associate Professor James E. Crowfoot
Professor John W. Robinson

I've sometimes thought this inner peace of mind, this quietness is similar to if not identical with the sort of calm you sometimes get when going fishing, which accounts for much of the popularity of this sport. Just to sit with the line in the water, not moving, not really thinking about anything, not really caring about anything either, seems to draw out the inner tensions and frustrations that have prevented you from solving problems you couldn't solve before and introduced ugliness and clumsiness into your actions and thoughts.

Robert M. Pirsig
Zen and The Art of
Motorcycle Maintenance

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	v
LIST OF FIGURES	vii
CHAPTER I: INTRODUCTION, PURPOSES, THEORY, HYPOTHESES	1
INTRODUCTION	1
PURPOSES OF THE RESEARCH	7
LITERATURE REVIEW	9
CONCEPTUAL FRAMEWORK	25
CHAPTER II: METHODOLOGY	35
TIME BUDGETS	35
VARIABLES USED IN THE ANALYSIS	46
CHAPTER III: DETERMINANTS OF FISHING BEHAVIOR	55
CHAPTER IV: SUMMARY, IMPLICATIONS FOR PLANNING AND RECOMMENDATIONS FOR FUTURE RESEARCH	96
APPENDIX A: QUESTIONNAIRE ITEMS	115
APPENDIX B: SAMPLING PROCEDURES	125
APPENDIX C: PROCEDURES FOLLOWED IN DEVELOPING MOTIVATIONAL SCALES	139
APPENDIX D: SELECTED TIME BUDGET RESULTS	143
APPENDIX E: TWO APPROACHES TO SIMULATION, AS PROPOSED BY BRAIL	153
BIBLIOGRAPHY	155

LIST OF TABLES

Table		Page
1.	Time Budget Codes	47
2.	Dependent Variables: Percent Fished and Time Fished	58
3.	Characteristics of the Respondents.	60
4.	Privacy-Related Independent Variables	62
5.	Correlation Matrix of Objective and Subjective Density Measures	66
6.	Bivariate Relationships Between Characteristics of the Respondent and Measures of Fishing Behavior.	67
7.	Bivariate Relationships Between Privacy-Related Predictors and Measures of Fishing Behavior	69
8.	Results of Interaction Testing Using Least Squares Regression.	75
9.	Summary Descriptive Measures for Variables Used in Path Analyses	82
10.	Zero-Order Correlations Among Variables Included in Analysis.	83
11.	Rank-Order Comparison of Direct Effects of Predictors of Percent Fished and Time Fished.	95
12B.	Initial Estimates of Housing Units.	130
13B.	Sample Response Data Based on Revised Population Estimate	135
14D.	Original U.S. National Codes Included in Reduced Categorization for Comparison Between Samples	144
15D.	Primary Activities In The Reduced Categorization: Comparison with SRC National Study.	147

LIST OF TABLES (continued)

Table		Page
16D.	Proportional Allocation of Total Free Time By Northern Michigan and U.S. National Samples.	149
17D.	Satisfaction With Time Budget Activities.	150
18D.	Location of Activity by Household Characteristic.	151
19D.	Location of Water Recreation Time, by Household Characteristic	152

LIST OF FIGURES

Figure		Page
1.	Schematic of the Proposed General Theory of Recreation Behavior.	13
2.	An Equilibrum Model of Human Response in Crowding.	20
3.	Determinants of Community Satisfaction.	28
4.	Conceptual Model.	29
5.	Path Diagram.	32
6.	Effects of Perceived Neighborhood Privacy on Time and Percent Fished by Resident Type . . .	77
7.	Fitted Path Diagrams on Time Fished	85
8.	Fitted Path Diagrams on Percent Fished.	86

CHAPTER I

INTRODUCTION, PURPOSES, THEORY, HYPOTHESES

INTRODUCTION

The General Problem

Many rural and semi-rural areas of the United States, particularly areas with high-quality scenic and recreational resources, are experiencing strong and intensifying growth pressure. In many instances this pressure results in physical development -- the construction of second homes, resorts and other vacation housing. Ragatz (1974) has documented the long history of vacation homes in this country and examined their projected future. He estimates that 5.4 million households in the United States, or 8.5 percent of the total, now own some sort of recreational property. Most, over 3 million, of these properties are occupied by a single-family detached home. His projections are for an increase to 12 million vacation properties by 1985, owned by 14 percent of U.S. households, with the majority of additions taking the form of detached units (an increase of 7 million properties).

In other instances, growth pressure has not resulted in physical development. The Rockefeller Brothers Fund report, The Use of Land (Reilly, 1973), reports that surveys in California and Pennsylvania have suggested that most purchasers of vacant rural land were interested primarily in the land as an investment. In a time of rapid inflation,

rural land sellers have had great success in appealing to their customers' speculative motives, as documented by Cahn (1973).

Whether growth pressure assumes the form of physical development or merely title transfers, it has important consequences for land use planning in the areas affected. In the case where actual development occurs, it is all too often unplanned or badly planned, resulting in environmental or aesthetic deterioration of the land, and overburdening local community services. If, on the other hand, speculative motives are dominant, future land use planning efforts are likely to encounter formidable legal obstacles:

> Once the countryside has been given over to quarter-acre or 1-acre lots (and most recreational lots sold in 1971 were one-quarter to 1 acre in size), you can forget thoughts of clustering, variable densities, common open spaces and the like. Even if the buyers' dreams of riches have faded away, the lot lines will survive to block sensitive use of the land. (Reilly, 1973).

Thus, recreational property growth, whether real or speculative in nature, is strong and increasing rapidly and has important implications for environmental policy and planning.

There is a strong locational determinant involved in recreational property growth. Such growth tends to be concentrated around high-quality scenic and recreational resources. As the Outdoor Recreation Resources Review Commission report established, water is a very strong attractive force for recreational activity. Tombaugh (1968) in a Michigan leisure home survey, found that over 55 percent of the 1000 homes he surveyed were located on inland lakes, and 89 percent overall were within five minutes walk of water. Reilly reports that over two-thirds of recreational subdivisions are water-oriented. These water

resources are often not only extremely valuable multiple-use resources, but are very vulnerable to environmental damage from siltation, eutrophication and the runoff of chemicals.

It is becoming increasingly evident that public intervention into this developing problem area is warranted to protect the physical resources and the long-term welfare of the people involved. The people who are involved include not only present property owners and other residents living in recreational areas, but, in a larger sense, a more broadly defined urban population. Members of this urban population may already recreate in such areas and receive benefits with value to the larger society, such as an increased appreciation of natural environments, or temporary stress relief. In addition, they may benefit from the knowledge that opportunities to visit scenic and recreational areas are present, if and when they have the ability to participate. Finally, even for those urban residents with a very low expectation of ever visiting such areas, there may be benefits in the mere knowledge of their existence.

At the present time, there is a dearth of good information on the dynamics of the growth process and its many ramifications. For the most part, policy and planning decisions are now being made on the basis of very limited criteria (such as the public health coliform bacteria count), or simply by hunch. While some economic and ecological data are now finding their way into the decision-making process, social science input has been almost wholly absent. Since any steps taken to protect environmental quality in semi-rural vacation areas will, over time, influence many people's lives (see Chapin and Logan, 1969), and

since public intervention depends, in the long run, on the support of concerned people and groups, social science information can play an important role in concert with ecological and economic data in shaping the future of such areas.

Northern Michigan

Northern lower Michigan (Emmet and Cheboygan Counties) is a semi-rural area blessed with an abundance of high-quality scenic and recreational resources, located within easy reach of the Great Lakes megalopolis. As such, it is an excellent example of the growth process discussed above. Its position as a resort area was established even before the turn of the century, but the most rapid growth has occurred since World War II and especially in the last decade. For example, Emmet County census data indicates a population increase of over 15 percent in the decade from 1960-1970. Much of this growth has concentrated around the inland lakes and rivers of the area, as evidenced by the 30 percent growth rate for townships with inland lake shoreline. By contrast, townships and towns without inland lakes showed a 5 percent growth rate in the same decade.

One response to the rapid growth rate in the area was a series of lawsuits brought against planned residential developments by activists associated (at least initially) with the Sierra Club (Tanton v. Department of Natural Resources, 1972; Irish v. Green, 1972; Irish v. Property Development Group Incorporated, 1972). Though the cases were argued on technical grounds, it was evident that the underlying issue was growth. Would valuable resources such as beaches, wetlands, scenic views and wildlife habitat continue to be bought, sold and

transformed with virtually no public intervention?

At roughly the same time, events at the state and national levels were following a complementary course. At the national level, proposals for a national land use planning act were undergoing active debate. At the state level, an office of land use planning was established in the Office of the Governor, and later transferred to the Department of Natural Resources. The office has been laying the groundwork for a land use planning effort coordinated with the anticipated federal law. Although neither the federal nor the state effort had (or yet has) enabling legislation, the trend was visible.

It was in this atmosphere of a readiness for public action to protect environmental quality that the new leadership of the University of Michigan's Biological Station, located at Douglas Lake in Cheboygan County, decided to initiate a program of applied research. The chief purpose of the research was to develop a fund of information on aspects of the region relevant to the planning process, and to assist policy makers and planners in incorporating that information into their decision-making. In short, it was desired that scientifically derived environmental and social information be available to develop new criteria, in addition to economics, public health and politics, in determining the future of the two-county region.

After a pilot planning grant from the National Science Foundation's Research Applied to National Needs (RANN) division, the Biological Station, in conjunction with the Institute for Social Research, embarked on a three-pronged research effort. Three research phases -- aquatic, terrestrial and social -- were focused on the resource considered to be the most valuable and fragile in the area -- the

inland lakes. The aquatic research sought to gather detailed inventory information on the present physical, chemical and biological characteristics of the lake, and to develop an index of their relative sensitivity to man's impact. The terrestrial phase addressed the question of the impacts man's actions on land -- particularly septic waste handling and timber harvesting -- might have on nutrients in the soil, groundwater and surface runoff, and, ultimately, on inland lakes.

The third phase of the overall research effort was a survey of the residents on inland lakes and rivers in the two-county area (Marans et al., 1975). The original natural science base of the project was broadened to include the social sciences on the conviction that the area's environmental problems could not be dealt with effectively without an improved understanding of the people most directly related to these problems. In large part, the resource problems developing around the inland lakes and rivers of Emmet and Cheboygan Counties were either caused by the people living around them and using them in their recreational pursuits, or were more-or-less natural conditions defined as problems because of their interference with the activities of those people. In either case, solutions to the problems would influence these people, either directly or indirectly, and any intervention into the man-environment system would have to reckon in a political sense with the residents.

One of the aspects of the water-oriented residents' lives of which it was considered most important to develop a deeper understanding was outdoor recreation. It was assumed that the opportunity to engage in recreation was one of the chief attractions of the area. In his

survey of reservoir-oriented residents, Burby (1971) found that the "... primary consumer motivation (in acquiring shoreline property) was to acquire a place to pursue personal recreational and leisure activities." Sixty-three percent of Burby's sample mentioned active recreation as a reason for this acquisition of property. This was the most frequently mentioned response, the next ranking reason being relaxation, mentioned by 36 percent of his sample. Any public intervention which either directly or indirectly influenced recreation behavior should be undertaken only in light of improved understanding of that relationship. If interventions which were carried out to protect the resource resulted in diminished opportunities for engagement in outdoor recreation, or if failure to intervene led to a reduction in the quality of the recreation resource, there might be serious consequences for the social and economic fabric of the region.

PURPOSES OF THE RESEARCH

Developing awareness in the northern Michigan study area and elsewhere of emerging man-environment problems associated with growth of vacation housing has created pressure for public intervention. Among the many points in the system where public intervention is both permissable and possibly efficacious, residential site planning is one of the most promising. Better residential area planning can have beneficial impacts both on environmental quality and on the welfare of the residents. As Lewis Keeble (1971) put it:

> ... the layout of a residential area has, perhaps, the strongest and most direct influence on the happiness and well-being of the people of any planning tool.

The major purpose of this research is to examine the set of relationships between certain aspects of the layout of shoreline residential development and resident behaviors that may be related to site characteristics. More specifically, the research will seek to define the interrelationships between residential density and one outdoor recreation behavior -- fishing -- as conditioned by the residents' perceptions and assessments of residential density, their background characteristics, and their motivations for vacationing in northern Michigan. The focus is on seasonal residents' behavioral response to an aspect of the physical environment which has relevance to policy-makers and planners endeavoring to protect environmental resources while safeguarding citizen welfare.[1]

There are two secondary purposes of this research. The first is to examine two different measures of recreation behavior--the time budget and the somewhat more conventional proportional measure. The time budget variable consists of the total minutes the respondent devoted to fishing on the day before he was interviewed. The proportional measure is the percentage of the days the respondent has been on site during the previous four weeks in which he has engaged in fishing.

The second subsidary purpose of this research is to further test the utility of verbal expressions of motivation in explaining

---

[1] A word about the limitation of the analysis to fishing is in order here. Engagement in outdoor recreation activity is but one of many ways of responding to density and crowding, and fishing is only one example of recreation behavior. The reasons for concentrating on fishing to the exclusion of other recreational activities are that fishing:

a. seemed to be a logical response to crowding
b. was relatively unambiguous, compared to other recreational activities measured in the study
c. had sufficient cases to enable multivariate analysis.

recreation behavior. To the extent that reliable and valid measures of recreationists' motivations can be developed, such information can be incorporated with data on the physical resource, recreation use and economics to more satisfactorily plan and manage outdoor recreation systems. As one small contribution to the emerging "behavioral" approach, this research will examine the explanatory power of several density-related motivational variables developed at the University of Michigan by Driver, Knopf and others (see Knopf, 1972).

LITERATURE REVIEW

This research will examine the effects of three kinds of variables. In this section literature pertinent to each domain is reviewed and a preliminary selection of variables is made. First, past research on the relationships between socioeconomic and demographic characteristics and participation in fishing will be considered. Next, the relevant literature on recreation-related motivation is reviewed. Finally, existing information on the behavioral effects of density is examined. A fourth body of literature, that relating to time budgets, will be reviewed in the second chapter.

Socioeconomic and Demographic Characteristics

The primary purpose of this research is to improve our understanding of the effects of variables related to privacy on fishing behavior. In order to accomplish this, care must be taken to account for socioeconomic and demographic characteristics known to influence fishing behavior. In what follows, the literature on the effects on

fishing of sex, age, income, occupation and education will be examined.

There is wide agreement among researchers that sex is an important correlate of fishing. Mueller and Gurin (1962), in a national survey of recreation participation conducted for the Outdoor Recreation Resources Review Commission (ORRRC), found that men were much more active fishermen than women. ORRRC Study Report 7 (1962) supported this conclusion in its finding that whereas 30 percent of all males over 12 years of age were fishermen, the comparable figure for females was only 10 percent. Finally, Ladd and Dub (1969), in a survey of Oakland County, Michigan, found that men participated in fishing almost twice as much as women.

Research reported on the effect of age on fishing participation is somewhat mixed. Dyer, Allen and Whaley (1968), using multivariate analysis, found that the marginal power of the age variable in predicting use of several Utah fishing sites was very limited. Mueller and Gurin, on the other hand, found that fishing, like all but the least taxing recreational activities, declines with age. They did note, though, that fishing activity remains fairly constant until early middle age, and does not begin to decline markedly until the forties and fifties.

Income, although a major factor in outdoor recreation participation, generally seems to have limited effects on fishing. Mueller and Gurin found that the only differences in fishing by income were between the two lowest income groups. Brewer and Gillespie (1969) surveyed 1000 St. Louis families, and reported that boat fishing rose with higher incomes, but that bank fishing remained the same for all income groups. Dyer, Allen and Whaley found minimal income effects on fishing site use.

The research results on the effects of occupation on fishing behavior are also mixed. Ladd and Dub report that blue collar workers are more active fishermen. In contrast, Cunningham, Montaye, Metzner and Keller (1970), in a sample of 1648 working men, ages 16 - 69, discovered little or no relationship between occupational status and fishing. Finally, Green and Wadsworth (1967), found some occupation effect on fishing; clerical workers and craftsmen tended to make more short fishing trips than professionals.

No research evidence was found suggesting that education level influences fishing. In the only study reviewed which examined explicitly the effects of education on fishing, Brewer and Gillespie (1967) found participation by St. Louis families to be constant across education levels. Although the literature reviewed supplied little basis on which to predict education effects on fishing, the absence of much solid data on this relationship, and the findings of Mueller and Gurin, and Mandell and Marans (1972) of strong education effects on outdoor recreation participation generally prompted the inclusion of the education variable in this analysis.

Outdoor Recreation Motivational Research

An emerging body of theory and research suggests that one of the functions served by engagement in outdoor recreation is responding to needs generated and left unsatisfied in the home and work environment. Driver and Tocher (1970) have developed a theoretical framework for recreation behavior, and they and others have begun to validate that model empirically (Say, 1971; Knopf, 1972; Marans, 1972; Mandell and Marans, 1972; Knopf, Driver and Bassett, 1973; Davis, 1973;

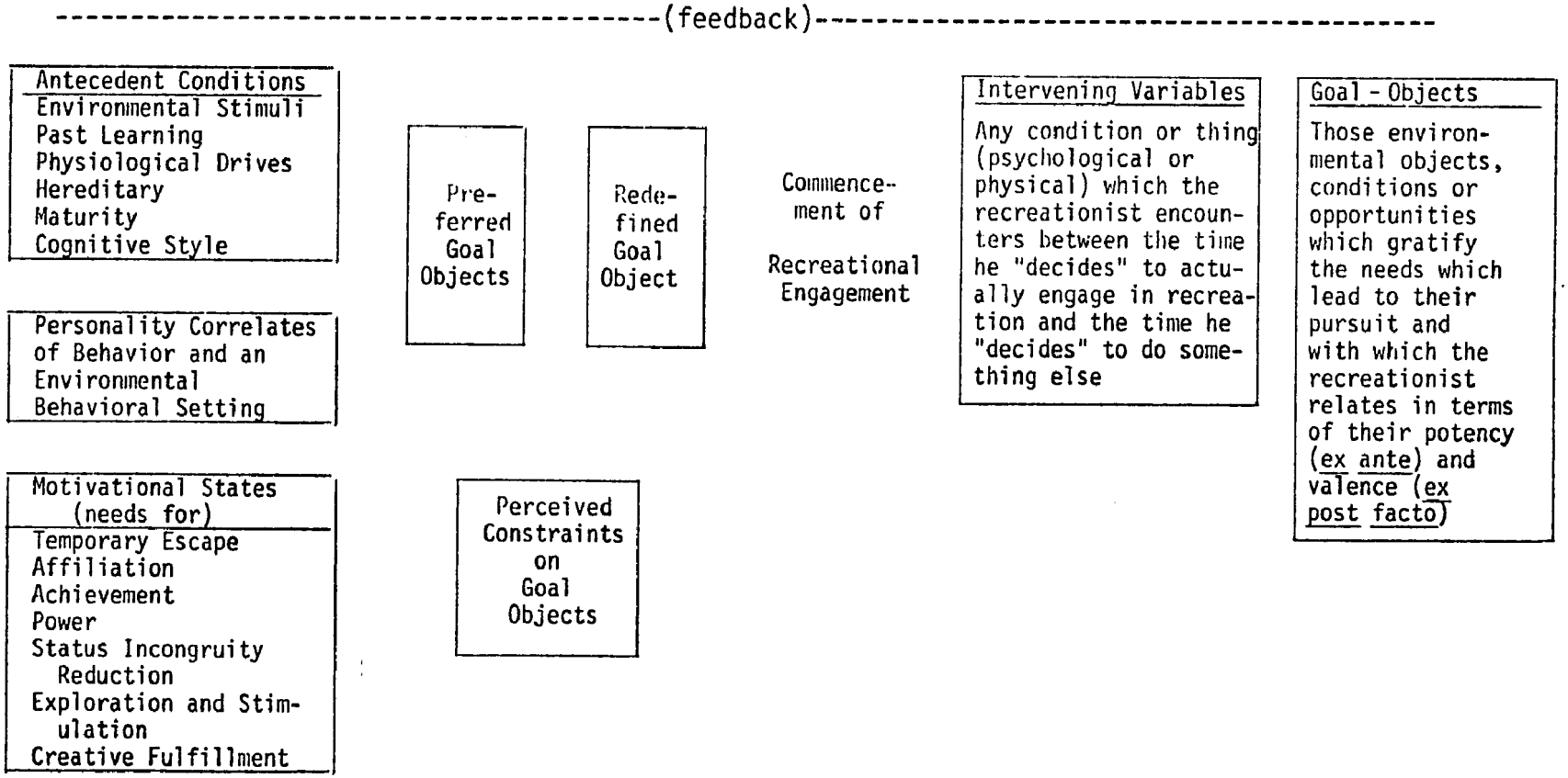
Grubb, 1973). In essence, Driver and Tocher argue that recreation behavior, like virtually all human behavior, is goal-directed. The goal in this instance is a psychological state which satisfies motivations derived from complex inter-relationships between the characteristics of the person -- such as his physical and emotional maturity, his past learnings and his cognitive style -- and physical and social conditions of his environment. In all likelihood, most recreation (like most human behavior) is determined by multiple motivations, with the weightings shifting from time to time. Finally, recreation, as distinct from some other forms of human behavior, requires a commitment, is self-rewarding, involves personal and free choice, and occurs during non-obligated time.

Knopf and Driver (1973) have compactly summarized the recreation behavior model. It begins with a problem-solving model of man, a being constantly monitoring his situation for problems. Problems are defined in terms of the goodness of fit between one's expectations and situation. Man experiences tension when conditions are not to his liking, and is motivated to rectify matters. Engagement in recreation is one way of meeting problems that cannot be dealt with in non-recreational environments.

Figure 1 depicts the Driver-Tocher model of recreation behavior. Verbally summarizing it briefly, it postulates that the interrelationships of personal and environmental conditions produces motivational (need) states for the recreationist; that these need states or behavioral tendencies lead him to examine alternative courses of action and their perceived constraints; that based upon this selection

Figure 1

Schematic of the Proposed General Theory of Recreation Behavior[1]



[1] Driver, B. L. and S. Ross Tocher, "Development of a General Theory of Recreation Behavior", 1970.

process a recreational choice is made; that the engagement may be influenced by intervening variables of various kinds; and that the behavioral need is to some degree consummated during the recreational engagement.[2]

Among the many points Driver and Tocher touch upon, two are of special relevance to this topic. The first concerns the role of intervening variables in the recreation engagement, and the second relates to key motivations behind recreation. Intervening variables are simply conditions encountered by the recreationist as he pursues his goal-object. To illustrate, consider the man who, as a result of his personal and environmental conditions has decided to go deer hunting. Perhaps big-game hunting in Africa was his first choice, but the realities of his time and financial situation led to the redefinition of his perferred goal object as a trophy buck. He thus gears up and sets out on the hunt. Conditions encountered at this point may cause a change in his recreational state, as well as memory effects feeding back to alter future recreation choices and experiences. For example, his original achievement need with its trophy object may be re-directed to realize an experiencing nature need, if he learns that it is virtually impossible to get a deer. Over the years, repeated failure in trophy collection may result in long-term changes in his expectations, such that the annual hunt may

---

[2] In a paper prepared for the National Research Council, National Academy of Science, Committee on Assessment of Demand for Outdoor Recreation Resources, Driver and Brown (1975) have clarified the later stages of the recreation cycle by following Clawson and breaking the active engagement portion into anticipation/preparation, on site activity and recall phases, and by further defining the goal-object stage as satisfactions and benefits. Despite the added clarity, the earlier formulation is used here because it specifically deals with need-states.

be undertaken more with an idea of experiencing nature, escaping temporarily from home or work, or socializing with other hunters than for bringing back a trophy.

The second point to be emphasized is the importance of stress mediation and the desire to experience natural environments in motivating recreational behavior. Driver and Tocher put it this way:

> The authors are convinced that many of our recreational engagements are underlaid in large part (and others to a lesser degree) by our desires to escape temporarily--to disengage, to leave the structured and non-random. These recreationists are 'pushed' from their everyday life-space, by that life-space, at least temporarily, into a restorative ecological behavioral setting --into an environment that is less demanding, into one that is remedial and one that is in many ways, more predictable and less threatening.

Much of the empirical work based on the Driver-Tocher model has concentrated on defining scales for measuring motivations or need states. In essence, the process has consisted of asking people engaging in a variety of forms of recreation to rate the importance of different reasons for their engagement. The ratings of long lists of reasons have then been subjected to cluster analysis to empirically define need states such as experiencing nature, achievement, affiliation and temporary escape. Knopf and Driver summarize this research approach, and present the findings at that time resulting from their exploratory research effort. For a total of 556 recreationists engaging in twelve different activities, temporary escape was rated as the second most important reason for recreating, following only experiencing nature.

In a national study of recreation conducted for the Bureau of Outdoor Recreation, Mandell and Marans examined the relationship

between the respondents' ranking of their neighborhood along several dimensions, and their rating of the importance of outdoor recreation for temporary escape. They found that people who considered their neighborhood as crowded were more likely to say that recreation for temporary escape was very important. Further, those who reported that they frequently heard their neighbors while indoors were more likely to report that temporary escape was an important reason for outdoor recreation.

This motivational research suggests, in sum, that an important reason why people engage in recreation is to temporarily withdraw from stressful conditions. There are numerous dimensions of temporary escape as used in this program of motivational research. For example, Mandell and Marans used a temporary escape scale constructed of the responses to the following three items:

1. It's a change from city life
2. It allows me to get away from people
3. It relieves my tensions

One dimension of stress that has been used throughout the recreation motivation research program relates to crowding/privacy. It is the crowding/privacy dimension that is the focal point of the motivational aspect of this research.

Residential Density and Crowding

Considerable research in recent years has been conducted to examine the idea that crowding has negative impacts on people. According to Hawley (1972) in his polemical address to the Population

Association of America, our mind-set of a negative view of density was given by Louis Wirth in his 1938 paper, "Urbanism as a Way of Life." In Hawley's view,

> As he saw it, density, if only because of the sheer numbers present in a limited space, encouraged impersonality in relationships, a view of one's fellows as means to ends, and in general an exploitative attitude of persons toward one another. These were put forth as the ingredients of the urban way of life and they have been so accepted down to the present.

Hawley traces the recent upsurge of interest in density and crowding to Calhoun's highly publicized work with Norwegian rats, to a bizzare instance of a murder committed in the presence of many onlookers, and to Jane Jacobs' criticism of planners' neglect of old interior cities. In the remainder of this section, an overview of the density and crowding literature will be presented, beginning with the animal studies.

Research conducted on animals by Calhoun (1962), Leyhausen (1965), Southwick (1967) and Christian, Flyger and Davis (1960), among others, has strongly suggested the existence of a causal linkage between population density and pathology. Numerous popular treatments (for a review see Zlutnik and Altman, 1972) have helped raise this relationship to the level of a prevailing belief, not only with respect to animals but to human populations as well. The implications of a density-pathology relationship for humans have aroused increasing interest among social scientists concerned with the prospects for man on a shrinking planet.

There is widespread agreement among social scientists concerned with the effects of density on humans that the animal studies must be

accepted very cautiously. These studies have been invaluable as warnings and spurs to research on human populations, but simple extrapolations from caged rats to people living in cities are at best premature and probably wrong. Nor has correlational research on human settlements as yet provided convincing evidence of a density-pathology link. In his census tract study of Honolulu, Schmitt (1957) found evidence of a density-sociopathology linkage. This finding is contradicted by his own (1963) study of Hong Kong, and by Winsborough's (1965) Chicago study. Galle, Gove and McPherson's (1972) study of Chicago found no density effect using traditional density measures (housing units per structure, and structures per acre), but did find a strong density effect using what they termed "interpersonal press" (persons per room and rooms per housing unit). Freedman (1971) supports this finding with his suggestion that the number of interacting individuals, rather than density per se, influences human behavior. Gillis (1973) found in his analysis of Edmonton census tract data that only building type (single family vs. multiple family) showed significant relationships with welfare payments and juvenile delinquency when income and ethnicity controls were applied.

What can we conclude from the existing evidence on the relationship between residential density and sociopathological behavior in humans? Lawrence (1974) has examined the "meager" body of data on human response to density, and judged that "... the only certain conclusion that can be drawn at this time is that there is no clear demonstrable linear relationship between high density and aberrant human behaviors, or between the social crowding of the individual

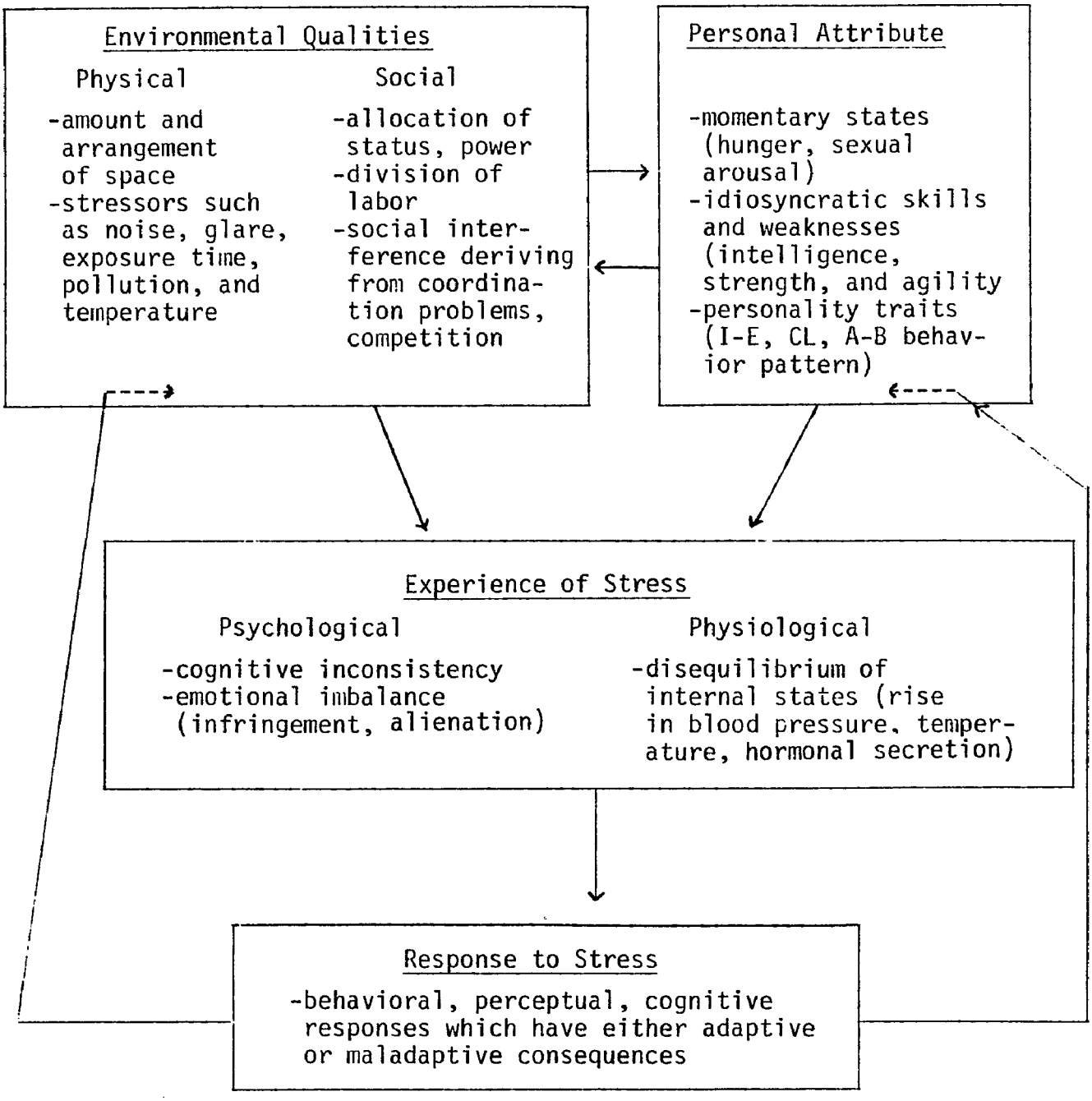
and aggression." Similar conclusions were reached by Zlutnik and Altman (1972, Stokols (1972) and Freedman (1971). It appears, and not surprisingly, that the density connection for humans is very complex, that people are able to adapt to a wide range of conditions, and that whatever relationship may exist is mediated by such variables as gender (Freedman, 1971 and Stokols, et al., 1973), interpersonal relationships (Mitchell, 1971), and social and physical structuring (Loo, 1973).

Stokols has proposed the model of human response to density shown in Figure 2. Two major sets of variables -- the characteristics of the physical/social environment and the characteristics of the individual -- interact (Stokols' terminology) to produce the experience of crowding stress. Stokols differentiates between density, which is the physical condition of a limitation of space and crowding, which refers to the experimential state of a perceived lack of space. The experience of crowding is stressful. Such stress may be psychological (cognitive inconsistency, emotional strain) or physiological (e.g., increased blood pressure or adrenalin secretion). In turn, this experience of stress provokes a behavioral response intended to reduce the discomfort. The form of the behavioral response depends on "the relative intensity of environmental and personal factors and the degree to which they can be modified." A behavioral response is deemed adaptive to the extent that it reduces crowding stress.

Stokols, et. al., (1973) have begun to test this model. In an experimental mode they have examined the following hypotheses related to physical, social or personal variables:

Figure 2

An Equilibrium Model of Human Response to Crowding[1]



[1] Stokols, Daniel, "A Social-Psychological Model of Human Crowding Phenomena", 1972.

> 1. ...as the supply of space in a given area is reduced, the occupants of the area will tend to feel crowded.
>
> 2. ...under conditions of spatial limitations, subjects should feel more crowded and exhibit greater stress when they are competing against each other than when they are cooperating as a group.
>
> 3. ...females interacting in an area of limited space will experience less crowding and display fewer manifestations of stress than males in the same situation. (Based on previous studies by Freedman, 1970, and Ross et. al., 1972).

The results of the experiment showed that physical conditions of density do cause perceived crowding (hypothesis 1). No clear support was found for the notion that conditions of competition in dense quarters would produce greater stress responses (hypothesis 2). Finally, clear sex differences were shown, with males experiencing more stress in crowded conditions (hypothesis 3). Stokols et al. concluded:

> Although the results of this experiment do not verify all the specific hypotheses tested, they do demonstrate that social and personal variables mediate the perception of the environment, as well as the experience of crowding. Perceptions of limited physical space do not always translate into identical feelings of crowdedness; rather, the impact of spatial variables on affect and behavior is determined through an interaction or juxtaposition of physical, social and personal factors.

The literature on the impacts of density on humans has concentrated strongly on behavioral responses to density and perceived crowding. While the emphasis has been on the results of the relationship, some attempts have been made to explain the social and psychological processes involved. Stokols uses cognitive consistency theory to explain the experience of crowding stress and subsequent behavior. In this

explanation, the individual recognizes the disparity between the space he desires and that supplied, and that realization provokes a sense of restricted freedom. Such an infringement on freedom leads to "psychological reactance" (Brehm, 1966), a noxious state motivating behavior designed to restore the sense of freedom. Proskansky, Ittleson and Rivlin (1970) have evolved a similar explanation. Esser (1971) defines crowding as a mental state which occurs under conditions of stimulus overload, due either to an over-abundance of stimuli or to inadequate nervous system functioning. Desor (1972) also posits a stimulus overload mechanism, but specifies social stimuli, thus making the presence of other people a necessary condition of crowding. Galle, Gove and McPherson (1972) suggest that with increasing density comes an expansion of social obligations, and the necessary inhibiting of personal need-gratification. In addition, they note the possibility that humans, like many animals, may have basic biological territoriality or privacy needs which cannot be ignored.

The literature on density and crowding thus suggests that under certain limited conditions, density may lead to crowding stress, and this, in turn, if sufficiently severe, may result in personal and social disorganization unless adequate coping responses are possible. It is obvious that conditions leading to personal and social disorganization do not begin to be approached in the northern Michigan vacation environment. It would be illogical in the extreme for people to purchase or rent housing there if conditions inducing such severe stress did exist, and it would be expected that most residents would report dissatisfaction with the setting if such crowding obtained,

precisely the opposite of what we found. Nevertheless, it may be the case that to a limited extent and under particular conditions of the person vis-a-vis his environment, crowding stress does occur, and that the behavioral response to it is not symptomatic of psychic disorganization, but rather a very normal, everyday behavior in a vacation environment -- i.e., engagement in outdoor recreation which promotes personal quiet and solitude, thereby mediating the crowding stress.

Another Hong Kong study on density may bear on this notion. Mitchell (1971) reports a survey he conducted there on people living in extreme density, with 39 percent of the dwelling units having more than one family unit, 28 percent of the cases sleeping three or more people to a bed, and 13 percent with four or more in a bed. Mitchell's focus was on the effect of density within a dwelling unit. He found, after applying various controls, that the density within an individual dwelling unit has very little impact on patterns of interaction among family members, on people's manifest levels of emotional strain, or upon their attitudes toward housing. Interestingly, Mitchell found that one physical feature of the housing environment had important effects; for multiple family households, higher scores on an index of emotional illness were recorded for residents of the upper stories of multi-story buildings than for those people nearer the ground floor. Mitchell explains this as a result of the relative availability of escape; it is harder for upper story residents to move about and away from stressful circumstances. While cross-cultural comparisons are inherently hazardous, and it is a long way from the sixth floor of a

Hong Kong tenement to a row of rental cabins on a lake in northern Michigan, it is nonetheless interesting to speculate on the role of the out-of-doors as a place in which to escape crowding stress.

Rice (1970) used data from the 1965 National Recreation Survey (conducted by the Bureau of the Census for the Bureau of Outdoor Recreation) to test the proposition that density of home living conditions is stress-producing and that participation in outdoor recreation is a response to that density-induced stress. Using city size as a surrogate measure for residential density and income as a surrogate opportunity variable, Rice found a weak positive relationship between city size and participation in bicycling, playing outdoor sports and games, walking for pleasure, picnicking, driving for pleasure and attending outdoor sports and games.

The study by Mandell and Marans cited earlier is also pertinent in this discussion of the crowding literature. To reiterate, they found that respondents who perceive their neighborhood as crowded and who report hearing their neighbors while indoors tend to consider outdoor recreation as more important for temporary escape. Although perceptions of neighborhood crowding were found to influence expressed motivations for recreation, no relationship was found between expressed motivations and the amount of outdoor recreation activity.

The findings of Mitchell, Rice and Mandell and Marans, then, lead to the essential idea on which this research is based -- i.e., that under certain conditions residential density may promote the experience of crowding stress, and that one behavioral response to that stress may be engagement in outdoor recreation.

CONCEPTUAL FRAMEWORK

The major purpose of the dissertation is to examine the effects of residential density on recreational behavior, while accounting for variations in the personal characteristics of the respondents which might be expected to influence recreation activity. A number of conceptual models of human behavior designed for either recreation or residential planning were considered, with each adding something to the development of the theoretical framework ultimately developed to guide this research. Two of these have previously been discussed -- the Driver-Tocher model of recreation behavior, and Stokols' model of responses to crowding. The third is a model of the determinants of neighborhood satisfaction developed by Marans and Rodgers (1972). Salient aspects of each of these models will be summarized in what follows, and then the model underpinning this study will be presented.

Two aspects of the general model of recreation behavior proposed by Driver and Tocher are especially relevant to the present problem. First, the model proposes that the recreation engagement is purposive behavior undertaken in response to specific need states. The dominant motivations are the product of characteristics of the person and his home/work environment. Thus, the model specifically directs our attention to the motivational state of the respondent energizing his behavior. One such need state is the need for privacy.[3]

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[3] Privacy needs have generally been lumped with other stress-related needs and treated as a temporary escape variable in the research which has evolved from the Driver-Tocher model. In a personal communication, Driver suggested that it would be wise to look at the individual privacy items, as well as the scale formed from them. This will be done in Chapter III.

The second aspect of the Driver-Tocher model that is especially relevant to the present research is the attention paid to "intervening variables" (1970) or "on-site conditions" (Driver and Brown, 1975). In this research, the on-site condition of interest is the residential density of the respondents' neighborhood. The model suggests that site conditions may influence the recreationists' behavior and, ultimately, his satisfaction with the activity and the more generalized benefits he may derive from it.

Need states can arise at different stages in the decision process. It is evident that in the case of fishing behavior by seasonal residents we are looking at a nested set of recreation choices. The second home owner or vacationer (cabin renter) first chooses to buy or rent. In the case of the owner the choice was likely made with the goal of optimizing family benefits, and his particular motivations may be only partially consummated by cabin ownership. Other motives may compete with psychological need-gratification; the cabin may have been inherited or purchased in part for speculative reasons. There is the choice by the second home owner of whether to use the cottage on any given year. Finally, once on site, there are choices about the particular activities to be engaged in. The Driver-Tocher model applies equally well at all three choice levels, though the specific motivational measures we collected refer to the larger context -- i.e., we asked the respondents to rate the importance to them of various motivations when they decided to visit northern Michigan.

Stokols' model is focused on responses to density, and as such could relate to the decision to visit northern Michigan as well as to

choices made in response to on-site conditions. The model is particularly interesting in its specification of an interaction between characteristics of the person and the environment in which he finds himself. The possibility of interactive effects will be examined in Chapter III as part of the analysis. A second point of interest is that the interaction between the person and his environment does not lead directly to a behavioral response; rather there must be an experience of stress, whether psychological or physiological, and it is the discomfort caused by this stress that prompts coping behavior.

The Marans-Rodgers model of community satisfaction is interesting in its attention to the relationships between objective characteristics of the environment and a person's subjective or psychological response to that environment. The general model is presented in Figure 3.[4] The model presents the notion that objective environmental conditions influence neighborhood satisfaction not directly, but through the respondents' perception of them as influenced by his personal characteristics, and through his assessment of the perceived conditions vis-a-vis some standard of comparison. In later formulations, overall neighborhood satisfaction is seen as influencing behaviors, such as household relocation decisions.

Using elements from the conceptual models of Driver and Tocher, Stokols and Marans and Rodgers, the model depicted in Figure 4 was developed to guide this study. For purposes of explication of this

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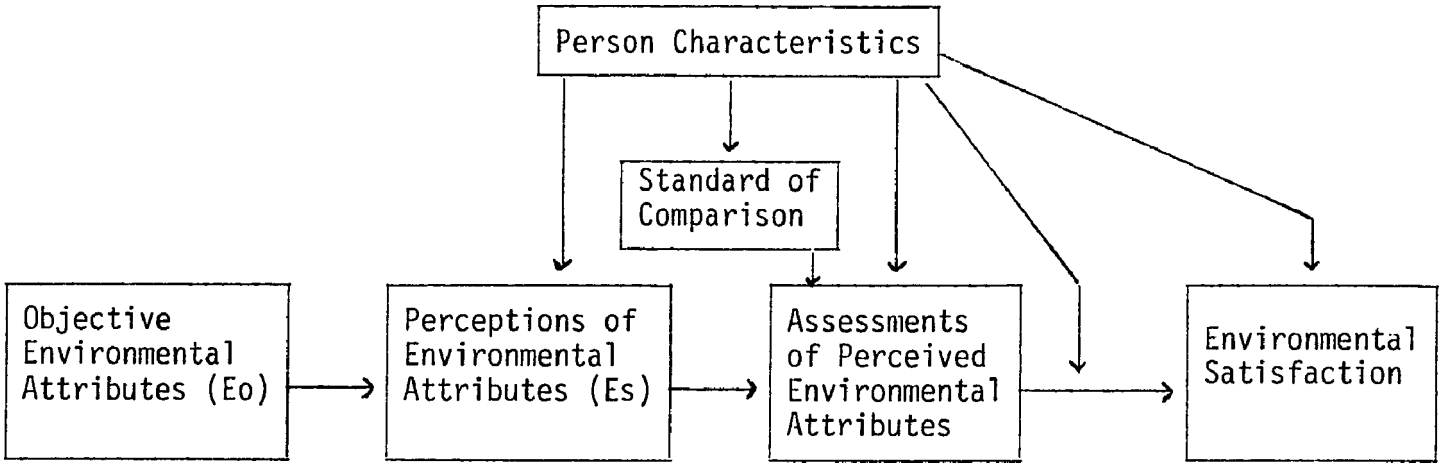
[4] A more elaborate model depicting conditions and assessments at varying geographical levels and the interrelationships between levels is presented in Marans and Rodgers (1974). For the present purposes it was determined that the simpler schema would suffice.

Figure 3

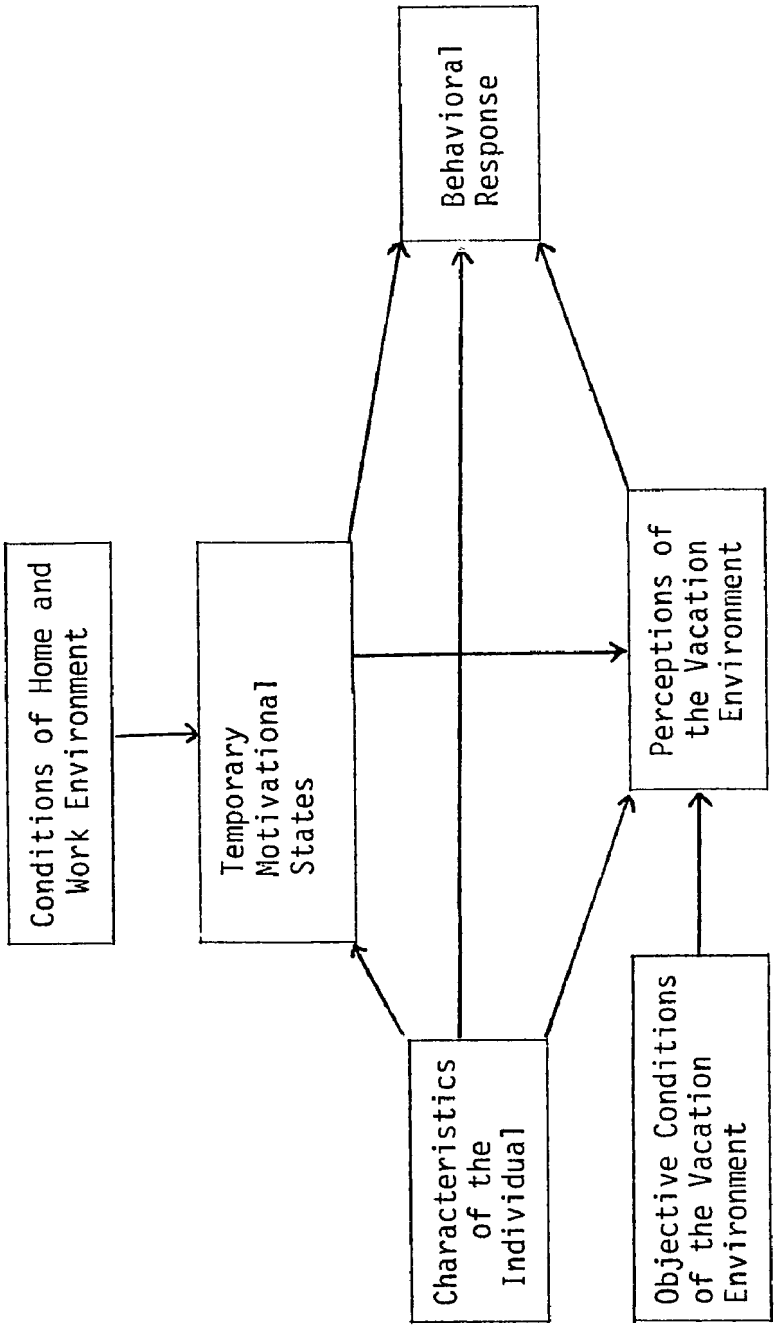
Determinants of Community Satisfaction[1]



[1] Marans, Robert W., and Willard Rodgers, "Toward an Understanding of Community Satisfaction", 1974.

Figure 4

Conceptual Model



model, it is useful to consider it as separate sub-systems.

We will begin by looking at the interrelationships between the boxes labeled "Conditions of the Home and Work Environment", "Characteristics of the Individual" and "Temporary Motivational States". This portion of the general model derives from the recreation motivation work based on the Driver-Tocher model. To reiterate, it assumes that the individual enters the recreation environment with motivations or need states developed in his home-work environment. These motivations depend not only on the actual conditions in his home and work, but also on such personal attributes of the individual as age, sex, maturity, cognitive style, income and education.

The second part of the model consists of the linkages between "Objective Conditions of the Vacation Environment", and "Perceptions of the Vacation Environment". Marans and Rodgers have hypothesized this relationship in their community satisfaction model, and present some data to support it. Specifically, using data from Mandell and Marans' (1972) survey conducted for the Bureau of Outdoor Recreation, Marans and Rodgers found that objectively measured neighborhood density (dwelling units per acre) was strongly related to perceived neighborhood crowding.

A third sub-part of the model concerns the interrelationships between "Temporary Motivational States", "Characteristics of the Individual" and "Perceptions of the Vacation Environment". It seems reasonable for the momemt to assume that a person coming to a vacation area with a strong privacy need would be likely to rate any given area as more crowded or less private than another person without such motivation. With respect to the effects of personal

characteristics on perceptions, the findings of Freedman and Stokols et al., that men are more prone to feel crowded than women, under the same conditions, alert us to the potential importance of the socioeconomic and demographic variables.

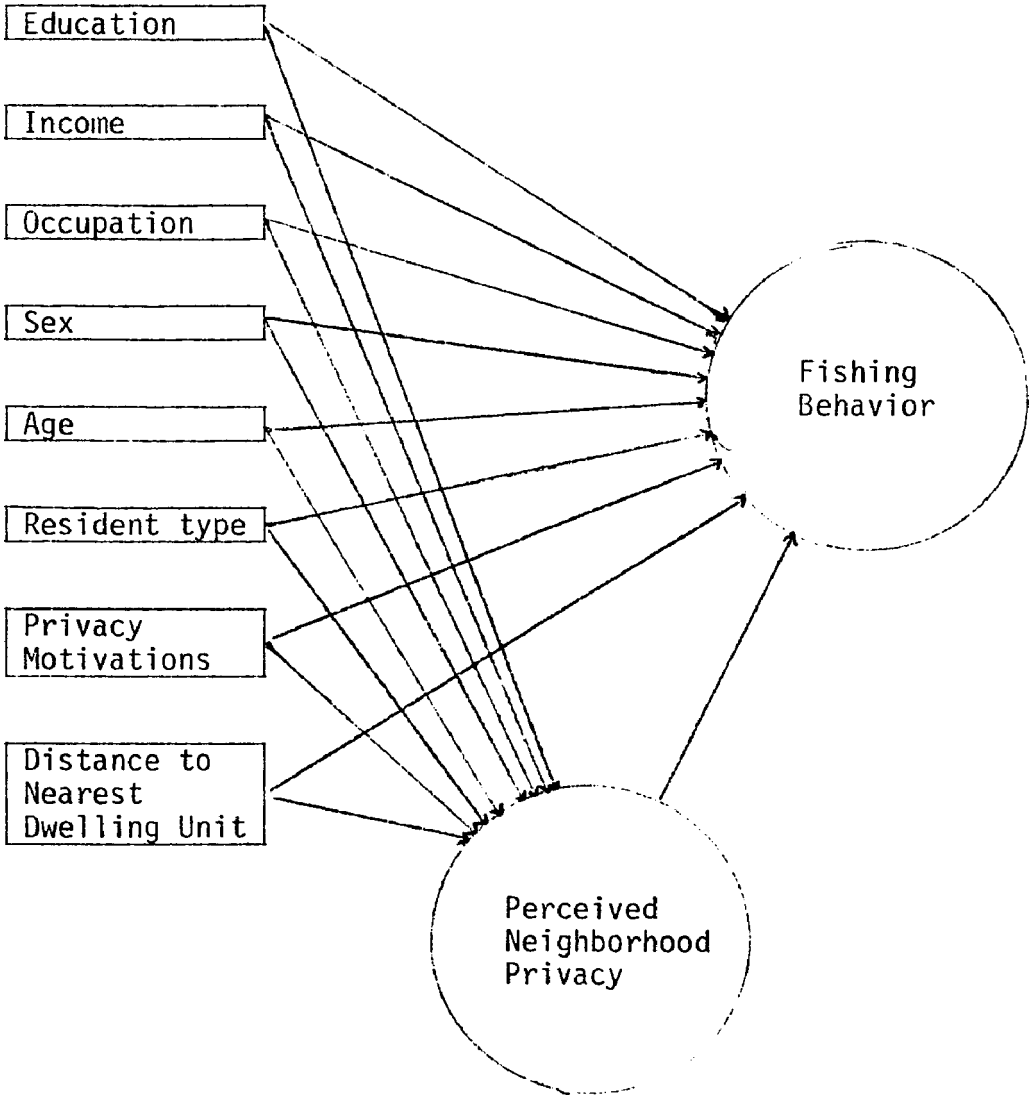
The final portion of the model depicts the effects of "Temporary Motivational States", "Characteristics of the Individual" and "Perceptions of the Vacation Environment" on "Behavioral Response". Clearly, many behavioral responses to temporary need states and perceived environmental conditions are possible, but the specific response of interest in this study is outdoor recreation behavior. The effects of personal characteristics on recreation behavior have been well established by numerous researchers, and some progress has been made in defining recreational responses to motivational states. The role of perceptions of the recreational environment in determining recreational behavior, although theoretically defined by Driver and Tocher, has not as yet received empirical testing.

Hypotheses

The substantive objective of this research is to test the validity of a complex model of the privacy-related determinants of one form of recreation behavior -- fishing. Figure 5 presents that model as it will be used in the analysis. The model obviously is limited to a selection of the determinants of fishing activity. It is not meant to suggest that privacy and density-related variables are anything more than one set of factors among others which may induce fishermen to fish. It is explicitly recognized that many

Figure 5

Path Diagram



other determinants not treated in this analysis may strongly motivate fishing behavior; among these may be included the suspense created by the possibility of catching a trophy size fish, a desire for the status endowed by the trophy, and the motivation to exercise competence in hooking and landing a big fish.

This path diagram contains a number of hypotheses about the linkages between objectively measured environmental conditions, expressed motivations, perceived conditions, and fishing behavior. Specifically, the model hypothesizes that, after controlling for personal characteristics of the seasonal fishermen:

1. privacy-related environmental conditions of the neighborhood will indirectly influence fishing behavior by way of their effect on the perceived crowding/lack of privacy of the neighborhood -- i.e., seasonal fishermen living in densely developed neighborhoods will tend to perceive the neighborhood as crowded or lacking in privacy, and those who perceive their neighborhood in this way will be more likely to fish intensively.

2. privacy-related motivations which prompted the overall vacation choice will affect fishing behavior both directly -- i.e., those seasonal fishermen for whom privacy-related reasons were important vacation planning considerations will fish more intensively -- and indirectly, through their influence on perceived neighborhood conditions -- i.e., people who come north for privacy-related reasons will tend to view the neighborhood as more crowded and less private, and these perceptions will lead to more active fishing behavior.

Plan of the Dissertation

Chapter I has introduced the overall and specific research projects from which this study derives, stated the specific purposes of the dissertation, discussed the practical significance of the present research topic, reviewed relevant selections from the literature,

presented a conceptual framework designed to guide the study and designated two specific hypotheses to be examined.

The first part of Chapter II will introduce the time budget as a methodology, examine its potential contribution to planning, review the literature on its use, and present the specific methodological decisions made as a part of the survey. A second part of the chapter will introduce the specific variables which were chosen from a survey of the purposes of this study.

Chapter III will be concerned with the analysis of the data. From the predictor variables presented earlier, predictors will be selected for further analysis. Following this selection process, selected possible interactions suggested by Stokols will be examined. Finally, for each dependent variable a path analysis for the privacy-related determinants of fishing intensity will be carried out and the results discussed.

Chapter IV will summarize the research findings, examine their planning implications, and suggest further research.

CHAPTER II

METHODOLOGY

In this chapter several methodological issues are considered. The first pertains to time budgets, and to the particular adaptation of the methodology in this research. Arguments are presented for the usefulness of time-budget information; time budget literature, both historical and contemporary, is reviewed; specific methodological issues are discussed, and our choices with respect to them explicated. In the second part of the chapter, variables operationalizing the theoretical model will be presented and discussed.

TIME BUDGETS

As pointed out in the introduction to the first chapter, social science information, in spite of its evident relevance for man-environment relations, has made only minor inroads into the land-use planning process. There are doubtless many reasons for this limited penetration, but two that are particularly notable concern the choice of subjects and their situations and the means of measurement. Psychology and sociology have their roots as science in the study of severe human problems. This influence has persisted through the years, so that much of the information these two young sciences have amassed concerns the abnormal and pathological extremes of the human condition, to the neglect of everyday, normal life. As to the means of measurement, the galaxy of inventive measures of human behavior and thought all too

often are of little use in a pragmatic planning context, and far less comprehensible to decision-makers than economic or physical science data.

The emerging field of time budget study is concerned with the everyday activity patterns of people and therefore offers great potential as social science input into resource planning and management (Michelson and Reed, 1975). In essence, a time budget is merely a log of the sequence and duration of an individual's daily activities. It is an exhaustive accounting of a slice of time in an individual's experience. In contrast to analogous studies of personal financial conditions, the time budget has one unique aspect: all people are equal. Everyone has exactly twenty-four hours a day at his disposal, and it is assumed that the activity selections a person makes, particularly with respect to his discretionary or leisure time, are to some extent indicative of his values in relationship to his personal situation.

Time budgets, thus, are attractive for planning purposes in that they can supply descriptions of the everyday activity patterns of people. The extent to which conditions of the physical environment shape everyday behavior can be explored. For example, do people living in a residential area with small parks close at hand spend more time in outdoor recreation than people living in areas with fewer, larger parks? Do apartment dwellers spend more time in leisure pursuits than homeowners? Are the activity patterns of people with readily available mass transportation systems appreciably different from the patterns of others?

Time budgets are especially attractive for assessments of the impacts of policy and planning decisions on people's lives. While other variables fluctuate, people will always have no more and no less than twenty-four hours a day to allocate. For example, the impact of a transportation innovation might be gauged by comparing the activity patterns of people before and after its implementation. Gutenschwager (1973) has noted that "recurrent inventories of time-use patterns may be the only way, ultimately, to assess the effects of public policy on behavioral patterns in time and space".

Time budgets, although more expensive and laborious to code and analyze,[5] are more accurate measures of people's actual behavior than simpler questions which merely ask the respondent to sum his daily time on a specific activity (Michelson and Reed, 1975). Robinson (1975) notes that respondent estimates of time spent on activities with minimal social desirability bias tend to be exaggerated.[6] Using direct and indirect observational methods, Robinson has found correlations on the order of .80 between aggregate activity as estimated by the time budget and actual behavior.

With these considerations in mind, we gathered time-budget information on our sample of northern Michigan residents in the hopes that an improved picture of their everyday lives would provide insight into their actions and values with respect to the environment that

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[5] See Michelson and Reed (1975) for a thorough discussion of costs and difficulties entailed in time budget research.

[6] Bull (1972) asked people to predict what they would do the next day, and compared their predictions with the time budget record of their actual behavior. He found that leisure activities were predominately overestimated and work activities underestimated.

would prove useful in planning land use and in monitoring the impacts of that planning.

A Brief History of Time Budget Research[7]

The earliest rigorous time budget research was conducted by Frederick Taylor as part of his efficiency-oriented time and motion studies at around the turn of the century. The first known large-scale time budget survey was conducted in 1924 by Strumilin on Moscow workers. Strumilin's study provided the basis for the historical comparison made by Prudensky in 1959, documenting the changes in Russian time and activity patterns brought by industrialization (Robinson and Converse, 1972). Time budget work in Soviet bloc countries has, for many years, enjoyed a vigorous tradition as part of their state planning efforts.

In western Europe, Canada and the United States, the emphasis has been on the use of time budgets for understanding leisure behavior. One notable early exception to this rule was the series of five studies done in the late 1920's by the Bureau of Home Economics of the U.S. Department of Agriculture, concerning the effeciency of time use by farm women. In 1934 Lundberg, Komarovsky and McInerny published their classical study of leisure behavior in suburban Westchester County, New York. Another milestone study in the United States was done by Sorokin and Berger in 1939; this study had an examination of human motives as its central theme.

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[7] For a very useful summary statement on time budgets the reader is referred to Philip E. Converse's article in the International Encyclopedia of Social Science (1968).

Both the Lundberg et al. and the Sorokin and Berger studies are interesting primarily as historical pieces in the development of the time budget. Their value in comparative studies of social change is limited because neither had a coding scheme that is readily compatible with today's research, neither was based on a representative sample, and both were plagued by severe response problems -- 60 percent of Lundberg's et. al. diaries were completed by high school students, and Sorokin and Berger's analyses were based on a response rate of around 10 percent, half of which were discarded because of false or inaccurate recording.[8]

In 1954 J. A. Ward, Inc. conducted a time budget study for the Mutual Broadcasting Company to use in programming. Some of the results are reported by de Grazia (1964), who cited them in support of his argument that the much-acclaimed gains in leisure time since 1850 are in large part illusory. The time budget data revealed that although paid work time had indeed fallen, seven or eight hours each week was being spent on work-related travel.

The single most important event in time budget research occurred in 1965 and 1966 with the Multinational Comparative Time-Budget Research Project. The basic volume resulting from this work, The Use of Time: Daily Activities of Urban and Suburban Populations in Twelve Countries, appeared in 1972 (Szalzi, 1972). The project was designed to permit comparison of the effects of urbanization and

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[8] As Robinson and Converse have noted, Sorokin and Berger included data in their published reports only from respondents who maintained a diary for four weeks or longer. Sorokin and Berger defend their choice vigorously as necessary to get a realistic portrayal of the daily lives of each respondent.

industrialization, to provide base-line data against which change could be measured, and to promote the refinement and standardization of time budget methodology.

The United States portion of this coordinated research effort was directed by Converse and Robinson of the Institute for Social Research. Two studies were carried out; the first was a national sample of people living in urban areas, while the other was a survey of Jackson, Michigan residents. The national study gathered time diaries and appurtenant information on 1243 respondents in 44 cities with populations of 50,000 or larger. In Jackson, a midwestern city of 72,000, 778 diaries were taken. These studies provided a wealth of information, one of the greatest values of which may develop over the years as it is used as a baseline. Comparisons with our data are presented in Appendix D tables. The national survey was conducted during November and December, 1965, and March and April, 1966; the Jackson study was in the field then, and during January and February, 1966 as well. Due to seasonal differences, comparisons with our data must be accepted cautiously.

One of the important aspects of the Converse-Robinson survey was the demonstration that high response rates were possible on time diaries used in the United States. The response rate for the National study was 74 percent, and for Jackson it was 82 percent. In addition, the diaries were quite detailed -- an average of 27.0 primary activities for the National and 28.4 for Jackson. This was accomplished by having the interviewer introduce the study, leave the diary with the respondent for self-completion, then return the next day and review it with the respondent for accuracy and detail.

There are currently three major efforts under way in North America. Since 1963 Chapin and his associates at the Center for Urban and Regional Studies at the University of North Carolina have been engaged in a program of time budget research. The overall interest is in the application of time budget data to improve social planning. The guiding ideas and results to date are summarized in Chapin (1974). Among other achievements, this research program has conducted several national time-use studies and two Washington, D.C. studies, one of which was directed toward low-income respondents. The results of this research program are clearly too numerous to summarize here; for more information the reader is referred to Chapin (1974).

A second contemporary research effort is being conducted by Michelson and his colleagues at Toronto. Michelson's substantive area of interest is in site design, and its impact on human behavior. Methodologically his time budget research is unique at this point in time in his use of a panel design; through a series of interviews with Toronto families moving to urban high rise apartments and suburban dwellings, he is tracing the impacts of site conditions on human time allocation.

Finally, a major national study is being readied under the direction of Juster and Robinson at the Institute for Social Research.[9] Personal interviews will be conducted in the fall of 1975, with three subsequent telephone interviews. Of primary interest are the forthcoming comparisons with the 1965-1966 survey.

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[9] Juster, F. T. and J. P. Robinson, "Incorporating Time Use Data Into Economic and Social Accounts", proposal to the National Science Foundation, March 1974.

Several modern time budget studies bear mentioning. In the first, Vanek (1974) used time budget data from the Bureau of Home Economics studies, the 1965-1966 U.S. National study by Robinson and Converse and cross-national comparisons from the international study in an inquiry into the changes in women's housework time over the last half century. Even with data incompatibilities, the conclusion is unavoidable that despite the advent of household conveniences, the amount of time women devote to housekeeping has not diminished significantly. In her conclusion, Vanek speculates that in addition to explanations couched in terms of rising standards, it may be the case that housework expands, Parkinson-like, to maintain a symbolic balance between the household contributions to the marriage partners.

Research findings of particular interest to this study are reported by Bishop et al., (1975). Participation rates by college students in 35 leisure activities -- obtained through a recall questionnaire -- were compared with rates obtained through time budgets. The correlation between recall frequency and time budget frequency was .88, and that between recall participation and time budget elapsed time was .78.[10] Bishop concludes that, at least where summary information about activity participation is required, the additional difficulty and expense of a time budget methodology is difficult to justify. This is especially the case where the time budget is used for frequency of participation information. "When

[10] Using a statistical technique called correction for attenuation, which estimates the maximum expected correlation between two variables on the assumption of perfect reliability for each measure, Bishop obtained an expected correlation of .95 between the leisure behavior questionnaire and time diary occasions.

participation is measured by the amount of time spent in activities the results are less definitive, because the investigation was unable to compare recall questionnaires and time diaries on such measurements."

Methodological Issues

Over the years that time budget research has been carried out, a great variety of approaches has been tried, and these have met with varying degrees of success. The specific form of the time budget we used is based on this long history of trial and error. In addition, we operated within the limitations imposed by the fact that our time budget was but one part of a rather lengthy interview. With these things in mind, the most important methodological decisions we made and the reasons for these choices will be discussed next.

1. Method of Obtaining Data

Essentially, two approaches have been used. In the first case the respondent carries with him a diary in which he records his activities. The diary approach is necessary for time scales longer than one day, but due to the burden placed on the respondent, response rates in this approach tend to be low. The other major approach, lately the norm in time budget research, uses recall to describe the person's previous day's activities. Robinson and Converse combined these approaches, having the respondent fill out a 24-hour diary, then having the interviewer review it with the respondent to assure clarity and completness. We decided to use the day-before recall method, as part of our regular interview. Cost constraints prevented adoption of the Robinson and Converse approach, which might have been preferable. However, indications are

that for up to 24 hours, recall of major events in the day is quite accurate (Michelson and Reed, 1975). One result of our day-before approach is that we collected almost no information on Saturday time use, since our interviewers avoided Sunday interviews to avoid antagonizing religious respondents.

2. Time Scale

Among the many possible time scales (or slices of life) for our time budget, we selected the 24-hour day. This has become an established time budget convention; shorter periods are primarily reserved for studies of work, while longer periods encounter increasingly severe problems of declining response rates, in the case of the diary format, and memory lapses in the recall approach.

3. Time Frame

A continuing subject of debate in time budget methodology is whether to provide the respondent with time intervals (e.g. 15 minute blocks) or to leave it open-ended. We chose the latter course and instructed the interviewers to probe for detailed time information only with respect to travel and recreational activities. For example, a housewife's morning cleaning activities were not recorded in extreme detail, but were lumped together as indoors housework. On the other hand, for example, we did record a two-minute walk to a neighbor's as travel connected with the activity involved.

4. Pre-Code vs. Self-Code

It has generally been concluded by time budget researchers that attempting to have the respondent choose from a list of pre-coded activity classes is altogether too cumbersome if one wishes to capture

the richness of everyday life. Furthermore, self-coded formats with detailed coding by the research staff enable various collapsings of the data to be carried out according to different research objectives. Therefore, we adopted the self-code format.

5. Primary and Secondary Activities

A moment's reflection by the reader will convince him that on many occasions he is simultaneously engaged in more than one activity. For example, the man of the house may be whipping up the week's mayonnaise (at least in France) while listening to the radio. Much TV watching is done with a low level of attention (Robinson, 1975), and accompanied by housework, childcare, visiting and other compatible activities. In order to capture this complexity in the fabric of everyday life, numerous studies have asked for secondary activities. We decided that this would be unnecessarily complex and costly (mostly in terms of respondent patience) for our purposes, and that we could get the major outlines of the day by letting the respondent self-code his primary activity. Where two or more simultaneous activities were, in fact, recorded, we adopted the coding convention of dividing the allotted time equally between or among them.

6. Other Appurtenant Information

For each activity we recorded the time it began, the time it ended, and the place where it occurred. In addition, following the time budget, we inquired if the respondent had particularly enjoyed or disliked any of his activities that day, and if so, which ones (first three mentions). Results on this phase of the time budget are presented in Appendix D. Other studies have asked satisfaction

with each activity and presence of others. For example, the 1965-1966 Converse-Robinson study recorded the primary activity, then asked the respondent if he was doing anything else at that time, how he felt during this time and whether his children were present. While information like this would have been interesting, we decided that marginal utility of such information did not outweigh the costs of collection.

7. Coding

For purposes of comparability, we adopted the 99-category code used in the multinational comparative time budget study. We expanded the sports and active leisure categories in anticipation of a more detailed treatment of what we assumed would be a great deal more of the kind of activity than would be found in non-vacationing populations. For analytical purposes, we reduced our original code to the level indicated in Table 1; this table has eleven major activity classes, and 42 categories in the code at the next level of detail. The full and reduced codes, and average times for each are presented in Appendix D.

VARIABLES USED IN THE ANALYSIS

This analysis is, to some extent, secondary research. The questionnaire was designed with the intent of providing information on a broad range of matters relevant to land-use planning. The analysis presented in this dissertation was designed after-the-fact, so that although the survey questions and this analysis are to a large extent based on common theoretical ground, there is less than an

Table 1

Time Budget Codes

Total Work	Work Outside Home Other Employment Travel for Work
Total Housework	Food Preparation & Cleanup House Chores Gardening & Animal Care House Maintenance & Repair Lot Maintenance & Improvement Other Housework
Total Childcare	
Total Shopping and Services	Shopping Services & Other Travel for Shopping & Services
Total Personal Needs	Personal Hygiene Home Meals Meals Out Night Sleep Other Private Needs Travel for Personal Needs
Total Education and Civic/Organization Participation	
Total Social	Visit & Entertain Neighbors Visit & Entertain Friends Visit & Entertain Relatives Other Informal Gatherings
Total Entertainment and Cultural[1]	
Total Sports and Active Leisure	Swimming Fishing Sail, Canoe, Row Waterski, Motorboat Other Water Sport Outdoor Non-Water Walking Pleasure Driving Other Non-Water (travel) Travel for Sports & Active Leisure

[1] Includes all travel associated with both entertainment and cultural and social activity.

Table 1 (continued)

Total Passive Leisure	Radio
	TV
	Reading
	Relaxing and Resting
	Games
	Other Passive Leisure
Total Miscellaneous	

optimal correspondence between elements of the conceptual model to be tested and variables with which to operationalize those elements.

The discussion that follows is concerned first with the two recreation behavior measures compared in the analysis as dependent variables, and second with the set of predictor variables from which those used in the path analyses will be selected.

Dependent Variables

As mentioned previously, we are considering a nested set of recreation choices. The decision to be in northern Michigan is likely the product of a wide variety of considerations by the household. The vacation home offers opportunities for the different members of the household to engage in specific recreational activities. For those who do fish, that choice of recreational activity is again the result of many factors. The determination of the choice of activities is rooted in the person's past learning and the opportunities of his present personal and environmental situation.

The third in the nested series is the choice of intensity, and that is the focus of this analysis. Thus, given that the respondent chose to come to northern Michigan, and given his choice to fish, what variables are important predictors of the intensity of his activity? Among those predictors, how important are variables related to crowding, density and privacy?

Two measures of fishing intensity will be used. The first is the more conventional measure, the proportion of days on site during the last four weeks (28 days) in which the respondent went

fishing. It will be referred to as percent fishing.[11] Possible responses range from 3.6 percent (1/28) to 100 percent. The second measure, derived from the time budget, is the total time in minutes the respondent fished on the day prior to the interview. This variable is labelled time fished. Possible scores range from zero to 1440 minutes (if the person fished for 24 hours). Both measures of fishing behavior are continuous, interval measures well suited for the regression analysis that is planned.

Predictor Variables

The background or person characteristics included in this analysis are as follows:

sex
age
income
education
occupation
resident type

The literature reviewed earlier suggested inclusion of the first five variables. The sixth, resident type, is a pattern variable developed for the northern Michigan study which is composed of variables on property ownership and seasons of residence. The following three categories of resident type were defined, though only the second

[11] The proportional measure was used to account for the inequalities in the fishing opportunities among respondents. Had we used a measure like the number of days during the last month, or the number of days during the summer, residents who by chance were interviewed soon after they had arrived or early in the summer would have had a far lower opportunity to participate, and our measure would have been severely biased. We wanted an interval measure, one well suited for regression analyses, so merely asking the respondent how avid a fisherman he was, was not considered adequate. Finally, to limit memory biases somewhat, we asked about activity in the previous four weeks, rather than over the course of the summer.

and third were included in this analysis:

1. Year-round Residents: those residents who reside year-round in the study area, whether they own the property, rent it or neither own nor rent it

2. Second Home Owners: those residents who own their property and who visit either during the summer months or at different times during the year.

3. Vacationers: those residents who rent or neither own nor rent the home in which they were interviewed, and who visit either during the summer months or at different times throughout the year.

Resident type emerged during analysis as a potent explanatory variable for a wide range of attitudes and behaviors. It had an especially strong effect on time use (see Appendix D). Even after controlling for other differences such as age (vacationers are younger), the resident type of the respondent had a strong influence on his use of time. There are several reasons why we might have expected more fishing activity from vacationers than from second home owners, even when other variables were controlled. First, since their stays in northern Michigan are much shorter, vacationers might be expected to consummate their behavioral tendencies more vigorously -- i.e., whereas a second home owning fisherman has a wide range of time available for whatever fishing he wants to do, the vacationer has to "pack it in". A second reason that vacationers might be expected to be more active fishermen is that their energy and time is less likely to be diverted by other duties or attractions. Theirs is a more spartan existence, generally with less of the house and lot maintenance, television, visiting neighbors and other diversions of the more complex homeowner's life. A third possibility is that both recreational behavior and resident type are products of the person's

life-style. It may be the case that those who choose to purchase second homes are qualitatively different from those who rent vacation housing -- that they are more settled, less adventurous and less active physically.

Three privacy and crowding-related motivational variables are included in this analysis. As detailed in Appendix B, these were chosen by means of cluster analysis from a selection of motivational statements used in past research on recreation motivations at the University of Michigan. Seasonal residents only (i.e., second home owners and vacationers) were asked to rate the importance of each of a list of 20 statements in their decision to visit northern Michigan. The three statements referring to privacy/crowding which clustered together were:

1. To get away from other people
2. To get away from crowded situations
3. Because you thought there wouldn't be so many distractions here

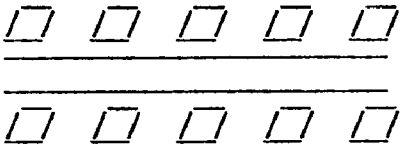
Two objective measures of neighborhood density will be examined in this analysis. Both are assessments made by the interviewer. The interviewer assessments are not true measures of objective environmental conditions; rather, they are independent but trained judgements intended to be surrogate measures of actual conditions (see Marans and Mandell, 1972). The first, for which the interviewers were specifically trained, was an estimate of the distance to the nearest house.[12]

[12] A reliability check was made on a subsample of interviewer assessments by a project staff member using a range-finder. The relationship between the interviewer estimate and the other measure was moderately good, gamma = .66.

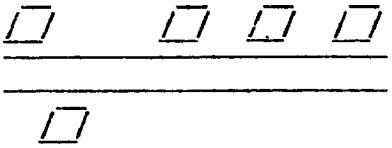
The following answers were possible:

1. Less than 15 feet (less than 1 car length)
2. 15-29 feet (1 to 2 car lengths)
3. 30-49 feet (2 to 3 car lengths)
4. 50-99 feet (3 to 6 car lengths)
5. 100 feet or more (more than 6 car lengths)

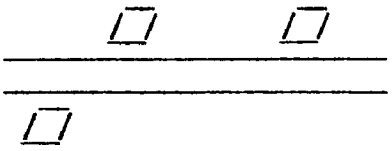
For the second neighborhood density measure the interviewer was to select from the following the description that best matched the area within 100 yards of the respondent's dwelling, or within three houses on either side.[13]



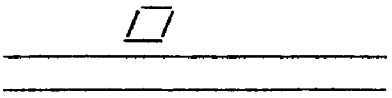
1. Entirely built up with buildings; no open space present except that associated with privately owned buildings.



2. Mostly built up with buildings, some open space present such as vacant lots, open fields, and undeveloped woods and wetlands.



3. Sparsely built up with buildings; mostly open space present sucy as vacant lots, open fields and undeveloped woods and wetlands.



4. All open space; respondent's dwelling is the only building within the area.

Marans and Mandell Have made comparisons between the interviewer's judgement of the degree to which the area is built up and a measure of residential density constructed from interviewers' sketch maps. Based

[13] This measure, too, was validated by a staff member. The relationship between a selection of interviewer assessments and his independent judgement was only slightly lower -- gamma = .62.

on a correlation of .47 between the two measures, Marans and Mandell tentatively concluded that, "... The interviewer assessment of open space and the respondents' perceptions of crowding do not appear to be appropriate substitutes for actual residential density. In fact, they may be measuring other dimensions of density to which people will respond." The authors note some operational difficulties in the construction of the objective density measure, caused by the use of interviewer sketch maps of variable accuracy and scale.

Finally, two measures of the residents' perception of neighborhood density were included in this analysis. Both were selected from a self-administered series of 15 seven-point semantic differential questions about the immediate neighborhood -- i.e., "the three or four cottages or homes nearest yours." The two items included in the analysis were:

crowded ☐ ☐ ☐ ☐ ☐ ☐ ☐ uncrowded

a lot of privacy ☐ ☐ ☐ ☐ ☐ ☐ ☐ no privacy

We defined "neighborhood" for this series of questions as "the three or four cottages or homes nearest to yours." Following Marans and Rodgers (1972), we used this micro-neighborhood definition, rather than a broader one, because this zone should be very familiar to the respondent and is likely to be a place where much children's play, neighboring and leisure activity take place. In addition, it typically is one area where homeowners have a large investment.

In the next chapter, univariate and bivariate data on these items will be employed to select a parsimonious set of variables for use in a path analysis on fishing behavior as a response to residential density in the vacation environment.

CHAPTER III

DETERMINANTS OF FISHING BEHAVIOR

In the first chapter a conceptual framework was developed linking recreation behavior -- exemplified by fishing -- to a set of personal and situational variables related to privacy or crowding in the vacation neighborhood. The general argument was developed that conditions of dense residential development are stress producing as evidenced in perceptions of the neighborhood as crowded or lacking in privacy, and that crowding stress is one of several determinants of increased fishing intensity. In connection with the development of the model the possibility was raised that the person-environment relationships of interest were interactive, rather than additive.

Drawing on data collected during the summer of 1974 a household survey of residents living around northern lower Michigan lakes and rivers, we selected respondents who were seasonal residents, had fished at least once in the four weeks before the interview, and had taken the time diary. Specific measures to be used in this analysis were presented in the second chapter.

This chapter concerns the results of the analysis and consists of a number of steps. First, univariate and bivariate data are presented, and on the basis of these findings, variables to be included in the explanatory analysis are selected. Second, Stokols' suggestion on interactive relationships will be explored. Third, the

analytical technique used in the explanatory analysis, path analysis, will be introduced and its suitability discussed. Fourth, the results of the path analysis for each of the two dependent variables -- percent fishing and time fishing -- will be presented and discussed.

Univariate Results

The univariate distributions of all variables considered in Chapter I are presented in the first three tables in this chapter. These data are for that segment of respondents who:

a. were either second home owners or vacationers (seasonal residents who rent or neither own nor rent),

b. had fished at least one day during the last month, and

c. had completed the time budget.

All told, there were 198 respondents who met all these conditions. Several of the variables had cases with missing data, especially the income variable, with the result that the regression analysis had to be done on a rather limited sample of 172 cases. This fact had important implications for the analysis. First, it dictated (in part) the variable selection process now being discussed. Second, to anticipate later developments somewhat, it made it difficult to handle a case of interaction which was discovered.

It might be argued that in order to overcome these sample size limitations it would be worth eliminating or modifying one or more of the selection criteria. However, it was felt that each was justified. Since two measures of fishing were to be compared, it made sense to have the same subjects for each, and furthermore, only

12 percent of the respondents did not take the time budget.[14] As concerns the exclusion of the year-round residents, it was felt that their recreational opportunities were too severely limited by work and other obligations to permit equitable comparison, and in addition no data on their motivations was collected. Finally, with respect to the exclusion of respondents who did not fish at least once in the past month, it was felt that it would not be reasonable to hypothesize a specific behavioral response such as fishing for the entire sample. Both dependent variables are measures of behavioral intensity, and they are logical only for those with the learned response propensity under study. Doubtless, some fishermen who had recently arrived and hadn't yet wet a line were improperly excluded from the analysis, but there was no other way of defining fishermen.

The dependent variables are described in Table 2. As we might expect, they are similar but hardly identical in their univariate form. The time diary, based as it is on a quite narrow slice of reality (24 hours), shows considerably more variance than the proportional measure. Furthermore, the proportional measure is far less skewed than the time budget measure. This is partially the result of the sub-sampling procedures followed, since by using the case selection criterion of at least one day's fishing, all zeros on percent fished were excluded. For the time budget, on the other hand, fully 58

[14] Virtually all of the missing data on the time budget were the result of our decision to exclude seasonal residents who had not been in residence for 48 hours or longer at the time of the interview. This decision was made in the hopes of allowing seasonals' living patterns to have settled into somewhat of a routine before recording the time budget. In only 2 percent of the cases did the respondent simply refuse to supply the information.

Table 2

Dependent Variables[1]: Percent Fished and Time Fished
(percentage distribution)

Percent Fished[2]	Percent of Respondents	Number of Respondents
1-20 percent	32	64
21-40 percent	25	48
41-60 percent	16	32
61-80 percent	7	14
81-100 percent	20	40
TOTAL	100	198

Mean = 44.6 S.D. = 32.3

Time Fished[3]		
0 minutes	58	114
1-60 minutes	6	12
61-120 minutes	9	18
121-180 minutes	10	19
181-240 minutes	5	10
241-300 minutes	3	6
301-360 minutes	4	8
over 360 minutes	5	11
TOTAL	100	198

Mean = 87.6 S.D. = 137.8

---

[1] Both dependent variables are continuous; they have been bracketed here for ease of presentation.

[2] Percent fished refers to the proportion of days in residence at the sampled dwelling unit during the previous four weeks in which the respondent engaged in fishing.

[3] Time fished refers to the total elapsed time, in minutes, that the respondent engaged in fishing on the day prior to the interview.

of the subsample showed zero minutes of participation.

One piece of appurtenant information gathered on the time budget is worth mentioning in passing at this point. Following the completion of the time budget, the respondent was asked whether he particularly enjoyed any of his day's activities, and then whether he particularly disliked any of them. The complete results for these variables are presented in Appendix D. In these questions, fishing appeared to have a salience unique among the recreation variables, since it was the major component of water recreation activities both enjoyed and disliked. Forty percent of all "enjoyed" mentions pertained to fishing, and it accounted for 89 percent of all "disliked" mentions. Information on the reasons activities were enjoyed or disliked was not gathered, so that, while there is an inclination to attribute the disliked mentions to a lack of fishing success, we have no data to support that assumption.

Univariate distributions for the socioeconomic and demographic variables are presented in Table 3. To summarize this table, it shows that the subsample is well-balanced between those with no more than a high school education and those with at least some college; income is relatively evenly distributed across categories; white collar occupations outnumber blue collar by a ratio of over 2 to 1; females and males are almost equally represented; age is well distributed; and second home owners are in a strong majority. Fifteen of the 198 cases recorded missing data on the income question.

Table 4 describes the privacy-related predictor variables. The two objective measures of neighborhood density, those carried out

Table 3

Characteristics of the Respondents[1]
(univariate distributions)

Education of Respondent[2]	Percent of Respondents	Number of Respondents
0-8 years	4	8
9-12 years	42	84
13-16 years	36	71
17 or more years	18	35
TOTAL	100	198

Mean = 13.6 S.D. = 2.6

Family Income[3]		
under $5,000	2	4
$5,000 - $9,999	13	24
$10,000 - $13,999	14	25
$14,000 - $19,999	23	43
$20,000 - $24,999	21	39
$25,000 - $34,999	13	23
$35,000 or more	14	25
Not ascertained		15
TOTAL	100	198

Mean = $15,499 S.D. = 3.4

[1] The respondents are seasonal residents who had fished at least once in the previous month, and who took the time budget. There were a total of 198 respondents with these characteristics.

[2] Originally coded from 0-17, this was bracketed for purposes of presentation here. For details on this and other variables, see Appendix A.

[3] Total family income, before taxes, was a pre-bracketed 18-category variable. For ease of presentation the original was collapsed here. The mean was calculated by taking the midpoint of the mean coding category (13). Interpretation of the S.D. should be based on coding categories of the original variable.

Table 3 (continued)

	Percent of Respondents	Number of Respondents
Occupation of Head[4]		
White collar	70	133
Blue collar	30	56
Not ascertained	--	9
TOTAL	100	198
Mean = 1.6	S.D. = 1.7	
Sex of Respondent		
Female	52	102
Male	48	96
TOTAL	100	198
Mean = 1.5	S.D. = 0.5	
Age of Respondent[5]		
18 - 24	3	5
25 - 34	15	30
35 - 44	24	48
45 - 54	21	42
55 - 64	19	38
65 - 74	14	27
75 and over	4	8
TOTAL	100	198
Mean = 48.8	S.D. = 14.4	
Resident Type[6]		
Second home owners	61	121
Vacationers	39	77
TOTAL	100	198
Mean = 0.4	S.D. = 0.5	

[4] Occupation was originally coded as a seven-category variable. For regression analysis it was dichotomized.

[5] Age of the respondent is an interval variable ranging from age 18 upward. For purposes of presentation it was collapsed here.

[6] Resident type is a three-category pattern variable developed from ownership and use information. Second home owners are those seasonal respondents who own their vacation property. Vacationers are seasonal respondents who are renting or borrowing their lakefront residence. The third category, excluded from this analysis, are the year-round residents; they have their permanent residence at the sampled dwelling unit, regardless of their ownership status.

Table 4

Privacy-Related Independent Variables
(percentage distributions)

Area Description[1]	Percent of Respondents	Number of Respondents
1. All open space	6	12
2. Sparsely built up	15	29
3. Mostly built up	53	106
4. Entirely built up	26	51
TOTAL	100	198
Mean = 3.0	S.D. = 0.8	
Distance to Nearest Dwelling Unit[2]		
1. 100 feet or more	14	29
2. 50 - 99 feet	16	31
3. 30 - 49 feet	26	51
4. 15 - 29 feet	25	49
5. Less than 15 feet	19	38
TOTAL	100	198
Mean = 3.2	S.D. = 1.3	
Avoid People[3]		
1. Not at all important	22	43
2. Not very important	25	49
3. Moderately important	23	45
4. Very important	17	33
5. Extremely important	13	27
Not ascertained	--	1
TOTAL	100	198
Mean = 2.8	S.D. = 1.3	

[1] This was an interviewer assessment guided by four verbal descriptions and schematic drawings. For further detail on this and other variables in this table see Appendix A.

[2] This was an interviewer assessment, in which the interviewer selected from pre-bracketed distances which parenthetically estimated the distance in car lengths.

[3] As asked, this read: "To get away from other people."

Table 4 (continued)

Avoid Crowds[4]	Percent of Respondents	Number of Respondents
1. Not at all important	7	14
2. Not very important	14	27
3. Moderately important	26	52
4. Very important	24	48
5. Extremely important	29	56
Not ascertained	--	1
TOTAL	100	198

Mean = 3.5 S.D. = 1.2

Fewer Distractions[5]		
1. Not at all important	8	15
2. Not very important	24	46
3. Moderately important	32	63
4. Very important	22	44
5. Extremely important	14	28
Not ascertained	--	2
TOTAL	100	198

Mean = 2.9 S.D. = 1.2

Index of Privacy Motivation[6]		
1 - 2.3 Not very important	29	57
2.6 - 3.3 Moderately important	36	70
3.6 - 5 Very important	35	69
Not ascertained	--	2
TOTAL	100	198

Mean = 3.1 S.D. = 1.0

[4] As asked, this read: "To get away from crowded situations."

[5] As asked, this read: "Because you thought there wouldn't be so many distractions here."

[6] The index of privacy motivation was formed by averaging responses to the three motivational statements. For purposes of analysis the five category response was collapsed as indicated, to three catagories. See Appendix C for details of index development.

Table 4 (continued)

Perceived Neighborhood Crowding	Percent of Respondents	Number of Respondents
1. Uncrowded	51	100
2.	17	34
3.	9	18
4.	16	32
5.	5	9
6.	--	--
7. Crowded	2	3
Not ascertained	--	2
TOTAL	100	198
Mean = 2.1	S.D. = 1.4	
Perceived Neighborhood Privacy		
1. A lot of privacy	53	104
2.	16	32
3.	14	28
4.	11	22
5.	5	9
6.	1	2
7. No privacy	--	--
Not ascertained	--	--
TOTAL	100	198
Mean = 2.0	S.D. = 1.3	
Index of Preceived Neighborhood Crowding[7]		
1 - 1.7 Uncrowded	52	102
1.8 - 3.7	36	70
3.8 - 7.0 Crowded	12	24
Not ascertained	--	2
TOTAL	100	198
Mean = 2.1	S.D. = 1.2	

[7] The index of perceived neighborhood crowding was created by averaging responses to the two perception questions. For purposes of analysis the seven category response was collapsed, as indicated, to three categories.

by trained interviewers, are clearly related, with the mean in each case being located at the dense end of the scale. The interviewer's estimate of the distance to the house nearest the respondent's is less skewed than his assessment of the open space.

The three motivational items are also similar. They were selected for inclusion in the questionnaire on the basis of previous results (c.f. Knopf, Driver and others), and cluster analysis on this data set confirmed their similarity. The average intercorrelation among them is a moderately high .49, however, and for this reason it was decided to consider the items separately, as well as in index form. The mean importance scores for "avoid people" and "fewer distractions" are quite similar, while "avoid crowds" is rated quite a bit more important. The distribution of the last -- "fewer distractions" -- is the least skewed of the three.

Perceived neighborhood crowding and perceived neighborhood privacy were also considered separately as well as in index form. On the basis of their univariate distributions there is little justification in choosing either one or the index over the others.

That there are distinct differences between our measures of actual density and perceived density is evident from the correlation matrix presented in Table 5. The strongest relationship between an objective and a subjective measure is .23.

Bivariate Results

The results of separate one-way analyses of variance for each possible predictor on each dependent variable are displayed in Tables 6 and 7. The bivariate relationships between the characteristics of

Table 5

Correlation Matrix of Objective and Subjective Density Measures

	1	2	3	4	5
1. Area description	1.00				
2. Distance to nearest dwelling unit	.49	1.00			
3. Perceived neighborhood crowding	.21	.21	1.00		
4. Perceived neighborhood privacy	.09	.19	.53	1.00	
5. Crowding index	.08	.23	.88	.87	1.00

Table 6

Bivariate Relationships Between Characteristics of the Respondent and Measures of Fishing Behavior

		Percent Fished[1]		Time Fished[2]	
Education	N	Mean	S.D.	Mean	S.D.
0-12	92	48.0	33.4	111.2	162.3
13-17	106	41.6	31.1	67.1	109.0
All	198	44.6	32.3	87.6	137.8
F-ratio (1,196)		1.93		5.17*	
Income					
$0 - $11,999	39	45.4	31.6	81.3	103.4
$12,000 - $16,999	37	48.4	36.6	110.5	178.1
$17,000 - $24,999	59	49.4	33.4	104.4	152.6
$25,000 and over	48	37.8	29.8	55.1	103.2
All	183	45.3	32.9	87.8	138.4
F-ratio (3,179)		1.25		1.55	
Occupation					
White collar	133	41.0	31.0	75.3	130.2
Blue collar	56	52.2	33.2	128.6	155.2
Other	9	49.9	39.7	13.3	40.0
All	198	44.6	32.3	87.6	137.8
F-ratio (2,195)		2.52		4.47*	
Sex					
Female	102	37.6	29.2	37.9	84.4
Male	96	52.0	33.8	140.4	162.2
All	198	44.6	32.3	87.6	137.8
F-ratio (1,196)		10.40**		31.68**	

[1] Percent fished refers to the proportion of days in residence during the last four weeks in which the respondent engaged in fishing.

[2] Time fished refers to the total elapsed time, in minutes, that the respondent fished on the day prior to the interview.

* significant at probability level of .05

** significant at probability level of .01

Table 6 (continued)

		Percent Fished		Time Fished	
Age	N	Mean	S.D.	Mean	S.D.
18 - 34	35	46.2	29.7	86.7	122.5
35 - 44	48	47.4	34.3	99.1	168.1
45 - 54	42	51.3	35.9	96.9	159.6
55 - 64	38	49.6	33.0	104.3	129.6
65 and older	35	25.4	17.6	43.4	65.5
All	198	44.6	32.3	87.6	137.8
F-ratio (4,193)		4.15**		1.18	
Resident Type					
Second home owner	121	33.7	26.7	51.4	103.2
Vacationer	77	61.6	33.1	144.4	164.3
All	198	44.6	32.3	87.6	137.8
F-ratio (1,196)		42.53**		23.95**	

Table 7

Bivariate Relationships Between Privacy-Related Predictors[1] and Measures of Fishing Behavior

		Percent Fished[2]		Time Fished[3]	
Area Description	N	Mean	S.D.	Mean	S.D.
Open space	12	50.4	39.6	50.0	105.0
Sparsely built up	29	40.2	28.6	74.4	120.1
Mostly built up	106	41.9	31.0	98.0	142.6
Entirely built up	51	51.3	34.6	82.2	144.4
All	198	44.6	32.3	87.6	137.8
F-ratio (3,194)		1.31		0.61	
Distance to Nearest Dwelling Unit					
100 feet or more	29	41.5	34.0	46.5	97.3
50 - 99 feet	31	40.3	30.5	93.6	144.8
30 - 49 feet	51	41.3	30.7	81.6	150.1
15 - 29 feet	49	50.4	32.2	96.5	128.3
Less than 15 feet	38	47.2	34.8	110.7	151.8
All	198	44.6	32.3	87.6	137.8
F-ratio (4,193)		0.80		1.00	
Avoid People					
Not at all important	43	39.4	32.5	64.7	106.0
Not very important	49	50.9	32.0	83.9	132.9
Moderately important	45	36.0	28.9	105.4	153.8
Very important	33	49.1	30.9	77.8	116.3
Extremely important	27	51.3	36.7	116.2	183.6
All	197	44.7	32.3	88.0	138.0
F-ratio (4,192)		2.03		0.82	

[1] For information on the privacy-related predictors see Table 6.

[2] Percent fished refers to the proportion of days in residence during the last four weeks in which the respondent engaged in fishing.

[3] Time fished refers to the total elapsed time, in minutes, that the respondent fished on the day prior to the interview.

Table 7 (continued)

		Percent Fished		Time Fished	
Avoid Crowds	N	Mean	S.D.	Mean	S.D.
Not at all important	14	41.7	32.7	47.5	67.7
Not very important	27	44.0	32.4	47.2	104.5
Moderately important	52	44.8	32.7	97.9	137.1
Very important	48	44.7	30.5	90.4	143.7
Extremely important	56	45.9	34.2	106.7	157.5
All	197	44.7	32.3	88.0	138.0
F-ratio (4,192)		0.05		1.23	
Fewer Distractions					
Not at all important	28	33.7	27.6	23.5	57.3
Not very important	44	51.6	32.6	101.9	125.3
Moderately important	63	40.7	30.0	85.7	142.9
Very important	46	44.1	32.5	88.6	134.2
Extremely important	15	66.6	37.6	181.7	211.6
All	196	44.9	32.3	88.5	138.2
F-ratio (4,191)		3.47**		3.54**	
Index of Privacy Motivation					
Not very important	57	43.2	31.5	59.5	95.0
Moderately important	70	42.9	31.5	87.1	147.3
Very important	69	48.4	33.9	113.9	154.8
All	196	44.9	32.3	88.5	138.2
F-ratio (2,193)		0.61		2.46	
Perceived Neighborhood Crowding					
1. Uncrowded	100	40.3	32.7	70.9	132.2
2.	34	45.0	29.2	78.6	94.8
3.	18	57.8	30.4	159.2	176.8
4.	32	49.6	33.6	128.6	170.6
5.	9	53.7	37.0	53.3	85.6
6.	--	--	--	--	--
7. Crowded	3	34.7	26.6	40.0	69.3
All	196	44.7	32.3	88.5	138.2
F-ratio (5,190)		1.32		2.09	

** significant at probability level of .01.

Table 7 (continued)

		Percent Fished		Time Fished	
Perceived Neighborhood Privacy	N	Mean	S.D.	Mean	S.D.
1. A lot of privacy	104	41.0	32.6	72.4	126.4
2.	32	35.5	25.7	57.1	97.9
3.	28	57.4	32.3	103.9	148.8
4.	22	58.0	34.1	165.9	197.0
5.	9	41.1	28.2	126.1	140.7
6.	3	58.3	38.2	97.3	86.4
7. No privacy	--	--	--	--	--
All	198	44.6	32.3	87.6	137.8
F-ratio (5,192)		2.64*		2.28*	
Index of Perceived Neighborhood Crowding					
1. Uncrowded	102	40.6	32.1	73.4	130.4
2.	70	48.4	32.3	92.5	131.1
3. Crowded	24	51.7	32.2	141.1	178.1
All	196	44.7	32.3	88.5	138.2
F-ratio (2,193)		1.86		2.4	

* significant at probability level of .05.

the respondents and the two measures of fishing are shown in Table 6. Since they are included primarily for purposes of control, they will be discussed only very briefly. Suffice it to say that, on the basis of these bivariate results, we can expect that in multivariate analysis the major effects on fishing will come from the sex and resident type variables, and that for all background variables other than income, the effects on the two dependent variables will be somewhat different.

Table 7 presents the bivariate relationships between the privacy-related predictors and fishing behavior. As predicted by the conceptual model, neither of the two objective measures of neighborhood density has a significant direct effect on fishing behavior. On the basis of the bivariate results, there is little to choose between them; whereas there appears to be a discernible though non-significant relationship between the area description and percent fished, it is non-linear. Further, the area description bears no relation at all to time fished. The distance to the nearest dwelling unit variable, on the other hand, is at least somewhat linear in its (non-significant) relationship with time fished. More importantly, the distance measure has a better distribution. Finally, the reliability check on the distance measure, using the range-finder as opposed to an independent judgment, is considered better. For these reasons, distance to the nearest dwelling unit will be the objective measure of neighborhood density employed in the explanatory analysis that follows.

Of the three motivational variables, only "fewer distractions" showed a significant bivariate relationship with either dependent variable. On this basis, plus its lower skewness, it was selected

over either of the other single items or the index as the motivational item for further analysis.

Perceived neighborhood privacy showed more significant relationships to both dependent variables than either perceived neighborhood crowding or the index using their sum. In addition, since we found elsewhere in the northern Michigan study (Marans, et al., 1975) that perceived privacy was the most important determinant of overall satisfaction with the neighborhood, it seems reasonable that it be selected over perceived crowdedness as a predictor variable in this analysis. For these reasons it was chosen for use in the hypothesis testing which follows.

A further word about the variable selection process is in order at this point. It is clearly recognized that the selection of variables for inclusion in the planned regression analysis has a good deal to do with the level of explanation to be expected. Nevertheless, the limitations in subsample size prompted a "best variable" approach, rather than the somewhat more stable index attack customarily employed. Certainly, selecting variables on the basis of their bivariate effects renders the analysis somewhat more exploratory in its character; that is, there is increased likelihood that whatever might be found is unique to this particular subsample. Given this possible trade-off between somewhat more exploratory research that might prove more interesting on the one hand, and less exploratory but probably less interesting research on the other, the choice favoring the former was made.

Interactions

As reviewed in Chapter I, Stokols raises the possibility that the relationships between the characteristics of the person and the characteristics of his environment may be interactive rather than additive. To test this possibility, a series of regressions were carried out using the variables selected for analysis plus interaction terms composed of the products of certain of those variables. It was recognized that a multiplicative interaction is only one of a number of possible forms of interaction, yet it was the form implied by Stokol's article and most logical.

The impact of the interaction term was tested by including it and its component parts, together with the control variables, in a least squares regression. The regression program provides a test of significance for each term as part of its output. This statistic, plus a comparison of the coefficients of the interaction term and its components, provided the test for each hypothesized interaction.

Table 8 presents the results of the search for interactions among the predictor variables. Of particular interest theoretically were the possible interactions between the motivational variable "Because you thought there would be fewer distractions", the objectively measured density and the perceived privacy. In addition, interactions were checked between these variables and the two control variables revealed as having the strongest bivariate impacts on fishing behavior, resident type and sex.

In only one of the eight interaction tests was a significant effect (at .05 level) uncovered, the cross-product interaction of

Table 8

Results of Interaction Testing Using Least Squares Regression

Interaction Term	Significance[1]		R^2 Without[2]		R^2 With[3]	
	Percent Fished	Time Fished	Percent Fished	Time Fished	Percent Fished	Time Fished
Fewer distractions x distance to nearest D.U.	N.S.	N.S.	.27	.27	.27	.26
Fewer distractions x perceived privacy	N.S.	N.S.	.27	.27	.27	.27
Resident type x perceived privacy	.006	.040	.27	.27	.29	.30
Resident type x distance to nearest D.U.	N.S.	N.S.	.27	.27	.27	.27
Resident type x fewer distractions	N.S.	N.S.	.27	.27	.27	.27
Sex x perceived privacy	N.S.	N.S.	.27	.27	.27	.27
Sex x distance to nearest D.U.	N.S.	N.S.	.27	.27	.27	.27
Sex x fewer distractions	N.S.	N.S.[4]	.27	.27	.28	.29

[1] At .05 level.

[2] Multiple R^2 without cross-product interaction term.

[3] Multiple R^2 with interaction term in addition to separate components.

[4] Attained signifiance level was .06.

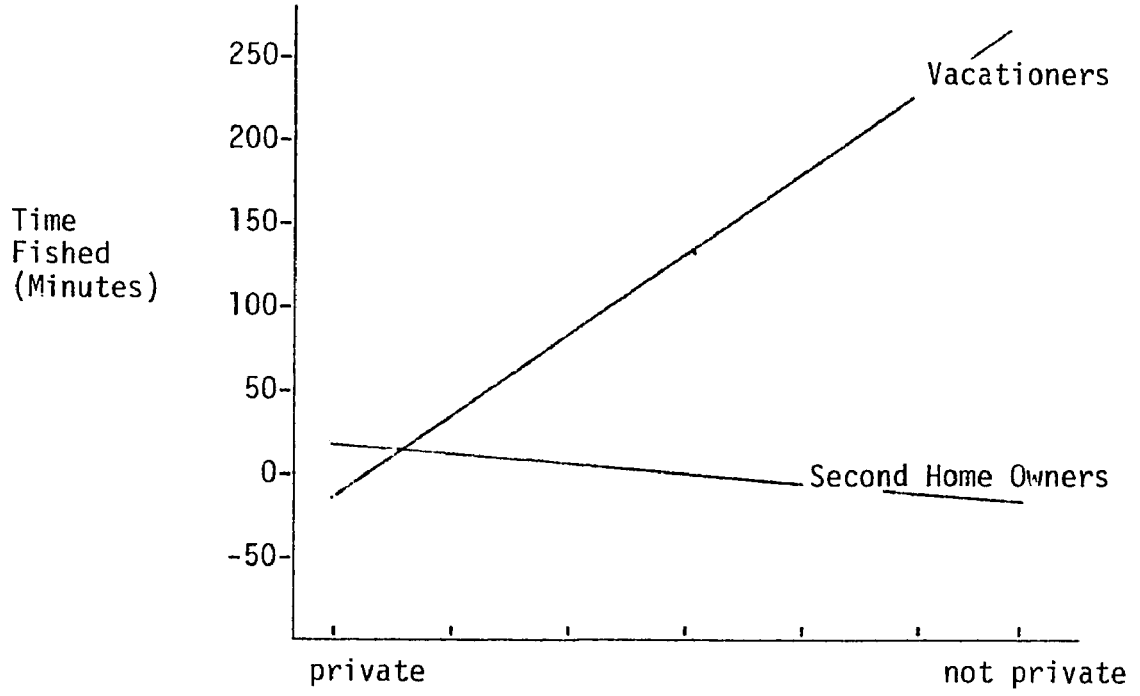
household characteristics and perceived privacy. What this means is that the effect of perceived neighborhood privacy on fishing behavior depends strongly on whether the person is a second home owner or a vacationer. Under average conditions of perceived neighborhood privacy, and with the effects of other variables accounted for, vacationers will spend 52.2 minutes more time fishing on any given day than will second home owners, and they will fish on 28.5 percent more of the days.[14] The interaction effect for each dependent variable is graphically portrayed in Figure 6.

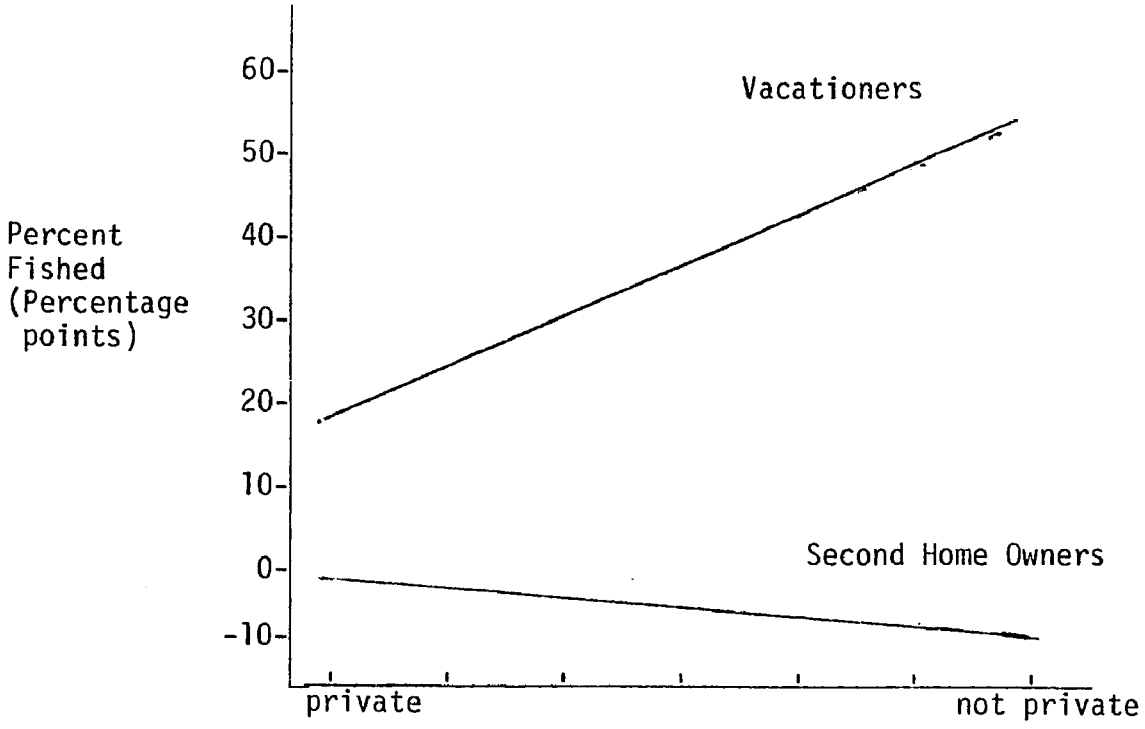
It is evident that only for vacationers does there appear to be a fishing response to the perceived lack of neighborhood privacy. One possible explanation for this finding might be that vacationers are less knowledgeable of the northern Michigan environment, and therefore, more likely to be surprised by the density and prompted to escape the situation through the socially acceptable behavior of going fishing. A second plausible explanation that could be advanced is that both vacationers and second home owners are stressed by their perception of a lack of privacy, but that the vacationer has fewer alternative courses of action open to him, as well as fewer obligations to tie him down, and so his fishing response is exaggerated. A third explanation could be couched in terms of the different communities in which second home owners and vacationers find themselves. Presumably, whereas the second home owner knows many of his neighbors, the vacationer is likely a stranger to them.

[14] These figures are achieved for each dependent measure by multiplying the regression coefficient for each independent variable by the mean score on that variable, solving the equation separately for second home owners and vacationers, and then taking the difference in scores between the two resident types.

Figure 6

Effects of Perceived Neighborhood Privacy on Time and Percent Fished by Resident Type





It may be considerably more stressful to have one's privacy invaded by strangers than by friends and acquaintances.

Ideally, the analytical response to the discovery of a significant interaction would be handled in linear regression and path analysis by conducting separate analyses -- in this case one analysis for second home owners and one for vacationers. However, in this analysis the number of cases was considered too small (for vacationers on the order of 70 cases) to make that course of action feasible. Therefore, the analysis will proceed as if no interaction were present, with the understanding that the fitting of the model is not quite accurate. With respect to the explanatory capacity of the model, it is evident that the exclusion of the interaction term produces conservatively lower results.

A Note On The Analysis

As mentioned above, path analysis was the technique chosen for this study's primary analytic technique. A brief description of this technique, following Land (1969), and a little on why how it was applied to the research problem is presented next.

Path analysis is one of the family of techniques, based on linear causal models, drawing increasing attention in social sciences. In essence, it estimates relationships among variables in a path diagram through least squares regression using standardized data. The estimates of effect or association in the fitted model are called path coefficients, and are, in fact, standardized partial regression coefficients (beta weights).

Land (1969) has succinctly described the use of causal modeling in social science theory building:

> ...the essential idea of the causal model involves the construction of an oversimplified model of reality in the sense that the model considers only a limited number of variables and relations out of the universe of social reality. Using the results of past research and current theory, the causal model is written as a set of structural equations that represent the causal processes assumed to operate among the variables under consideration. The structural equations, in turn, lead to parameter estimation procedures and evaluation of the model. The outcome of the evaluation process is either the corroboration or reformulation of the causal model. Finally, the inadequacies of the model should precipitate a reconstruction of the substantive theory that generated the causal model at the outset.

The general purpose of the present investigation was to see the extent to which the privacy-related variables influence the vigor of a certain form of recreation behavior. Thus, at the outset, some form of regression analysis was suggested. Due to the limitations in sample size, adaptations of the basic regression analysis designed to handle ordinal or nominal data and non-linear relationships (e.g. Multiple Classification Analysis -- see Morgan, et. al., 1973) could not be used. Having available intervally scaled dependent variables, the choice of regression was clear. The privacy-density model developed in Chapter I contained an intervening variable, suggesting a series of causal linkages, and there was at least a theoretically defined time sequence (i.e., some variables preceded others) in the model. Path analysis is essentially sequential regression analysis, and is best used for causal analysis of data at more than one point in time. For these reasons, it was the technique selected.

Variables in a path diagram are of two kinds -- endogenous or exogenous. Endogenous variables are those which are the dependent

variables in any given path analysis. The analysis proceeds under the assumption that these endogenous variables are completely determined by other variables in the path structure. Exogenous variables, on the other hand, are taken as given, and no attempt is made to explain them. Finally, in path analyses where the variation in any endogenous variable is not completely explained by other variables in the system (this is the case in the vast majority of cases, at least in social science applications) a residual variable is described. This residual variable is assumed to be uncorrelated with the system variables determining the endogenous variable under consideration.

The assumptions necessary in employing path analysis are, as with least squares regression, that the variables are linear, additive, causal and measurable on an interval scale. Previously, it has been shown that the bivariate relationships between the selected predictor variables and the two dependent variables are not in serious violation of the first assumption. The additivity assumption has been explored with the analysis of interactions. One instance of significant interaction was discovered, and reasons were presented for proceeding with the originally intended analysis. Essentially, it was considered that the sample was too small for separate path analyses for second home owners and vacationers, despite the fact that the overall level of explanation is reduced due to the interaction of household characteristics and perceived absence of neighborhood privacy. The third assumption is that of causality. On the basis of the literature review and the theorteical framework, it is assumed that background characteristics, objectively measured conditions and respondent

motivations cause, in part, neighborhood perceptions, and that these perceptions and the others cause, in part, fishing behavior. The final assumption is that the data are in interval form. Since dichotomous variables qualify as interval data, occupation was dichotomized. Several of the other predictors are not strictly interval, but rather quasi-interval, lying on the border between ordinal and interval. Included in this class are income (pre-bracketed), and distance to the nearest dwelling unit (pre-bracketed). The remaining variables are all interval in nature (although strictly speaking the equality of the intervals in the perception and motivation questions is open to question). With respect to the use of the quasi-interval predictor variables, Land has concluded that generally they will not introduce large errors into path analysis as long as their relationships with the dependent variable are linear.

For ease of reference, brief univariate descriptions of the variables used in the path analysis that follows are presented in Table 9. Customarily in path analysis, curved double-headed arrows indicate the correlations between exogenous variables. Since this course of action led to overly cluttered diagrams, these correlations and those with the endogenous variables are presented in Table 10.

Tests of Hypotheses

The first hypothesis presented in Chapter I suggested that, with the effects of certain other variables accounted for, objectively measured neighborhood density will influence the perception of

Table 9

Summary Descriptive Measures for Variables Used in Path Analyses

Variables	Mean	Standard Deviation	Range Min.	Range Max.
Percent Fished (percentage points)	44.6	32.3	3.0	100.0
Time Fished (minutes)	87.6	137.8	0.0	695.0
Education (years)	13.6	2.6	6.0	17.0
Income[1]	13.2	3.4	3.0	17.0
Occupation (White=0, Blue=1)	0.3	0.5	0.0	1.0
Sex (F=0, M=1)	0.5	0.5	0.0	1.0
Age (years)	48.8	14.4	18.0	80.0
Resident Type (Sec=0, Vac=1)	0.4	0.5	0.0	1.0
Distance to Nearest Dwelling Unit[2]	3.2	1.3	1.0	5.0
"Fewer Distractions"[3]	2.9	1.2	1.0	5.0
Perceived Privacy[4]	2.0	1.3	1.0	6.0

[1] Bracketed variable with 17 categories. Mean of 13.2 falls in category which brackets incomes from $14,000 to $16,999. Minimum -code 3- represents incomes from $3,000 to $3,999; maximum -code 17- represents incomes of $35,000 and more.

[2] Bracketed variable with 5 categories, reversed as follows for analysis:

1. 100 feet or more
2. 50 - 99 feet
3. 30 - 49 feet
4. 15 - 29 feet
5. less than 15 feet

[3] Rated importance of reason for vacationing in study area, using 5-point Likert-type scale, where 1 = not at all important and 5 = extremely important (as reversed for analysis).

[4] Neighborhood privacy as rated on a 7-point semantic differential scale, where 1 = a lot of privacy and 7 = no privacy (as reversed for analysis.

Table 10

Zero-Order Correlations Among Variables Included in Analysis

Variables	Percent Fished	Time Fished	Education	Income	Occup.	Sex	Age	Resident Type	Distance to D.U.	Fewer Distractions	Perceived Privacy
Percent Fished	--										
Time Fished	.61	--									
Education	-.09	-.18	--								
Income	.05	-.02	.29	--							
Occupation	.16	.17	-.49	-.30	--						
Sex	.22	.36	-.06	-.03	.11	--					
Age	-.15	-.07	-.04	-.21	.03	.25	--				
Resident Type	.45	.30	-.16	-.06	.02	.13	-.35	--			
Distance to Dwelling Unit	.08	.08	-.04	-.08	.01	.03	-.05	.27	--		
Fewer Distractions	.09	.20	-.00	.02	-.01	.02	-.06	.14	-.01	--	
Perceived Privacy	.14	.21	.07	.08	-.03	.23	-.09	.08	.19	-.06	--

neighborhood privacy, and that perception, in turn will influence recreation activity. More precisely, the intensity of fishing behavior will rise as the perception of the absence of privacy in the neighborhood rises, and the perceived lack of privacy will rise as the distance between the respondent's house and that of his nearest neighbor diminishes. The second hypothesis was advanced that respondents for whom a desire to escape distractions was an important reason in vacationing in northern Michigan would engage more actively in fishing, with the effect being traced both directly and by way of neighborhood perceptions.

Separate path analyses were carried out on each of the dependent variables -- percent fished (the proportion of the days on site in the previous four weeks when the respondent fished) and time fished (the total minutes the respondent spent fishing the previous day). In path analytic terms, there are two endogenous variables in each analysis; in the first they are perceived privacy and percent fished, and in the second perceived privacy and time fished.

The results of the two path analyses are shown in Figures 7 and 8. To reiterate, the path coefficients shown are standardized partial regression coefficients. The square of each path coefficient indicates the proportion of endogenous variable variation that is explained by the variable from which the path is drawn, holding constant the effects of other variables. The coefficients for the exogenous sources of variation, shown by the arrows which do not come from other variables in the system, are calculated by taking the square root of the proportion of variance in the dependent

Figure 7

Fitted Path Diagrams
On Time Fished

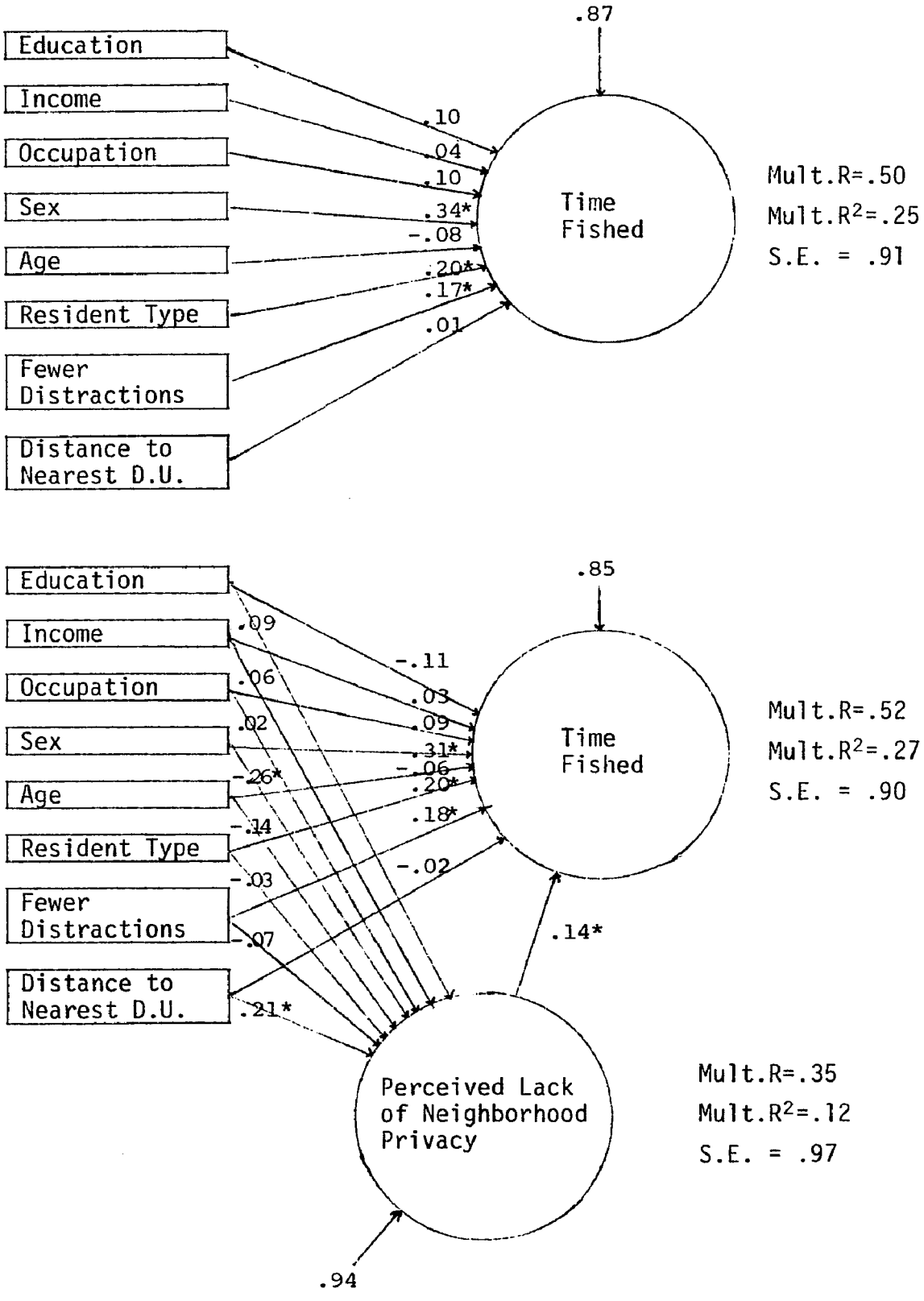
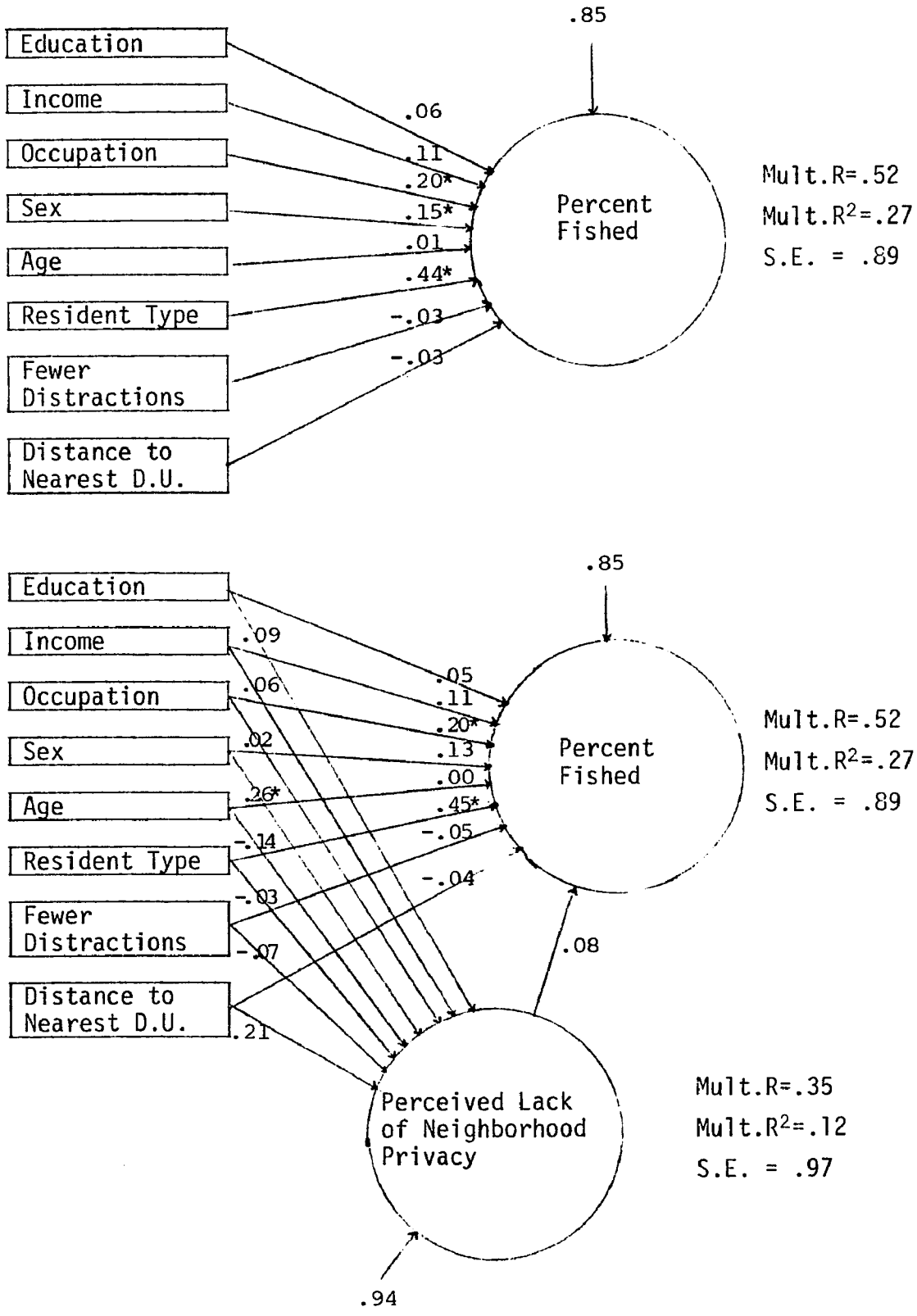


Figure 8

Fitted Path Diagrams
on Percent Fished



variable not accounted for by the antecedent variables in the system ($\sqrt{1 - R^2}$). Path coefficients that are statistically significant at the .05 level are followed by an asterisk.[15]

The primary hypothesis -- that respondents living in densely developed neighborhoods would tend to perceive the neighborhood as less private, and that this stress-indicating perception would prompt more intensive fishing behavior -- received support only in the analysis of time fished, and even that support was not strong. In that case, objectively measured density (distance to nearest dwelling unit) was the second most significant determinant to perceived neighborhood privacy, accounting for roughly 4 percent of that endogenous variable's variance. Perceived neighborhood privacy, in turn, accounted for roughly 2 percent of the variance in time fished. The indirect effect of objectively measured neighborhood density on time fished, calculated by the product of the two path coefficients, was roughly .03. As expected, there is virtually no direct effect of neighborhood density on time fished.[16] In the case of percent fished, even this modest indirect effect is missing, since the path coefficient linking perceived privacy and percent fished is at .08, not statistically significant.

Thus, there is some tentative support for the notion that certain seasonal residents in vacation areas may experience stress as a result of

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[15] When all missing data cases had been eliminated, there remained 172 cases on which to conduct the analysis. The major source of missing data (26 cases) was the often-touchy family income question. Since income's explanatory power in the multivariate analyses was slight, test runs were made without it. The added cases brought no change in the level of explanation; the multiple R^2 remained the same.

[16] This confirms similar findings reported in Marans and Mandell (1972).

dense housing conditions, and may seek to deal with this stress by the socially acceptable behavioral response of fishing.[17] This support at present is quite slender for several reasons. First, the variables used in the analysis were screened for bivariate explanatory relevance. Second, even with selected variables, the hypothesized link was found for only one dependent variable. Third, there remains at least one competitive hypothesis, which could not be analyzed with the present data -- namely, that avid fishermen purposefully sub-optimize in their housing selection since they expect to be spending little time at home. Hopefully, future research efforts will be able to take account of this last possibility.

The fitted model supports previous findings about the determinants of perceived neighborhood privacy. Stokols found, in confirmation of Freedman (1970)and Ross (1972), important sex differences in the perception of crowding; males appear more sensitive to conditions of limited space. The present research has supported these findings. As the fitted path diagrams show, sex is the most important predictor of the perceived absence of neighborhood privacy, and the relationship is in the expected direction.

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[17] To explore the possibility that other recreation activities might equally well be behavioral responses to privacy, a regression analysis of time and percent boating was conducted for those seasonal residents who took the time diary and who had either motorboated or sailed during the previous four weeks. Using the same set of predictor variables as employed in the path analyses on fishing, we were able to explain 7 percent of the variance in time spent boating, and 8 percent of the variance in percent boating. In the case of time fished, the sum of the marginal variance accounted for by the three privacy-related predictors was 1.2 percent, while for percent fished the sum was 0.3 percent. An earlier Multiple Classification Analysis run using the only other recreation activity for which we had enough observations -- swimming -- as the dependent variable also achieved a very low multiple R^2. Thus, the choice of fishing as a logical recreation activity in response to privacy-related stress appears justified.

The second most important and the only other significant determinant of the perceived lack of neighborhood privacy is objectively measured neighborhood density. This finding supports that of Marans and Rodgers (1974). It is interesting not only because it demonstrates that people's perceptions are reasonbaly well attuned to actual conditions (this is usually the case outside of the extreme distortions found in clinical psychology, psychiatry, and perceptual-defense experiments), but also because of the measure of objective density employed. An interviewer's estimate of the distance to the nearest dwelling unit is at best a very rough approximation for actual neighborhood density (see Marans and Mandell, 1972), and yet as an inexpensive index it appears to work moderately well.

It is noteworthy that objectively measured neighborhood density emerged as an important determinant of perceived privacy, given the strong main effects of resident type and the differences between second home owners and vacationers in the mean distance to the nearest house. The mean distance for second home owners was 62 feet, while for vacationers it was 37 feet.

As Marans and Rodgers (1972) suggest, sociological variables relevant to the neighborhood may have an important bearing on perceived neighborhood privacy, in addition to objective density. Although the focus of this research was on the effects of objectively measured neighborhood density, since that is a variable under the purview of planners, the effects of sociological variables were examined cursorily. A series of runs were made using Multiple Classification

Analysis (MCA)[18] to explain perceived neighborhood privacy by all seasonal residents (N=572). By adding three variables concerning the respondent's knowledge of and attitudes towards his neighbors[19] to our set of predictors,[20] we were able to raise the explained proportion of variance of perceived neighborhood privacy from .10 to .23. Perceived similarity of the neighbors by itself added .12, whereas perceived friendliness of the neighbors contributed only .03, and the number of neighbors known added nothing. The objective measure had more explanatory power than the perceived friendliness of the neighbors or the number known, and when all variables were considered at the same time it ranked second behind perceived similarity of the neighbors.

The second hypothesis was that respondents who rated "fewer distractions" as a relatively more important reason for vacationing in northern Michigan would fish more intensively. It further specified that the behavioral effect of the recreation motivation to avoid distractions would be felt both directly and through perceived neighborhood privacy. The fitted path diagrams show the expected

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[18] Multiple Classification Analysis is a multiple regression technique that works with predictors in as weak a form as nominal. For a complete discussion see Andrews et. al., (1973).

[19] The three items were as follows:
a. "Now I'd like to ask you about your close neighbors here -- I mean the half-dozen people who live nearest to you. How many of the adults in these families would you know by name if you met them on the lake or on the road -- all of the, nearly all, half of them, just a few of them, or none of them?"
b. "Friendly neighbors ☐ ☐ ☐ ☐ ☐ ☐ ☐ Unfriendly neighbors."
c. "People similar to me ☐ ☐ ☐ ☐ ☐ ☐ ☐ people dissimilar to me."

[20] Our set of predictors includes distance to the nearest dwelling unit, privacy motivation (fewer distractions), resident type, education, income, occupation, sex and age.

effect only on time fishing, and even there only the direct effect is found. Those seasonal fishermen who tended to rate escaping distractions as an important recreation motivation also tended to spend more time fishing. The effect is significant but not especially important, as the motivational variable accounts for only 3 percent of the variation in time fishing.

Interestingly, the background characteristics traditionally used in recreation analysis -- education, occupation, age and income -- in general had little influence on the measures of fishing used in this analysis. This discrepancy very likely stems in part from the fact that the dependent variables used are measures of intensity of recreation behavior among participants in a given activity, rather than the more usual participant/non-participant or frequency measures for less specific populations. It may also mean that certain other characteristics of recreationists, not previously well accounted for, ought to be more carefully considered. For example, variables like resident type, which may be interpreted as an index of a wide range of opportunity variables or as a life-style indicator, should be considered more closely in recreation behavior studies. Resident type emerged in this study as a powerful predictor, primarily in the case of percent fished. Taxonomies of recreationists' such as that which Burch and Wenger (1967) used for campers, can provide useful analytical frameworks. As a second example, consider the usefulness of verbal expressions of recreationists' motivations. The motivational variable used in this analysis -- "fewer distractions" -- was the third most important predictor of time spent fishing, with more explanatory

power than education, income, age or occupation. Finally, perceived conditions of the recreation environment deserve more attention than they have heretofore received. Although the effects shown in this analysis were only marginal, still, at least for time fished, they were more important than the effects of age, income, education and occupation.

The results for the two dependent variables supply evidence that there are meaningful differences between these two measures of recreation behavior. Whereas for percent fished the most important determinants were resident type and occupation, the sex variable was the prime determinant for the time fished variable, and although the privacy-related predictors worked as hypothesized for time fished, they did not for percent fished. What these two path analyses may indicate is an essential difference in the time frames of the dependent measures, with a correspondingly different set of predictors operating for each. Perceptions of privacy probably fluctuate over the course of one's vacation. Doubtless, numerous variables influence one's sense of privacy, including the social setting, the physical environment, and temporary dispositional states. Since the time budget represents a thin slice of behavior located close in time to the recording of the privacy perception, it would be more likely to reflect temporary states of crowding stress then would be broader-based proportional measure. In other words, if our essential hypothesis is correct, and fishing really is a behavioral response to privacy stress, perceived neighborhood privacy should show a stronger effect on time fished than on percent fished. This, of course, is precisely what we found.

The overall levels of explanation for the two dependent variables were identical -- in each case the path model accounted for 27 percent of the variance. As the interaction analysis indicated, accounting for non-additive relationships could result in a better approximation of reality. Nevertheless, a simple model targeted on a single concept (privacy) which accounts for over one-fourth of the variance in measures of a behavior traditionally considered free, and strongly subject to influence by such factors as the weather and the vagaries of fish feeding behavior, is considered to be doing reasonably well.[21]

It is particularly interesting that the same model should do equally well estimating time budget data as it does estimating the proportional recreational variable. The odds of correctly identifying an avid fisherman from an activity log of one day in his vacation are presumably far lower than the odds of correct identification using the proportional measure which may cover up to a month of time.

These findings serve to temper somewhat Bishop's et. al., (1957) conclusion that the time budget and traditional recreation participation

[21] A note on the exclusion of year-round residents from the analysis is in order at this point. Year-round residents were not considered because it was felt that their recreational opportunities were too severely limited by non-leisure obligations, and because no data on their motivations was (quite logically) gathered. To check the reasonableness of the decision to exclude them, regression analyses on each dependent variable were run for year-round fishermen who had completed the time diary. Eighty-nine such respondents were found. The set of predictors used on the path analyses (minus the motivation item) explained 9 percent of the variance in percent fished, and 20 percent of the variance in time fished. In both regressions the socioeconomic and demographic variables--age, education and income--were the dominant predictors. In neither case did the privacy-related variables rank among the most important predictors, though for time fished the distance to the nearest dwelling unit ranked fourth, with a marginal R^2 of .03. Thus, these regression analyses lend support to our decision excluding year-round residents.

measures give essentially similar summary participation information. Obviously, Bishop's recreation measure -- the "Leisure Behavior Questionnaire", which asks the respondent to rate the frequency of his participation in any given activity on an ordinal 6 point scale ranging from not at all to almost every day -- is different from the percent of days on site participated measure we used. Further, Bishop's analysis focused on time budget occurrences or engagements, rather than on elapsed time. Whereas, for 30 students Bishop reports an unadjusted correlation between the time budget minutes and leisure behavior questionnaire rated frequency of .78, our sample of 182 respondents showed a correlation of .61 between time fished and percent fished. More interesting, perhaps, than the lower correlation coefficient is the difference in the ranking of the predictors for the regression analyses, summarized in Table 11.

Based on this analysis, therefore, it is evident that although some preliminary support for the validity of the privacy-density model has been demonstrated, the effects of these variables are overshadowed by the effects of sex and household characteristics. For both dependent measures a moderate level of explanation is achieved using all the predictors. The results for the time budget were clearly distinguishable from those for the proportional measure of fishing intensity. In the final chapter, conclusions will be drawn from these results, their implications for planning will be discussed, and some directions for future research will be presented.

Table 11

Rank-Order Comparison of Direct Effects of Predictors of Percent Fished and Time Fished (standardized regression coefficients)

Percent Fished		Time Fished	
Predictor	Path Coefficient	Predictor	Path Coefficient
Resident Type	.45	Sex	.31
Occupation	.20	Resident Type	.20
Sex	.13	Fewer Distractions	.18
Income	.11	Perceived Privacy	.14
Perceived Privacy	.08	Education	-.11
Education	.05	Occupation	.09
Distance to Nearest Dwelling Unit	-.05	Age	-.06
Fewer Distractions	-.04	Income	.03
Age	.00	Distance to Nearest Dwelling Unit	-.02

CHAPTER IV

SUMMARY, IMPLICATIONS FOR PLANNING AND RECOMMENDATIONS FOR FUTURE RESEARCH

Summary

This research effort has proceeded with several purposes. The primary purpose was to test the validity of a model predicting recreation behavior from privacy-related variables with other important sources of variation controlled. Secondary purposes were to further test the usefulness of verbal expressions of recreation motivation in explaining recreation behavior, and to compare two different measures of recreation activity:

1. Percent Fished - the proportion of days the respondent went fishing during the four weeks before he was interviewed.

2. Time Fished - the total time spent fishing on a time budget record of the previous day's activities.

In order to accomplish these purposes, data were selected from a survey of people living around the inland lakes and navigable rivers of Emmet and Cheboygan Counties in the northern lower peninsula of Michigan. The study was based on a sample survey of 826 respondents, including both seasonal and year-round residents. From this sample, 198 respondents were selected for this investigation, to include those who:

1. were seasonal residents, whether short-term renters, guests, or second home owners,

2. were fishermen -- i.e., had fished on at least one day during the four weeks before the interview, and

3. took the time diary -- thus excluding seasonal residents who had been on site less than 48 hours.

The analysis was confined to this limited group because the motivational questions were not asked of year-round residents, and it was felt that non-leisure obligations set them distinctly apart from second home owners and vacationers; because the dependent measures were both related to the intensity of a learned response -- fishing -- and thus only fishermen should logically be included; and because it was desired to compare analysis of the time budget with a more conventional measure of recreation participation.

For the 198 cases, univariate descriptions and one-way analysis of variance were used to select a parsimonious set of explanatory variables. This selection procedure was justified on the basis of the limited number of cases, as well as the conceptual redundancy of the alternatives available. Variables were selected which were most nearly interval and least skewed.

Using the selected predictors, a series of linear regression runs were made to explore the possibility of interactive relationships among certain predictors. One case of a significant cross-product interaction effect was discovered, and this was between the resident type variable (second home owner or vacationer) and perceived of neighborhood privacy. Vacationers who felt their neighborhood lacked privacy were more prone to fish actively than second home owners who felt this way. With the inclusion of the interaction term the proportion of variance explained in the two dependent variables for percent fished was .29 and .30 for time fished, while

without it the variance explained was .27 for both. The proper response to the discovery of this interaction, separate analyses for each resident type, was not considered feasible due to a limited number of cases.

A path analysis of the model developed for this research was carried out for each measure of fishing participation. The predictions of perceived neighborhood privacy, which formed the first part of both path analyses, was not accomplished well by the variables selected for this analysis. Further examination of perceived privacy revealed a strong influence from variables measuring perceptions of the neighbors. In the path models, the major effects on perceived privacy came from the sex and objective neighborhood density variables.

Percent fished was determined primarily by resident type, occupation and sex, in that order. Resident type accounted for 19 percent of the 27 percent of variance explained; vacationers tended to fish on a higher proportion of the days they were in residence than did second home owners. No significant effect was found from the privacy variables, either directly or as predicted by perceived neighborhood privacy.

Time fished was determined most strongly by the sex of the respondent, both directly (10 percent of the variance) and indirectly through perceived neighborhood privacy (4 percent). The second most important predictor of time fished was resident type (4 percent). The privacy-related variables showed effects on time fished. The privacy motivation -- avoiding distractions -- directly accounted for 3 percent of the variance in time fished. Perceived neighborhood

privacy, itself determined to some extent by the objective measure of neighborhood density, accounted for 2 percent of the variance in time fished.

The analysis of the time budget measure of fishing activity this indicated weak and therefore tentative support for the hypothesized relationship between conditions of the residential environment and recreation behavior. In addition, it showed some support for the explanatory value of the verbal expression of recreation motivation. In an attempt to explain why only the time budget measure showed this relationship, I suggested that both time fished and the respondent's perceptions of neighborhood privacy are likely to be more strongly influenced than percent fished by temporary perceptual or attitudinal states of the respondent.

In both path analyses sex and resident type surfaced as important determinants of fishing behavior. That sex of the respondent was an important predictor of recreational behavior and perceptions comes as no surprise; the recreation literature has established its importance firmly. The importance of the resident type variable was unexpected, based on the literature review; however, this variable may be restricted in its research usefulness to vacation housing settings, and research on this facet of the recreation spectrum is just beginning. In the explanation of the intensity of fishing behavior, the traditional socioeconomic status variables were disappointing. For time fished they accounted in sum for just over 2 percent of the variance, while for percent fished, they did slightly better with 6 percent of the variance explained. It appears that the

socioeconomic covariates may be relatively more important in determining who fishes, rather than how much fishermen fish.

Finally, the exploratory nature of this research must be re-emphasized. From an existing dataset, density-related independent variables were selected to examine their effects on fishing behavior. While some effects of those variables were identified, these results must be accepted with caution until they are verified on the basis of an independent set of observations.

Methodological Findings and Limitations

There are two major conclusions to be drawn from this comparison of measures of recreation behavior. First, the time budget is a viable instrument for use in vacation settings. There was no discernibly greater difficulty experienced by seasonals and year-round residents in completing the time budget. The recall approach works equally well for different groups, though its overall validity in a vacation setting has not been tested at this point. This success should encourage use of the time budget methodology in other recreation settings, such as camping. Few measures have the potential usefulness of the time budget for measuring the changes wrought by policy, planning and management decisions.

The second methodological conclusion is that the two measures of recreational behavior are similar, but sufficiently different that they should not be readily substituted. Considerations of interview time, coding and data preparation all favor the more conventional measure if the sole purpose is to classify respondent activity on one

form of recreational behavior.[22] There are, however, several reasons why the added time and expense of a time budget may be worthwhile. First, the possibilities of systematic response bias should be lower. A respondent asked how active a swimmer he is may wish to impress the interviewer, either consciously or unconsciously; a respondent asked to recount his previous day's activities, depending on the context of the time budget of course, receives fewer cues about what the interviewer would like to hear. Obviously, socially undesirable activities will be under-reported, just as they would if asked in more conventional questions, but the chances of interviewer-induced response bias should be reduced.

Secondly, and more importantly, the time budget can set the recreation activity of interest in its daily context (Burton, 1971). It is possible to see to what extent it absorbs discretionary time available, how it interrelates with other activities, and how it is scheduled in the day.

As an overall indicator of recreational or leisure behavior the time budget may be more flexible and meaningful (at least at the aggregate level) than the frequency measures. Any given activity may be considered primarily leisurely or not, depending on the spirit with which it is done. As discussed in the next section, it may be possible to so modify the time diary as to get an indication of

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[22] In fact, if the primary purpose is to classify respondents along an active-inactive continuum, it may be that an instrument such as Bishop et al. (1975) used--a self-rating of recreational frequency--may be sufficient. The major drawbacks of that approach lie in the fact that the measure is not as flexible analytically and the possibilities of response bias may be greater.

whether it was viewed as obligatory or discretionary activity. This possibility doesn't exist with the conventional measure to the extent that it does with the time budget since in the former case different occasions with differing meanings must somehow be averaged. In addition, the time budget measure can readily be converted into proportional form, such as the percent of a respondent's non-obligatory time spent in active recreation.

While both of the recreation measures employed in this research are capable of supplying useful and interesting data, neither is sufficient as a general measure of recreation behavior. At non-aggregative levels of analysis, such as used in this research, there are serious questions about the adequacy of either of the dependent measures used, in terms of the accuracy with which they may categorize any given respondent. Designating someone as an avid or occasional fisherman on the basis of one day of their lives has a limited probability of providing an accurate description of them. Many of our respondents noted that their time diary did not represent a typical day. At the aggregate level, on the other hand, a sampling of days from a population should provide an accurate and useful picture of daily life for the population as a whole and for meaningful sub-groups. On the other hand, as I noted in the discussion of the analytical results, the time budget may be a very useful measure at the individual level of analysis, in that it may be quite responsive to transitory attitudinal and perceptual states of the respondent.

Nor is the proportional measure necessarily a better representative of the real recreational behavior of any given respondent. One

of the weaknesses of the percent fished measure was that it gave equal weight to the fishing of someone who had been on site two days and fished one, and the respondent who had fished 14 of the 28 possible days. As another example, the respondent who waded once a day for five minutes would be considered a more avid swimmer than someone who worked out vigoroursly for an hour or two a day for 27 of the 28 days.

Implications for Planning

Several substantive findings would appear to be relevant to future resource planning in Emmet and Cheboygan Counties, and perhaps in other areas with high-quality recreational resources threatened by continued growth. It may be that the most significant finding concerns the importance of the resident type variable. In two different measures of the intensity of fishing behavior, with other probable sources of variation controlled, it was shown that vacationers (seasonal residents who do not own their vacation house) are more active fishermen than second home owners. It may be that they feel they have less time to get in the fishing they want, or that they are not as involved in various obligatory household and neighborhood activities, or that they perceive fewer attractive alternative recreational activities, or that they are simply more active people than second home owners -- whatever the reason, they are more avid fishermen.

This fact may have important implications for planning in the area. If the composition of the water-oriented population shifts

toward a greater proportion of vacationers, the already heavily used fishing resource may become overutilized. Several factors could lead to an increasing proportion of vacationers. On the one hand, continued economic stagnation may make second home ownership infeasible for many who potentially would be buyers. Secondly, high property taxes -- the major source of dissatisfaction among second home owners (Marans et al., 1975) -- could force changes in use from second home to rental properties, or lead to a breakup and development of large riparian parcels.

Just as changes in the composition of the riparian population could influence the degree of recreational use and thus the quality of the lakes and rivers, so could changes in the resource influence the population attracted to it. For example, shifts in the species composition of the fish or other reductions in fishery quality, whether due to increased water pollution or over-fishing, could reduce the attractiveness of the lakes and rivers for fishing, while not impairing their aesthetic value or their value for other water sports.[23] In this case, the composition of the water-oriented population might shift toward a higher proportion of second home owners, as the vacationers who are more avid fishermen and have little commitment to northern Michigan would move to what they considered to be better fishing waters. This possibility is quite speculative, and depends to a great extent on the substitutability among recreation activities

[23] There is some disagreement as to the relationship between the probability of success in catching fish and fishing activity. Stroud (1964) feels much sport fishing is done strictly for fun, while Reid, Barlowe et al., (1962) note that over 60 percent of angler's expressed dissatisfaction stems from lack of fishing success.

by the different types of residents. It also depends on the validity of my assumption that the second home owners are in a more stable housing situation, based on more diverse use of the lake environment as well as more varied household motivations. If this ecosystem analogy is correct, second home owners as a class should be more able to accpet the loss or reduction of any given environmental feature.

Another reason why declining fisheries may cause water-oriented population shifts is suggested in Brown's (1968) study of California trophy trout fishermen. Brown found that the anglers least receptive to a catch and release management program tended either to be novices or to fish less than an average amount of time. Brown's finding suggests that fishermen must cross some sort of a threshold -- perhaps because of needs for evidence of skill or a gestalt-like complete fishing experience -- before they can be satisfied by the catching alone. Once this threshold is crossed, the angler may be more ready to enjoy other aspects of fishing, such as the experiencing of nature. The second home owning fisherman, who presumably has better information about the fishery resource than the vacationer as well as far more time in which to achieve his goal-state (57 days, on the average, compared to 24 days for vacationers), stands a far better chance of satisfying his needs than the vacationing fisherman, and thus less of a motivation to seek elsewhere.

The findings concerning the impact of residential density on the intensity of fishing activity are far more equivocal. No significant effect was found for the more conventional measure (percent

fished), and the significant path found in the time budget analysis was at best marginally important. However, as the analysis of the interaction between resident type and perceived privacy showed, the inclusion of the second home owners muted the effects of perceived neighborhood privacy to a considerable extent. Clearly, it would be premature to initiate land use planning policies based on these results. Nevertheless, the suggestion has been made and partially substantiated that one socially acceptable behavioral response to the lack of residential privacy may be to spend more time fishing. As development proceeds, privacy in the residential setting will almost undoubtedly become a scarcer commodity, and this may prompt yet stronger fishing pressure. On the other side of the coin, increased recreational use of the water body as a result of more dwellings, more public access, or a higher proportion of vacationers, may mean that fishing will be a less attractive haven from intrusion and crowding stress. Thus, as recreation pressure increases, we may expect to find those less tolerant with respect to privacy to be succeeded by those whose privacy needs are less stringent. The implications of a shift of this nature away from fishermen are very speculative, but it is worth noting that fishermen might be expected to be more vitally concerned with such issues as water pollution, and more supportive of measures to control it, than any of the number of other types of recreationists.

Finally, the privacy motivation variable used in this analysis -- the importance of the reason "Because you thought there would be fewer distractions here" -- has been shown to have some impact on

the intensity of fishing activity as measured in the time budget. It is difficult to imagine that those Americans in jobs which provide the economic wherewithall to take a lakeside vacation will find their lives less distracting in the future. All indications are that the opposite will be true. Urban life is rapidly becoming more complex and, presumably, more full of distractions. Based on the data on hand, it can be tentatively advanced that fishermen in the future -- ceteris parebus, which it never is -- will spend more time on the water.

Future Research

There are a number of ways this research might be extended. The first that suggests itself is in validating the privacy-density model by using the same variables on a new sample of seasonal fishermen. Clearly, it would be prohibitively expensive to collect another 800 interviews and select from them. However, a limited sample of seasonal fishermen, with controls for important background variables such as resident type and sex, might accomplish the goal of testing the linkage between objectively measured neighborhood density and fishing behavior. As discussed in Chapter III, any future work with the privacy-density hypothesis will have to account for the possibility that avid fishermen deliberately select less expensive (and therefore probably more densely developed) housing, since they expect to use the dwelling unit merely as a base of operations for fishing excursions.

The temporary states hypothesis I have set forth to explain the differing path anlaysis results for the two dependent variables

needs research examination. One possible approach might be to gather a number of time budgets (or as a reasonable facimile for the purposes at hand, respondent estimates of time fished) and a number of measurements of perceived neighborhood privacy, to see to what extent they vary and how that variation is related. In addition, information could be gathered on mood states of the respondent, which More (1973) has shown to have relevance to outdoor recreation behavior. The major problem with a panel design lies in getting data from those most likely to show the crowding stress syndrome -- the short-term cabin renter or guest.

Another avenue of future research, one which could clearly be related to the first suggestion, would be the refinement of the motivational items dealing with the need for privacy. In the present research, the items relating to gross physical crowding of people had little explanatory capacity; rather, the dimension of privacy-crowding that seemed to make a difference had to do with the respondent's feeling harried, distracted, or hassled. The concept that matters may have more to do with the complexity of one's existence than with its crowdedness (Walker, 1972). Fishing has prima facie value as a complexity reducing activity. This dimension of the determinants of fishing and other functionally similar recreational activities -- e.g., backpacking, bicycling, canoeing -- should be explored at greater depth. It may be that to some extent we are missing the mark in our focus on the number of people encountered (i.e., crowding). One can be very undistracted and unconfused when surrounded by vast numbers of people on a city street or at a sports event or a concert, and under

given circumstances, probably exacerbated by work pressure, one can be very harried and distracted in the presence of a very small number of people. In this regard, the motivational scales Knopf, Driver et al., (see Knopf, 1972) are working on which relate to role overload, or competing and excessive demands on the person, may be more salient than the physical density and crowding variables.

In light of Mitchell's finding on the relationship between accessibility to the streets and crowding-related stress, one specific study of interest to northern Michigan and other vacation environments might relate the location of the respondent's housing unit in his neighborhood or housing cluster to his recreation behavior. For example, do these people on the edges of development fish less, because they are less subject to crowding stress, than people living toward the centers? If such a relationship exists, what are the implications for various clustered housing designs?

A specific area for future research which was previously discussed concerns the interaction of the resident type variable with perceived residential crowding. Inclusion of a cross-product interaction variable raised the overall variance explained by from two to three percentage points. This finding suggests that second home owners and vacationers may be really quite different people, and alerts us to be watchful for other cases where it interacts with other variables.

Considering the recreation behavior of interest, fishing, several questions arise. First, to what extent is fishing satisfaction contingent on catching fish? It may be that in other things such as escaping complexity, gaining privacy and experiencing nature enough

benefits are achieved to offset poor fishing success. In light of our earlier discussion about the implications of Brown's catch-and-return findings, a very interesting piece of research could be directed toward ascertaining the validity of the threshold hypothesis -- i.e. that it is not until fish are caught, displayed or photographed and (perhaps) consumed that real possibilities for enjoyment of the non-consumptive aspects of fishing become possible.

A second fishing question concerns the extent to which the resource is overutilized. In an over-exploited fishing resource, the rate of catch declines, on the average, with increasing effort. In the northern Michigan data set we have no information on the catch made by the fishermen. As another measure, we could use the satisfaction with the lake as a place to fish. What is the relationship between effort, whether measured by time budget or the proportional measure, and fishing satisfaction?

A third question related to fishing concerns the activities fishermen would substitute for that activity if it were less attractive either because of deteriorating conditions or restrictive regulations. What activities that could be carried on around the lakes are functionally equivalent for fishing? Many of the recreation activities commonly done by lakefront residents in general would not appear to be logical substitutes. Motorboating lacks the quietude, swimming is often sociable, and walks are not particularly private in many densely developed areas. If privacy really is an important motivation for fishermen, will they emigrate from the area if faced with increasing recreational conflict, annoying time/space regulations on their

activity, or unsatisfying catches?

As discussed previously, second home purchases and cabin rentals are most often family decisions, reflecting an attempt to optimize on a variety of needs and desires, some of which may be quite contrary. It may thus be the case that even with deteriorating fishing conditions the family may, as a whole, be relatively satisfied. A study of entire families, their recreation activities and related attitudes, would be useful to explore this idea further.

In considering both individuals and families, it would be good to have a measure of their standard of comparison in assessing the recreational opportunities avilable to them. The Marans-Rodgers community satisfaction model discussed in Chapter I takes explicit account of this potentially useful variable. In connection with the foregoing discussion of fishing conditions, for example, it would be good to know the yardstick against which the fisherman is assessing his lake or river. It may be the case that even a considerable reduction in the quality of the fishing experience would not result in a change of behavior, since the standard of comparison is far worse yet.

The possibilities inherent in the time budget have only been partially tapped in this research. To begin, one of the oft-mentioned uses of time budgets is as a measure of social change. Eastern European countries have included a time budget in their decennial censuses in order to detect changes brought about by their state planning efforts. It would be interesting to use the same respondents, sampling segments or lakes used in this study to carry out a longitudinal study of

behavioral responses to changing fishing conditions. The time budget information could be compared with the fisheries data available from biologists.

A second interesting opportunity for use of the time budget's unique social change measurement potential might be presented if, at some future time, controls on recreational use of certain study area lakes are instituted. What impact on the activity patterns of lake-oriented residents would such measures as engine size limitations, or time and space zoning have?

Chapin and his associates at the University of North Carolina view the development of simulation models to be one of the most beneficial uses of their time budget data. They want to be able to test out the effects of alternative plans and policies on human activity patterns in urban areas through simulation techniques. Chapin summarizes Brail's two proposals for the simulation of human activity, the first using Markov-like transitional matrices and the second employing a computer simulation. Chapin's summary of Brail's proposals is presented in Appendix E. At some point in the future, when repeated studies have established reasonably stable relationships among certain important predictor variables and fishing or other recreational activities, simulation may be of possible use in pre-testing policy, planning and management decisions. Such use of time diary data would exploit it's marginal utility relative to conventional participation questions.

Future time budget research in which recreation behavior is a major concern should devote more effort to sharpening the interviewers'

discrimination than we were able to. Faced with the task of learning how to conduct an interview, cope with a complex questionnaire, and manage an exacting and difficult sampling procedure, our neophyte[24] interviewers would probably have deserted us en masse had we started getting overly picky about the time budget recreational activities. Thus in many instances details about the recreational activty were slurred over; this was especially true in the case of boating, where the respondents often didn't distinguish between powerboating, rowing, sailing or other forms of boating.

Several other useful elaborations of the time budget which could be used for specialized studies include gathering data on the presence of other parties, the satisfaction with particular activities, the occurence of secondary activities, and perhaps the specific motivations involved. If we knew that fishing was done primarily in solitude or with a companion, this would have an important bearing on our understanding of its relationship to privacy. The overall satisfaction measures we obtained were interesting, but could be much richer if obtained for individual activities. Data on secondary activities accompanying recreation might help us understand more fully its meaning for the respondent. It might be possible to approach the motivation behind time budget activities rather directly, with the use of modified items of the sort Driver et. al. have used. Another sort of extension might be to ask the respondent to rate the degree to which the activity was obligatory. These extensions may be possible

[24] The interviewers were 26 study-area residents who were given one week's training before being sent into the field. Only one of the people we hired had had previous experience interviewing.

under certain conditions of respondent motivation to cooperate. Their inclusion would also depend on the number of other variables; respondents have very definite attention and interest limits. To the extent to which such supplemental information is asked, we may begin to respond to de Grazia's (1964) point that time doesn't measure importance:

> ...by using the strictly quantitative assembly-line conception of time -- time as a moving belt of equal units -- one ignores the significance of much activity. A moment of awe in religion, or ecstasy in love, or orgasm in intercourse, a decisive blow to an enemy, relief in a sneeze, or death in a fall is treated as equal to a moment of riding on the bus, shoveling coal, or eating beans.

Concluding Remarks

This research had its genesis in a study designed to be responsive to an emerging problem situation. The popularity and pending overdevelopment of the scenic and recreational resources of northern lower Michigan are representative of similar problems throughout the country and elsewhere. It is essential that our increasingly urban and industrial society maintain such areas of retreat while protecting, insofar as possible, the rights of the people who live and visit there. The interventions by which society protects such resources must be based on far more adequate data than we currently have about the physical and social conditions in these areas. As one small part in one modest effort toward this goal, it is hoped that this study will make a contribution.

APPENDIX A

QUESTIONNAIRE ITEMS

1. Sex and Age of the Respondent

These were recorded before the interview began on the coversheet for the sampled household. The "listing box" was in the form shown in the example below.

(a) All persons by relation to or connection with HEAD	(b) Sex	(d) Age	(d) Family Unit Number	(e) Normal Living Unit Letter	(f) Enter "R" To Identify Respondent
1. Head of household	M	38	1	A	R
2. Wife	F	36	1	A	
3. Son	M	14	1	A	
4. Daughter	F	12	1	A	
5. Daughter	F	10	1	A	

2. Total Family Income

(CARD 12-YELLOW) In this survey of families in northern Michigan, we are trying to get a clear picture of people's financial situations. Taking into consideration all sources of income, what was your total family income before taxes in 1973? Just give me the letter on the card.

A. NOTHING	(00.)	J. $9,000 - $9,999	(09.)
B. $1 - $1,999	(01.)	K. $10,000 - $10,999	(10.)
C. $2,000 - $2,999	(02.)	L. $11,000 - $11,999	(11.)
D. $3,000 - $3,999	(03.)	M. $12,000 - $13,999	(12.)
E. $4,000 - $4,999	(04.)	N. $14,000 - $16,999	(13.)
F. $5,000 - $5,999	(05.)	O. $17,000 - $19,999	(14.)
G. $6,000 - $6,999	(06.)	P. $20,000 - $24,999	(15.)
H. $7,000 - $7,999	(07.)	Q. $25,000 - $34,999	(16.)
I. $8,000 - $8,999	(08.)	R. $35,000 OR MORE	(17.)

3. Education of Respondent

H5. What is the highest grade of school or year of college you completed?

GRADES OF SCHOOL

00 01 02 03 04 05 06 07 08 09 10 11 12

COLLEGE

13 14 15 16 17+

H5a. Did you get a high school graduation diploma or pass a high school equivalency test?

1. YES 5. NO

H5b. Do you have a college degree?

1. YES 5. NO

4. Occupation of the Head of the Household

Information on the head's occupation was gathered in questions H4-H11, and coded as shown below.

H8. Next we would like to talk with you about your work. Are you presently employed, unemployed, retired, a student (a housewife) or what?

1. WORKING NOW; TEMPORARILY LAID OFF

2. UNEMPLOYED

3. RETIRED

4. PERMANENTLY DISABLED

5. HOUSEWIFE

6. STUDENT

TURN TO P. 46 CLOSING

H9. What (is/was) your main occupation?

_____

H9a. Can you tell me a little more about what you (do/did)?

_____

_____

H10. What kind of business (is/was) that in?

_____

H11. (Do/Did) (you/HEAD) work for someone else or (are/were) (you/HEAD) self-employed?

1. SOMEONE ELSE 2. SELF-EMPLOYED

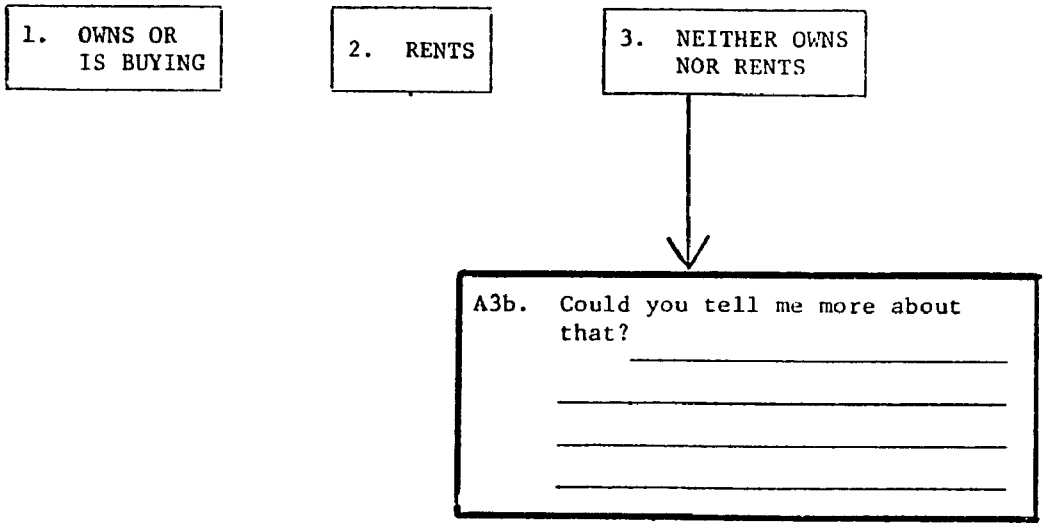
Occupation (continued)

Occupation Code

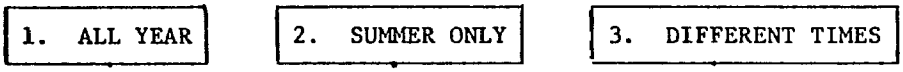
1. Professional, technical workers
2. Managers, officals (non-self-employed)
3. Self-employed businessmen and artisans
4. Clerical and sales workers
5. Craftsmen, foremen
6. Operatives
7. Laborers and service workers
8. Farmers and farm managers
9. Miscellaneous

5. Resident Type was a pattern variable developed from the following two items. The method in which the resident type variable was developed is fully described in Chapter II.

A3. Do you own this home, are you renting it, or what?



A13. Do you live here all year, only during the summer months or do you come here at different times throughout the year?



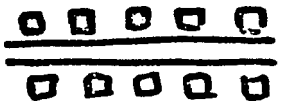
6. Distance to the Nearest Dwelling Unit

J10. How far is it from R's house to the nearest next house (on either side or across the road)?

1. LESS THAN 15 FEET (less than 1 car length)
2. 15 TO 29 FEET (1 to 2 car lengths)
3. 30 TO 49 FEET (2 to 3 car lengths)
4. 50 TO 99 FEET (3 to 6 car lengths)
5. 100 FEET OR MORE (more than 6 car lengths)

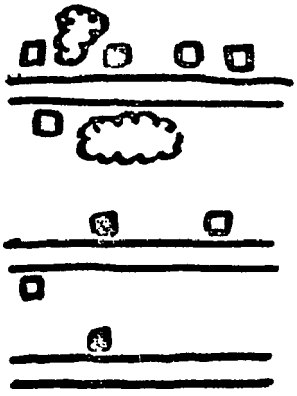
7. Area Description

J9. Is the area:



1. ENTIRELY BUILT UP WITH BUILDINGS; NO OPEN SPACE PRESENT EXCEPT THAT ASSOCIATED WITH PRIVATELY OWNED BUILDINGS

(TURN TO P. 49, Q. J10)



2. MOSTLY BUILT UP WITH BUILDINGS; SOME OPEN SPACE PRESENT SUCH AS VACANT LOTS, OPEN FIELDS AND UNDEVELOPED WOODS AND WETLANDS
3. SPARSELY BUILT UP WITH BUILDINGS; MOSTLY OPEN SPACE PRESENT SUCH AS VACANT LOTS, OPEN FIELDS AND UNDEVELOPED WOODS AND WETLANDS
4. ALL OPEN SPACE; RESPONDENTS'S DWELLING IS THE ONLY BUILDING WITHIN THE AREA

8. Neighborhood Evaluation

PART I

SELF-ADMINISTERED

This next section goes better if you fill it out yourself - (HAND R SELF-ADMINISTERED SHEET). Here are some words and phrases which we would like you to use to describe this particular neighborhood as it seems to you now during the summer. By neighborhood, we mean the three or four homes nearest to yours. For example, if you think the neighborhood is noisy, please put a mark in the box next to the word "noisy." If you think it is quiet, please put a mark in the box next to the word "quiet." If you think it is somewhere in between, please put a mark in the box where you think it belongs.

a.	Noisy	☐	☐	☐	☐	☐	☐	☐	Quiet
b.	Friendly neighbors	☐	☐	☐	☐	☐	☐	☐	Unfriendly neighbors
c.	Buildings are poorly kept up	☐	☐	☐	☐	☐	☐	☐	Buildings are well kept up
d.	Attractive	☐	☐	☐	☐	☐	☐	☐	Unattractive
e.	No trees	☐	☐	☐	☐	☐	☐	☐	Many trees
f.	A lot of road traffic	☐	☐	☐	☐	☐	☐	☐	No road traffic
g.	No children	☐	☐	☐	☐	☐	☐	☐	Many children
h.	Very good place to live	☐	☐	☐	☐	☐	☐	☐	Very poor place to live
i.	Crowded	☐	☐	☐	☐	☐	☐	☐	Uncrowded
j.	Outdoor areas are well kept up	☐	☐	☐	☐	☐	☐	☐	Outdoor areas are poorly kept up
k.	A lot of privacy	☐	☐	☐	☐	☐	☐	☐	No privacy
l.	People are like me	☐	☐	☐	☐	☐	☐	☐	People are not like me
m.	Pleasant	☐	☐	☐	☐	☐	☐	☐	Unpleasant
n.	Safe	☐	☐	☐	☐	☐	☐	☐	Unsafe
o.	Convenient	☐	☐	☐	☐	☐	☐	☐	Not convenient

9. Recreation Motivations

INTERVIEWER CHECKPOINT II

☐ 1. YEAR-ROUND RESIDENTS - Answered 1 in QA8 - GO TO SECTION B

☐ 2. SUMMER OR SEASONAL RESIDENTS - Answered 2 or 3 in QA8

A19. (CARD 1. YELLOW). There are many reasons why people say they enjoy coming to northern Michigan. I am going to read a list of reasons to you. Please indicate how important each of these reasons was at the time you decided to come up here.

	1 EXTREMELY IMPORTANT	2 VERY IMPORTANT	3 MODERATELY IMPORTANT	4 NOT VERY IMPORTANT	5 NOT AT ALL IMPORTANT
a. Because you thought the climate would be nicer here.					
b. To spend time with the family.					
c. To rest your nerves.					
d. Because the air is cleaner here.					
e. To do things with other people.					
f. To forget about pressures of daily work.					
g. To relax physically.					
h. To get away from other people.					
i. To work off tensions.					
j. To look at the natural scenery.					

A19. (CONTINUED)

	1 EXTREMELY IMPORTANT	2 VERY IMPORTANT	3 MODERATELY IMPORTANT	4 NOT VERY IMPORTANT	5 NOT AT ALL IMPORTANT
k. To get away from crowded situations.					
l. Because you thought there wouldn't be so many distractions here.					
m. To enjoy the sights and sounds of nature.					
n. It would be a chance to do something different.					
o. To be with other people.					
p. To get away from the ugly scenery.					
q. So the family could do something together.					
r. To get away from the responsibilities of everyday life.					
s. For a change from everyday life.					
t. To get away from the noise back home.					

10. Percent Fished was obtained by dividing the number of days the respondent fished by the number of days he had stayed in the sampled residence.

Now we're interested in the kinds of recreation activities that people participate in around here. First of all, please tell me how many days you personally have stayed here in this home during the past four weeks.

_____ NUMBER OF DAYS

H3. About how many days during this period did you fish?

_____ NUMBER OF DAYS

NONE → GO TO QH4

H3a. Did you most often fish in this lake/river or somewhere else?

1. HERE

2. ELSEWHERE

H3b. Where did you most often fish?

_____

GO TO QH4

H3c. Overall, how satisfied are you with this place to fish? Which number on the card comes closest to the way you feel?

1 2 3 4 5 6 7

11. Time Budget

FORMAT OF DIARY

G1 TIME BEGAN	G2 TIME ENDED	G3 WHAT DID YOU DO?	G4 WHERE DID YOU (specify activity)

Time Budget (continued)

G6. Did you particularly enjoy any of the activities you did yesterday?

[1. YES] [5. NO] ——— GO TO Q. G7

↓

G6a. Which ones did you enjoy doing most? _____

_____

G7. Did you particularly dislike any of the activities?

[1. YES] [5. NO] ——— GO TO P. 41, SECTION H

↓

G7a. Which ones did you dislike doing the most? _____

_____

APPENDIX B

SAMPLING PROCEDURES

Definition of the Population to be Studied

The universe sampled was limited to heads-of-household and their spouses occupying dwelling units located within one-quarter mile of the inland lakes and rivers of Emmet and Cheboygan Counties,[1] in the northern lower peninsula of Michigan. We designed our study to include residents who live near, although not directly adjacent to, the waters' edge as well as riparians (those residents whose property adjoins the waters' edge). Direct experience of the study staff as well as discussion with area officials, scientists and interested citizens led us to believe that backlotting was extensive, that it accounted for a significant portion of recent development around the waterways, and that such property would likely be the site of a large part of future development activity. River residents were included in our population since it was presumed that it is their accessibility to the lakes (as well as the whole inland waterway in 3 of 5 cases) that made their sites attractive to them, and because their activities -- e.g. dredging and filling, fishing, sewage treatment -- impact the lakes. Again, as with the decision to include backlotters, the decision to include river residents was arrived at based on staff experience and consultation with scientists, officials and interested citizens familiar with the region.

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[1] In several instances, lake perimeters fall into adjoining counties -- Charlevoix County in the case of Walloon Lake, and Presque Isle County in the case of Black Lake.

Estimating the Number of Houses

A careful search failed to turn up a pre-existing sampling frame of dwelling units for the lakes or rivers. We began by contacting area planning officials; this exercise revealed some 1972 sewer authority maps for two of the study lakes, with small boxes allegedly representing houses, and inventories of housing on selected Emmet County lakes which were of unknown realiability. We contacted regional electric companies for estimates of hookups on the lakes, but all we could get from this source was the field engineer's best guess. Census data did not distinguish lake from non-lake property, so was of little help, although a guess for Cheboygan County lakes based on census data by an area planner turned out to be remarkably close to our final estimate. Geological Survey topographical maps of the area indicated houses, but were made in 1957 and so were far out of date. We attempted in Cheboygan County to draw a count from the tax rolls, but the buildings were neither adequately mapped nor described. Many of the tax maps were in very rough shape, and the process of moving from the tax map to the legal description of the property, with a judgment to be made as to whether any given assessment indicated a building, was excessively cumbersome.

Finally, we struck on the notion of using aerial photographs of the lakes. Of the several possibilities, we found most current and usable the 24" x 24" blowups of the Agricultural Stabilization and Conservation Service's (ASCS) August, 1973 flyover of the region. The scale of these prints is 1":600'. As the pictures were taken with trees and other vegetation in full growth, counting housing structures was

often quite challenging. In many cases, all we could go by were the docks extending out into the lakes, or driveway traces. Due to time constraints it was necessary to press four different staff members into service in counting lake and river-oriented structures. Although some of us were more conservative or liberal in our estimates, the variation was not striking in the cases where we re-counted each others' work.

We counted structures along the lake and river shorelines, using the criteria to be mentioned in the next section, between readily identifiable geographical points such as a road intersection, the tip of a point, rivers, or extreme vegetational discontinuities, as when old field growth abruptly gave way to heavy woods, or an orchard adjoined cleared land.

Delineation of Study Area

Since we wanted to capture as much as possible of what we believed was significant backlot development, while avoiding asking water-related questions of people who couldn't be expected to answer them intelligently, we finally decided to include in our sampling frame all houses within one-quarter mile of the water's edge. With the quarter-mile distance as our basic criterion, we added the following refinements.

1. In the case of lakes, where a primary road (a road which generally carries more traffic than that generated by properties confronting it) ran within the quarter-mile zone roughly parallel to the lake (most of the lakes in the area

are rigned by such through-traffic roads), we included both the water-front homes and those backlot houses with driveway access to the primary road.

2. For lakes, if more than one primary road existed, we took only water-front houses and those backlot units with driveways onto the primary road nearest the water.
3. In the case where a village or town was located on the lake, we included only those houses directly adjacent to the waters' edge. Although none of the lake-fronting villages in our sample are legally incorporated, we followed this waterfront-only ruling in several cases where, based on experience and the advice of others familiar with the area, it would have been inappropriate to adhere to our other criteria. Specifically, we counted water-front properties only for Walloon Lake Village (Walloon Lake); Conway and Oden (Crooked Lake); Carp Lake Village (Paradise Lake); Indian River (Burt Lake); Topinabee (Mullett Lake); and Aloha (Mullett Lake).
4. For rivers we decided to include all houses within one-quarter mile of the waters' edge, provided there was some physical access to the river in evidence, such as a path or road, boat ramp or dock, or open land.
5. Where rivers flow through villages, towns, or other dense housing, we took only riparian properties.
6. We specifically excluded from our sample those dwellings on the Cheboygan River within the city limits of Cheboygan,

the only incorporated city in our study area that has inland waterway frontage.

Following these rules, we counted structures on the aerial photograph enlargements, and arrived at the estimates shown in Table 12B.

Sampling

We wanted to partition the data in numerous different ways -- small vs. big lakes; Emmet vs. Cheboygan Counties; relatively oligotrophic vs. eutrophic; lakes vs rivers -- and to examine numerous multivariate relationships. Thus, in order to minimize the impact of error variance on our analysis, we required a large number of interviews relative to the total estimated population. From these as well as budgetary considerations, it was determined that we would aim for a sample of 800 interviews. Past experience at the Institute for Social Research led to the expectation that in 20 percent of the cases where a bonafide dwelling unit was occupied we would fail, for one reason or another, to get an interview. This expected percentage of non-response meant we would have to attempt at least 1000 interviews. Furthermore, we assumed there would be a sizable number of vacant houses, structures that did not meet our definition of a housing unit, and other cases which would remove the structure from our sample.

The final sampling fraction for 800 interviews was based on the following estimates:

Housing units in population	5092
Coverage rate (proportion of housing units located by interviewers)	95%

Table 12B

Initial Estimates of Housing Units

Lake		DU's Best Estimate
1. Mullett		1043
2. Burt		715
3. Walloon		628
4. Black		609
5. Paradise		364
6. Crooked		317
7. Douglas		270
8. Pickerel		122
9. Long		91
10. Twin		68
11. Wildwood		54
12. Round		53
13. Munro		48
14. Larks		36
15. Silver		26
16. Lance		22
17. Devereaux		17
	Total	4483
River		
1. Black		172
2. Indian		162
3. Cheboygan		146
4. Crooked		78
5. Sturgeon		51
	Total	568
		Grand Totals 5092

Occupancy rate	90%
Response rate	80%
Desired number of interviews	800

The sampling fraction is then: $\frac{800}{5092\ (.95)(.90)(.80)} = \frac{1}{4.35}$.

For several reasons, we decided to divide our total population into clusters and sample on that basis rather than interviewing at everh n^{th} house. In the first place, we wanted to have the possibility of conducting out some micro-neighborhood analyses, and that required cluster sampling. Secondly, we wished to avoid having to list the entire population because of the time and money constraints. Finally, we felt that by clustering we could assure a coverage rate -- HU's located by interviewers -- of close to 100 percent. We recognized the potential distorting effect that pre-knowledge of the questionnaire by some of the respondents' neighbors might have, but it was our judgment that this consideration did not outweigh the ones favoring a clustering approach. As it turned out, an unexpected advantage of cluster sampling in this case was that during the course of the summer our interviewers soon became neighborhood fixtures, and satisfied respondents would voluntarily inform them as to the whereabouts of other householders -- something very useful in a setting where people come and go as irregularly and frequently as they do in the lake recreation community. Finally, in many cases an interviewer would approach a house, and be welcomed in immediately, often before he had even introduced himself, because the respondent had heard about the study from the neighbors. Needless to say, in a few cases the advance

warning may have scared off the respondent, but since the response rate in our study was close to the 80 percent we anticipated, it seems doubtful that this was an important effect.

We decided that for purposes of our planned micro-neighborhood analyses clusters of from 12 to 15 dwelling units would be best. In that case we would have something in the neighborhood of 100 clusters to distribute around the lakes and rivers we wanted to study. In order to get down to geographically identifiable groups of 12 - 15 structures, it was necessary in many cases to return to the aerial photos and search for cluster-defining geographical features; our first round counting had left us with numerous groups of one hundred or more cottages stretched along the shore. In quite a few cases it was impossible to break the segment down by this method, with the result that the entire group had to be listed.

The use of a clustered design had some effect on our ability to make comparisons between certain groups -- such as medium-sized lakes -- in which the respondents tended to be concentrated in a few clusters. In general, to the extent that a sample is based on a clustered design, the estimate of variability must be increased. This is the case in survey research because most natural human groups are patchy -- that is, people within the group (e.g. a neighborhood) are more like each other than they are like other households. This effect of clustering is referred to as a design effect. This design effect means that differences in scores between groups will have to be larger in order to be significant. Although the impact of the design effect on inter-lake comparisons was severe, this study was based on data from

the sample as a whole, so the design effect was minimal.[2]

Listing

In ten days at the end of May, two of the staff members listed and mapped every dwelling unit (except for motels and hotels, in which the average rental period was for less than a week; for these only the owner's unit was taken) in the selected segments. For each house, an identifying description was provided, and its approximate location was indicated on a segment map. The segments were numbered -- 100 series for Cheboygan County; 200 series for Emmet County lakes, 300 series for rivers -- and plotted on a large map of the region.

The listing process disclosed the impact on our estimates of the tree coverage at the time of the aerial photographs. Only the two lakes for which we had sewer authority maps (Crooked and Pickerel) were accurately estimated. The lakes for which structures were estimated from the aerial photographs showed field-listed structures to be more numerous than we estimated by an average ratio of 1.28 to 1, while the ratio of listed to estimated houses for the rivers was 1.31 to 1. In many instances we had fallen quite far short of the actual number of houses -- in a few cases, for example, we had estimated about 20 and actually found 60 houses. In the case of these large listings we took the first, second or third part. When this was completed, we still had a sample that, with expected response rates, would have exceeded our needs as well as our budget. We cut back by 10 percent by beginning at a randomly selected one digit number and

[2] For a discussion of clustering the reader is referred to Moser and Kalton (1972), pp. 100-106.

eliminating every tenth listing throughout the sample.

Table 13B presents the sample response data based on the revised population estimates. Summarizing it briefly, our final estimate of the total number of inland water-oriented housing units was 6359. We attempted interviews at 1220 of these, or every fifth house. Thirteen percent (157) of all our listed housing units were vacant throughout the study period. Of the 1963 occupied units, 3 were headed by persons under 18 years of age, and these were ineligible respondents. Seventy-eight percent of the interview attempts in the 1060 housing units with eligible respondents resulted in valid interviews. Twelve percent of all housholds approached refused to be interviewed, three percent could not be contacted within three calls, and the remaining six percent resulted in non-interviews for other reasons -- e.g., the respondent was ill, senile, unable to communicate well in English, or moved from the sampled residence after agreeing to an interview. Overall, we interviewed thirteen percent of the population, or one household in every 7.7.

Selecting the Respondent

We listed over 1330 structures prior to the 10 percent elimination. For every listing we made a coversheet with a pre-designated respondent, either the head of the household or the wife, alternatively throughout the sample. At the end of a week's training, the locally-hired interviewers were assigned segments, on the criterion of geographic proximity, and corresponding maps, listing sheets and coversheets.

Table 13B

Sample Response Data Based on Revised Population Estimate

Population Revision:

Lake HU's estimate (4044) x RATIO $\frac{\text{ACTUAL}}{\text{ESTIMATED}}$ HU's (1.28)=5176 (except Crooked & Pickeral)		
Plus Crooked and Pickeral Counts (439)=		5615
Plus River HU extimate x RATIO $\frac{\text{ACTUAL}}{\text{ESTIMATED}}$ HU's (1.31)=		744
Revised Estimate Total Water-Oriented Population		6359

Sampling Response Data:

Total Housing Units			1220
Vacant		157	
Occupied		1063	
No Eligible Respondent		3	
With Eligible Respondent		1060	
Non-interviews		234	
Refused	132		
Not at Home	36		
Non-interview for other reasons	66		
Interviews			826

Interview Sampling Rate:

6359 ÷ 826 = 1 interview/7.7 households

The interviewer's sampling task was as follows. He had to locate the sample segment and verify the accuracy of the listing. For each structure he had first to determine whether or not it contained one or more housing units. Basically, a housing unit is a room or group of rooms in which the occupants live and eat apart from any other groups, and which has a separate entrance and kitchen facilities. Short-term motels, hotels, camps, overflow cabins, tent quarters, recreational vehicles and institutional quarters were excluded, except for motel, hotel or institution owners', resident managers' or other employees' housing units. This task often required the interviewer to ask questions of people in the area, although in quite a few cases it was readily apparent that the strucutre was either not designed for or not fit for human habitation. The cluster approach we used was extremely useful during this phase, as it often occurred that a resident of the cluster would describe each structure and volunteer a history of its owners and the neighborhood.

Once he had determined which structures contained housing units, the interviewer was to attempt an interview with the designated respondent at all occupied housing units. To eliminate a housing unit because it was unoccupied, the interviewer was supposed to try on three separate occasions, well spaced by time of day, day of week, and month of the summer. In fact, as our interviewers were returning again and again to their segments, and occupation was usually discernible from the car, most of those housing units which we decided were unoccupied had been obsserved throughout the summer. Final calls in most cases were not made until the last week or two of

the summer, although there were a number that appeared occupied but were, in fact, not.

In occupied housing units the interviewer was to begin by completing a household listing and identifying the head in residence, or his wife, as pre-designated by the coversheet. We anticipated there would be numerous instances of multiple family residences and therefore provided the following rules for determining the "head in residence":

1. If the owner of the property is in residence, he/she is the head.

2. If there is one person in the primary family unit, he/she is the head.

3. If there is one married couple in the household, then the husband is the head.

4. In cases where there is more than one family unit, ask:

   "Which man (or woman) knows the most about this place, that is, who can best answer some questions about this place?"

   If your informant can single out one person in response to this question then that person is the head. If the informant cannot single out one person, to to rule number 5.

5. Ask, "Which one of you is older?" Person who is the oldest is the head.

We also assumed that in a recreation-resort context during the summer months there might be difficulties in finding the designated respondent at home. Insofar as possible our goal was to interview an equal number of husbands and wives, but as budgetary considerations would not permit infinite call backs, we settled on the following rules:

1. If the designated respondent was temporarily away -- e.g. fishing, shoping, visiting neighbors -- we

attempted to make an appointment for an interview.

2. If on the third attempt the interviewer still had not contacted the designated respondent, it was permissible to interview the spouse.

3. If the designated respondent was to be absent for an extended period -- e.g. husband remaining in Detroit to work while wife and kids vacationed -- an interview with the spouse was preferable to a non-response.

While we were unable to provide an exhaustive set of contingencies for interviewing alternate respondents, we supplied the interviewers with the following list of examples and instructed them to contact the field supervisor if they encountered other situations.

(a) if "Wife" is indicated and the head is unmarried you are to interview the head;

(b) if "Wife" is indicated and the head of the household is a female, you are to interview her;

(c) if the "Head" is indicated but he is unavailable after 3 calls, an interview with the wife is preferable to a non-response;

(d) if the "Wife" is indicated, but she is unavailable after 3 calls an interview with the head is preferable to a non-response;

(e) if the "Head" is indicated but is unavailable after 3 calls and has no wife (listed) and if there is a married couple living in the HU (listed on the listing box) an interview with the husband is preferable to a non-response;

(f) if the "Wife" is indicated but is unavailable after 3 calls and has no husband (listed) and there is a married couple living in the HU (listed on the listing box) an interview with the wife is preferable to a non-response.

Due to our rules on interviewing alternate responses, the final distribution of men and women was not the targeted 50/50, but rather closer to 60 percent female/40 percent male.

APPENDIX C

PROCEDURES FOLLOWED IN DEVELOPING MOTIVATIONAL SCALES

Seasonal residents were presented a list of 20 reasons for coming to northern Michigan, and asked to indicate on a five-point scale how important each reason was for them personally. The 20 reasons were selected from a much longer list empirically developed at the University of Michigan (e.g. Knopf and Driver, 1973).

The 20 reasons were chosen to measure certain motivations for recreational engagements, as indicated below.

INTENDED SCALE	REASON
Physical Stressors	Because you thought the climate would be nicer here
	Because the air is cleaner here
	To get away from crowded situations
	Because you thought there wouldn't be so many distractions here
	To get away from the ugly scenery
	To get away from the noise back home
Family Togetherness	To spend time with the family
	So the family could do something together
Tension Release	To rest your nerves
	To work off tensions
Affiliation	To do things with other people
	To be with other people

Lack of Social Regulation	To forget about pressures of daily work
	To get away from the responsibilities of everyday work
Physical Rest	To relax physically
Privacy	To get away from other people
Experience Nature	To look at the natural scenery
	To enjoy the sights and sounds of nature
Change/Variety	For a change from everyday life
	It would be a chance to do something different

For each reason, respondents were asked to choose one of the following categories of relative importance.

1	2	3	4	5
Extremely Important	Very Important	Moderately Important	Not Very Important	Not at All Important

We administered the battery of motivational questions to all seasonal residents, with the following introduction:

> "There are many reasons why people say they enjoy coming to northern Michigan. I am going to read a list of reasons to you. Please indicate how important each of these reasons was at the time you decided to come up here.[1] Respondents were presented with a card listing response categories to facilitate the questioning.

A cluster analysis (HICLUSTER) was run on the data to empirically define scales for this study. This program is derived from an algorithm

[1] There was some ambiguity in the wording of this question which was not, unfortunately, realized until field work began. A number of second home owners questioned whether we wanted importance at the time they bought the home, or for the 1974 season.

proposed by Stephen C. Johnson of the Bell Telephone Laboratories. (Johnson, 1967). HICLUSTER is a hierarchical clustering program which produces successive partitions of a set of variables by combining clusters at one level to a smaller number of clusters at the next level. The algorithm works on the rank order of correlation coefficients. The technique is well established and tested, and easy to analyze.

Based on the output from the cluster analysis, we derived seven motivational scales for use in our analysis. These are defined below:

EMPIRICALLY DERIVED SCALE	REASONS
Experience Nature	To look at the natural scenery
	To enjoy the sights and sounds of nature
Family Togetherness	To spend time with the family
	So the family could do something together
Release Tensions	To rest your nerves
	To forget about pressures of daily work
	To relax physically
	To work off tensions
Change From Everyday	To get away from the responsibilities of everyday life
	For a change from everyday life
Privacy	To get away from crowded situations
	To get away from other people
	Because you thought there wouldn't be so many distractions here

Avoid Environmental Stress	To get away from the ugly scenery
	To get away from the noise back home
Affiliation	To do things with other people
	To be with other people

There were two items that did not cluster satisfactorily -- "Because you thought the climate would be nicer here", and "It would be a chance to do something different" -- and these were dropped from our analysis.

APPENDIX D

SELECTED TIME BUDGET RESULTS

Table 14D

ORIGINAL U.S. NATIONAL CODES INCLUDED IN REDUCED CATEGORIZATION FOR COMPARISON BETWEEN SAMPLES

Northern Michigan Reduced Categorization	Original U.S. Sample Code	Average Minutes for Entire Sample
work outside home	regular work	213.4
	overtime	1.1
	waiting, delays	1.8
	second job	4.9
	at work, other	4.1
	work breaks	7.4
	travel for job	3.1
other employment	work at home	5.6
travel for work	travel to job	24.9
TOTAL WORK	266.3	
food preparation & clean-up	prepare food	43.8
	meal clean-up	21.1
home chores	clean house	33.9
	laundry, ironing	23.8
	clothes upkeep	1.7
gardening & animal care	garden, animal care	3.3
house maintenance & repair	other upkeep	5.7
	heat, water	0.4
lot maintenance & repair	outdoor chores	3.4
other housework	other duties	11.5
TOTAL HOUSEWORK	148.6	
total childcare	baby care	13.2
	child care	8.8
	help on housework	1.9
	talk to children	1.8
	indoor playing	3.4
	outdoor playing	0.7
	child health	0.5
	other, babysit	2.3
	travel with child	4.2
TOTAL CHILDCARE	36.8	

Table 14D (continued)

Northern Michigan Reduced Categorization	Original U.S. Sample Code	Average Minutes for Entire Sample
shopping	marketing	14.0
	shopping	1.1
services and other	personal care	1.6
	medical care	1.2
	administrative service	0.7
	repair service	2.4
	waiting in line	1.4
	other service	12.3
travel for shopping & services	travel, service	18.6
TOTAL SHOPPING & SERVICES 53.3		
personal hygiene	personal hygiene	51.5
	personal medical	0.4
home meals	meals, snacks	59.9
meals out	meals at work	10.2
	restaurant meals	11.2
night sleep	night sleep	459.2
other private needs	private, other	13.8
	care to adults	6.1
travel for personal needs	travel, personal	8.0
TOTAL PERSONAL NEEDS 620.2		
total education and civic/organizational participation	attend school	2.8
	other classes	2.1
	special lecture	0.2
	political courses	-
	homework	3.9
	read to learn	0.2
	other study	1.1
	travel, study	1.8
	union, politics	0.2
	work as officer	-
	other participation	0.9
	civic activities	1.2
	religious organization	2.0
	religious practice	7.9
	factory council	-
	misc. organization	1.8
	other organization	2.1
	travel, organization	3.8
TOTAL EDUCATION & CIVIC/ ORGANIZATIONAL PARTICIPATION 32		

Table 14D (continued)

Northern Michigan Reduced Categorization	Original U.S. Sample Code		Average Minutes for Entire Sample
total social	visiting with friends		39.4
	party, meals		15.0
	other, social		0.8
	conversation		18.4
	TOTAL SOCIAL	73.6	
total entertainment & cultural	sports event		1.0
	mass culture		4.4
	movies		3.2
	theater		0.4
	museums		0.2
	cafe, pub		2.7
	travel, social		1.7
	TOTAL ENTERTAINMENT & CULTURAL	23.6	
total sports and active leisure	active sports		5.5
	fishing, hiking		1.3
	taking a walk		1.1
	TOTAL SPORTS AND ACTIVE LEISURE	7.9	
radio	radio		3.6
TV	TV		91.6
reading	read book		5.3
	read magazine		6.4
	read paper		23.8
relaxing & resting	daytime sleep		10.7
	resting		4.7
	relax, think		4.0
games	parlor games		5.1
other passive leisure	hobbies		1.7
	ladies hobbies		7.0
	art work		0.8
	making music		0.9
	other pastime		2.3
	travel, pastime		1.7
	play records		0.9
	letters, private		5.9
	travel, leisure		-
	TOTAL PASSIVE LEISURE	176.4	

Table 15D

PRIMARY ACTIVITIES IN THE REDUCED CATEGORIZATION: COMPARISON WITH SRC NATIONAL STUDY[1]

(Total Samples: Average Minutes Per Day)

	Northern Michigan (1974)		U.S. National Sample (1965-66)[2]	
Total Work	62		266	
Work Outside Home		45		236
Other Employment		13		6
Travel for Work		4		25
Total Housework	166		149	
Food preparation & Cleanup		49		65
Home Chores		36		59
Gardening & Animal Care		11		3
House Maintenance & Repair		13		6
Lot Maintenance & Improvement		26		3
Other Housework		31		12
Total Childcare	17		37	
Total Shopping and Services	65		53	
Shopping		35		15
Services and Other		9		20
Travel for Shopping & Services		21		19
Total Personal Needs	685		620	
Personal Hygiene		41		52
Home Meals		92		60
Meals Out		22		21
Night Sleep		520		459
Other Private Needs		2		20
Travel for Personal Needs		8		8
Total Education and Civic/ Organization Participation	10		32	
Total Social	82		74	
Visit & Entertain Neighbors		19		
Visit & Entertain Friends		17		
Visit & Entertain Relatives		19		
Other Informal Gatherings		27		

[1]Data for U.S. National Survey were taken from the detailed categorization table, since the reduced categorizations of the two studies were not readily comparable. See Table 14D for details on National Sample Codes included in this categorization.

[2]Data for the National Survey were weighted to insure equality of days of the week and number of eligible respondents per household. Data for the northern Michigan sample are unweighted.

Table 15D (continued)

	Northern Michigan (1974)		U.S. National Sample (1965-66)	
Total Entertainment & Cultural[3]	18		24	
Total Sports & Active Leisure	101		8	
Swimming		10		
Fishing		31		
Sail, Canoe, Row		4		
Waterski, Motorboat		5		
Other Water Sport		11		
Outdoor Non-Water		15		
Walking		8		
Pleasure Driving		7		
Other Non-Water (travel)		3		
Travel for Sports & Active Leisure		7		
Total Passive Leisure	225		177	
Radio		5		4
TV		63		92
Reading		47		36
Relaxing and Resting		72		19
Games		22		5
Other Passive Leisure		16		21
Total Miscellaneous	9			
Total Free Time	424		283	
Total Travel	55		76	
Total Time	1440		1439	
Number of Respondents	727		1243	

[3]Includes all travel associated with both entertainment and cultural and social activity.

Table 16D

PROPORTIONAL ALLOCATION OF TOTAL FREE TIME BY NORTHERN MICHIGAN AND U.S. NATIONAL SAMPLES

Activity Class	Northern Michigan	U.S. National
Social	19	26
Entertainment	4	8
Sports and Active Leisure	24	3
Passive Leisure	53	63
Total	100%	100%
Total Time (minutes)	424	283
Number of Respondents	727	1243

Table 17D

SATISFACTION WITH TIME BUDGET ACTIVITIES

Activity	Number of Respondents Who: Enjoyed Activity	Disliked Activity	Participated	Percent Who: Enjoyed Activity	Disliked Activity	Index Net Satisfaction
Outdoor Recreation	189	13	387	49	3	46
Water Recreation[1]	124	9	259	48	3	45
Social	93	3	438	21	1	20
Passive Leisure[2]	125	3	660	19	1	18
Education/Participation	13	3	54	24	6	18
Work	27	12	96	28	13	15
Personal[3]	83	8	727	11	1	10
Entertainment/Cultural	23	2	217	11	1	10
Childcare	16	4	129	12	3	9
Housework	95	67	616	15	11	4
Shopping/Services	57	42	375	15	11	4
Number of Specific Mentions[4]	721	157				

[1] Fishing was the major component of water recreation activities both enjoyed and disliked; it accounted for 40 percent of all "enjoyed" mentions, and 89 percent of all "disliked" mentions.

[2] Forty-nine percent of passive leisure-enjoyed mentions were coded as resting and relaxing, which included sunbathing.

[3] Meals at home accounted for 35 percent, and meals out for 47 percent of all personal needs mentions for activities enjoyed.

[4] Additional codes not included for purposes of this table were "everything" and "other". Twenty-six percent of all responses to the activities enjoyed question were "everything", and less than one percent were "other". For activities disliked question, two percent of the responses were "everything" and six percent were "other".

Table 18D

LOCATION OF ACTIVITY BY HOUSEHOLD CHARACTERISTIC
(percent of total time)

Location of Activity	Household Characteristics		
	Year-round Residents	Second Home Owners	Vacationers
At home/lot	74	79	71
On lake/beach	3	6	11
Elsewhere	23	15	18
Total	100	100	100
Number of respondents	246	341	146

Table 19D

LOCATION OF WATER RECREATION[1] TIME,
BY HOUSEHOLD CHARACTERISTIC
(percentage distribution)

Location of Activity	Household Characteristic		
	Year-round Residents	Second Home Owners	Vacationers
Own lake/river or beach	44	85	82
Other Inland Water Route	13	4	13
Great Lakes	33	5	2
Other	10	6	3
Total	100	100	100
Number of hours	118	306	319

[1] Water recreation does not include travel connected with such activity.

APPENDIX E

TWO APPROACHES TO SIMULATION, AS PROPOSED BY BRAIL[1]

Brail (1969) has proposed two approaches to the simulation of human activity. The first calls for the construction of two sets of Markov-like transitional matrices for each population segment (say, for each sex in each stage of the life cycle in each stratum of the metropolitan community). Briefly, the probabilities of the first set of matrices (one for each interval of time) determine how many people in the given population segment change their activities from what they are doing at time t to other activities in each and every activity class at time $t + 1$, and the probabilities in the second set of matrices determine how many of those changing activities who were in in the ith grid cell to do the next succeeding activity at time $t + 1$. The probability matrices would be constructed from participation rates per unit of time and accumulations of people at all grid coordinate locations per unit of time applicable in the descriptive phase of analysis.

The second approach uses a computer simulation model. On the basis of the descriptive stage of analysis, probability distributions are developed for (1) walking time, (2) activity choice, (3) mode of transportation (for activities requiring transportation), (4) the time spent in transportation, (5) the location selected within the appropriate radius, (6) the duration of the activity, and (7) the retiring time. The

[1] Summarized in Chapin (1974).

day begins for each person in each subsample category (for example, sex, stage in the life cycle, and socioeconomic segment) at a time determined by the computer from sampling the probability distribution for walking time. Then by sampling each successive probability distribution a person's first activity of the day is chosen, a mode of travel and duration of travel are determined (if appropriate), and the activity duration is established. The computer continues building that person's routine for the day until the sampling of the "retiring time" probability distribution results in his bedtime. In the course of this process, the computer maintains accounts on activity times and places for each person category. In contrast to taking *aggregates of people* through equal time intervals and establishing net balances of people engaging in each activity at each interval of time at each grid cell location involved in the transitional matrix approach, the computer simulation puts *individual persons* in the various population segments used in the analysis through a day's routine, with each such routine variable in its activity content, start times, locations, modes of travel, and durations. The matrix approach is deterministic; the computer simulation would be stochastic.

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