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A SPATIAL ANALYSIS OF COMMERCIAL

CAMPGROUNDS IN MICHIGAN

By

Jong-Tswen Yu

A DISSERTATION

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Department of Resource Development

ABSTRACT

A SPATIAL ANALYSIS OF COMMERCIAL CAMPGROUNDS IN MICHIGAN

By

Jong-Tswen Yu

This study was designed to investigate the location problem of private campground enterprises in Michigan. Its primary objective was to provide information on the spatial distribution pattern of commercial campgrounds and to delineate campground location decision factors.

Methodologically, the study began with an investigation of significant spatial characteristics which were considered to be associated with the existing distribution pattern. Then, an attempt was made to determine which locational factors were statistically significant in explaining location decision behavior of private campground enterprises. The investigator approached the study from the standpoint of the commercial campground developer as a producer, and analyzed the problem within the conceptual framework of microeconomic theory.

Two types of research techniques were used in this study. First, the investigator applied geographic analysis

techniques such as computer-mapping and nearest neighbor analysis to describe and analyze the existing pattern of commercial campground development in Michigan. The geographic unit chosen for this analysis was the county, and thus county data were the main inputs for the analysis. Second, multiple linear regression analysis was employed to identify significant campground location decision factors and analyze the degree and direction of their relationships with the campground occupancy rate as the dependent variable.

Results of this study reveal that the private campground industry in Michigan was spatially characterized by a clustered distribution pattern. This distribution pattern was positively correlated with highway convenience and accessibility, location of quality water resources, and recognized tourist attractions. But since campground operations were extensive enterprises with modest financial returns, land costs were found to be important constraints on commercial campground development.

Results also indicate that both water resources and population variables played a key role in determining campground occupancy, and the former seemed to have much greater influence than the latter. But the higher occupancy rate was associated with campgrounds having both quality water resources and good access to population centers. These two factors together seem to indicate that urban fringe areas having a quality water resource base could be desirable locations for commercial campground development-provided, of course, that land costs are modest.

The influence of public campgrounds on private campground occupancy rate was also found to be statistically significant. Private campgrounds often share advantages of natural wonders with public neighbors, but they are in fact, competing for customers. No evidence was found to support the argument that private campgrounds were benefited by the overflow of campers from their public neighbors.

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CHAPTER I

INTRODUCTION: THE STATEMENT OF THE PROBLEM

Outdoor recreation has been an important segment of American life. Over the past years, the demand for outdoor recreation opportunities has grown rapidly as population and leisure time have increased, as outdoor recreation equipment and transportation facilities improved, and as increase in disposable income makes it possible for more people to travel and recreate more often and at a farther distance. In addition, growth of outdoor recreation demand has been also accelerated by the sales promotion of outdoor recreation equipment manufacturers, as well as by the availability of outdoor recreational areas and facilities to meet the needs of many people.

Along with a growing demand for recreational services in general, there has been a rapid increase in the private supply of outdoor recreational services. This may be partially due to the fact that the outdoor recreation opportunities provided by the public sector have not been able to cope with the growing demand, and as a consequence, most of public outdoor recreation areas and facilities have been overloaded. Meanwhile, the public

sector has encouraged private development of outdoor recreation services.¹ The federal government, for example, has established a number of programs to assist private recreation development. To mention some important ones, they include credits, technical aids, training and educational services, and research.² As a result, many private enterprises have taken an opportunity to engage in outdoor recreation development, and in fact, have satisfied a significant part of the outdoor recreation needs. Many rural lands retired from agricultural production or in an idle state have been developed into outdoor recre-These changes deeply affect use made of such ation use. natural resources as land, water, woodlands, wildlife, and related natural environments and have increased incomes or other forms of satisfaction to rural land owners.³

³Smith, Partain, and Champlin, Ibid., p. 11.

¹It should be recognized also that fee settings and intensive promotion of many public outdoor recreation services may create barriers for private entry in the outdoor recreation business. However, to new entrants public assistance, especially financial aid, may provide more encouragement than barrier and the pressures of public competition are oftentime realized after private enterprises have been in business.

²For a detailed discussion on the federal government assistance to private recreation development, see Clayne R. Jensen, "Outdoor Recreation in America" (Minneapolis, Minn.: Burgess Publishing Co., second edition, 1973), pp. 57-100. Also see, Clodus R. Smith, Lloyd E. Partain, and James R. Champlin, "Rural Recreation for Profit" (Danville, Ill.: The Interstate Printers & Publishers, Inc., 1966), Chapter 11, pp. 247-260.

Among the wide range of outdoor recreation activities and facilities provided by the private sector, commercial campgrounds are perhaps the most feasible and widespread outdoor recreation enterprises. They provide campers, families for the most part, with campsites for tents, trailers, or campers and other related services for In addition to camping, many private campgrounds a fee. also offer a variety of outdoor recreation activities such as swimming, picnicking, fishing, boating, and hunting on the campground or nearby. Some large campgrounds even provide recreation-room type of activities and facilities along with campsite rental. 4 Facing such a dramatic change and rapid growth in the campground industry, prospective campground developers may require additional information and decision techniques to facilitate their investment and management decision-making. As emphasized in the following section, campground location information is a necessary input to such decisions, and thus, requires a more rigorous investigation.

The Role of Location in Private Campground Development

Location has been emphasized in almost every discussion of the demand and supply of outdoor recreation

⁴For example, they may include such facilities as pool tables, table tennis, television set, or just a comfortable place where people can relax and chat with each other.

activities. Location of a campground and its relation to the location of potential customers is critical in estimating demand for campground services for several reasons. First, to obtain campground services, a camper must travel from home to a campground and back, and this takes time and money, sometimes relatively a lot of each. If a camper rationalizes his travel costs, the distance between the campground and his home would be important to him in determining whether he is going to visit the campground or not. As a result, demand for campground services is affected by the location of a campground relative to its potential customers. Second, most people have preferences as to the type of physical characteristics associated with a campground location, including the type of tree cover, or of topography and natural beauty. Most physical characteristics are fixed at a particular location, and each location often has a different type of physical features.⁵ The site may consist of an area of land, with or without tree cover; it may be a body of water or a flowing stream; or it may have other natural features, such as a cave or a rolling hill. These natural characteristics are important in studying demand for campground services because they affect the willingness of people to use the campground

⁵To certain degree, the physical environment can be modified by landscaping treatment. However, large scale treatments are usually costly and may not be feasible for campground operators to conduct.

for outdoor recreation. Third, the importance of location in studying demand for campground services can also be expressed in terms of spatial interdependence. The different campgrounds may lie at different distances from their customers and may also vary in the degree of physical Two or more campgrounds in the same area attractiveness. may be competitive for services to a given group of campers; in this situation, an increase in visits to one campground will be offset by a reduction in visits to the others. On the other hand, different recreation areas and facilities may also be complementary to each other. Tourist attractions, for example, may favorably affect the number of visits and the length of stay per visit to the campground located in the same area because they provide campers with different opportunities for a variety of experiences and make the campground more attractive. Therefore, demand for campground services is also affected by locational interdependence which is an important concept in location analysis.

The supply of outdoor recreation services also depends on natural resources such as land, water, and other physical features. The physical characteristics define limits to certain types of recreational experiences that can be gained at a site. Hence, they define the type of recreational services that can be supplied. The types of water-oriented activities, for example, vary from one

campground to another, depending upon the quality and area of water surface available at different campgrounds. To provide snow-skiing activity, for another example, the area where the campground is located must have sufficient slope and snow cover during the season. In addition to activity-mix, the campground location choice may also affect the supply costs of campground operation. This can be understood by considering the location decision as a selection of inputs such as land, labor, and other necessary supplies to support campground operation.

Improper campground location has been pointed to as one factor associated with low return level in the operation of campground business.⁶ It is important that campground enterprises facing the problem of increasing business competition re-evaluate their locations. If a manager finds that campground location has disadvantages for market competition, he may try to design a management strategy to overcome locational disadvantages. If locational disadvantages cannot be overcome by a new management strategy within reasonable cost, management may consider relocation of campground facilities or termination of the campground operation and conversion of the campground into other more lucrative uses. Therefore.

⁶Malcolm I. Bevins, "Private Recreation Enterprise Economics," in "The Forest Recreation Symposium Proceedings," USDA, Forest Services, Northeastern Forest Experiment Station, Upper Darby, PA., 1971, p. 34.

campground location information is important to existing campground enterprises, as well as new ones.

When planning a new campground development, problems concerned with the determination of location, design capacity and layout of the site will have to be solved before the investment can be properly carried out. The determination of location is the first and the most crucial decision to be made by the campground developers. Such a location decision must be based upon well-studied locational information such as physical environment and market potentials.

The Problem Context

It has been contended that locational factors may play a significant role in private campground development. Proceeding from such a premise, this study focuses on commercial campground enterprises in Michigan in an attempt to describe and analyze the spatial distribution patterns of the industry and the influence of location on business performance of individual campgrounds.⁷

In contrast to most studies concerning recreation location problem, this study approaches the problem from the viewpoint of the campground developer as a producer.

⁷The private campground enterprise considered in this study may be defined as a business venture, undertaking or operation which pursues a commercial motive seeking to gain a profit or sustain itself from user fees, by offering camping opportunities on a parcel or tract of land as a principal product of that venture.

The campground developer is considered important in the study of location problem because he is the decisionmaker actually making the locational choice. The idealized consumer's choice in campground location is limited in practice by the availability of campground alternatives substantially determined by the developers. In all cases, campground developers are mainly responsible for locating and purchasing land for campground development. Their locational behavior in providing campground services plays a key role in shaping the spatial distribution patterns of the campground industry.

With the above focus in mind, this spatial analysis of private campground locations and business performance necessarily involves three specific questions concerning the general problem of public outdoor recreation planning and private campground location decisions. They are:

- (1) Where are the existing private campgrounds located?
- (2) What are the major location factors that affected the existing private campground distribution pattern?
- (3) What are the essential relationships that exist between the business performance of a private campground enterprise and its location choice?

Among these questions, the first two are concerned primarily with an understanding and interpretation of the existing distribution pattern of the private campground industry as a whole. An inquiry into these questions will involve considerations of some spatially distributed phenomena such as spacing, diffusion, and relative location of private campgrounds to themselves, to public campgrounds, and to other cultural activities and natural resources. Two methodological questions that are critical in the analysis of spatial distribution must be resolved before the analysis can be proceeded. First, what sort of measures can be used to characterize the distribution, and second, for which pair of distributions ought these measures be established?

The third question consists of evaluation of location decision factors with respect to campground business performance. To investigate this question, it is first necessary to determine the performance measures so that contributions made by individual location factors can be evaluated. To be useful, such a performance measure must have two basic functions. First, it must be sensitively responsive to relative contributions of individual location factors. And second, it must be consistent with the investment objectives pursued by the prospective campground developers. In the present situation, we have no way of knowing the identity of prospective campground

developers and their investment objectives. This may impose some difficulty in determining what would be appropriate performance measures. However, this task can be completed in two alternative ways. In one case, the performance measures may be chosen on the basis of business operation goals cited by the current campground operators. On the other hand, we may simply follow the convention of assuming that as a commercial enterprise, the private campground would be operated in such a manner as to maximize profit. In this study, we examine campground location decision factors in the usual microeconomic framework of profit maximization.

To begin with, let us assume, for purposes of emphasis on the location decision, that we are investigating the production of a recreational service measured by a unit of "campsite-day"⁸ and that the campground location decision can be treated as an essential part of the developer's overall selection of inputs and outputs which determine profit. In selecting the campground location, it is also assumed that the private campground developer is guided by his desire to maximize profit within some constraints posed by his enterprise's "production function." Underlying these assumptions, we can

⁸The term, "campsite-day," is used here as a measure of unit output "produced" by the private campground enterprise which is defined as any use of a campsite within 24 hours by a camper or group of campers who rent(s) the site.

express, in a simple mathematical notation, the private campground developer's behavior as follows:

```
Maximize P = R(y_1, \dots, y_k) - C(x_1, \dots, x_n)
Subject to: F(x_1, \dots, x_n, y_1, \dots, y_k) = 0
```

- - $R(y_1, \ldots, y_k)$ is the revenue function whose value depends upon the prices, level and mix of outputs y_1, \ldots, y_k which may include site rental and other related incomes.
 - $C(x_1, \ldots, x_n)$ is the cost function whose value depends upon the prices, level and mix of inputs x_1, \ldots, x_n some referring to physical and locational characteristics of the site, some referring to material, labor, and capital.
 - $F(x_1,...,x_n,y_1,...,y_n) = 0$ are the technical constraints governing the relationships between inputs and outputs in the "production function."

The campground location decision can thus be treated as an important and complex part of the campground developer's overall selection of inputs, outputs, and constraints for campground operation. And consequently, we can hypothesize that the choice of location for campground development is conceptually equivalent to a multiple selection of locational characteristics. These locational characteristics are assumed to be reflected in three sets of locational decision factors: (1) those relating to individual campground site such as topography, vegetation cover, etc.; (2) those relating to local and immediate surroundings of the area; and (3) those which describe the relative locations of market areas and alternative recreation sites and facilities. These locational factors may affect campground outputs, either in terms of campsite-day or monetary income, in one or more ways. They may influence the output as inputs to the "production function." They may also act as parameters which influence the technical relationships between inputs and outputs, or as constraints which place a limit upon the outputs.

Based upon the above preliminary analysis, we can derive the following hypotheses:

- (1) The distribution of private campground development is substantially affected by spatial characteristics and these serve as location decision factors.
- (2) The optimal solution to the campground location decision can be substantially explained by the selected locational characteristics which act as inputs to, parameters in, or constraints on the production function closely relating to such decision.

(3) The campground locational choice would involve a selection of an array of relevant characteristics rather than a single locational factor.

These hypotheses must be carefully investigated, and this constitutes the main part of the problem in the present study.

Objective of the Study

This study is primarily designed to provide an understanding of the existing private campground location pattern and a systematic inquiry into campground location factors and their relationships to private campground performances. The main objective of this study is thus to generate campground location information and develop analytical models for private and public outdoor recreation planning. In addressing the questions mentioned in the problem context, this study specifically attempts to:

- describe and explain the spatial distribution of private campground development in Michigan;
- (2) determine whether multiple regression analysis techniques can be successfully used to analyze the influence of locational forces on private campground development and business performance; and
- (3) discuss and evaluate the practical implications of locational influences for private campground location decisions and public outdoor recreation planning.

The Study Area

The area under present study consists of the entire state of Michigan. This study area was divided into three regions to examine regional differences. The entire Upper Peninsula was designated as Region 1, the northern half of the Lower Peninsula as Region 2, and the southern half of the Lower Peninsula as Region 3. The regional boundaries and the counties contained in each region are shown in Figure 1 on page 15.

This scheme of regional division is currently used by the Michigan Department of Natural Resources to organize field offices and staff positions for managing natural resources and the state park system. Administrative efficiency was claimed to be the main rationale underlying this regionalization scheme.⁹

Adoption of this regional division for the present study is not based upon administrative efficiency as in the case of the Michigan Department of Natural Resources. It is instead based upon two essential reasons. First, there are differences in both physical and socio-economic settings between regions that may reflect differences in the patterns of both campground development and use. The Upper Peninsula is remote from major population centers,

⁹No description was found in the official or academic reports to rationalize this regionalization scheme. This rationale was suggested by a staff member of the Department.



Fig. 1.--Study Area Showing Regional Subdivisions.

and is, in addition, very scarcely populated. The entire region is characterized by extensive forest cover and a low level of economic development. Moreover, since it is situated at the northern tip of the state, the early arrival of winter means that the camping season in the Upper Peninsula is shorter than the other two regions. In terms of campground development, as noted by Dice and Wang, the Upper Peninsula "is influenced by major eastwest travel arteries serving non-native users."¹⁰

The northern Lower Peninsula has a natural environment for campground development similar to the Upper Peninsula. Since it is more accessible to major population centers, most campgrounds may be used by the Michigan residents. As in the Upper Peninsula, most tourist attractions in this region are oriented to natural scenery and points of historical significance. With a locational advantage of high quality water resources and reasonable distances from major population centers, many points within the region have been developed into resort or vacation home areas. In some cases, competition of land resources for private campground development and alternative uses may be considered significant.

¹⁰Eugene F. Dice and Darsan Wang, "Economic Scale and Dollar Exchanges in the Michigan Privately Owned Campground Industry," Research Report No. 228, Agricultural Experiment Station, Michigan State University, East Lansing, Michigan, p. 4.

The southern Lower Peninsula is characterized by population concentration and relatively intensive economic development. According to the 1970 Census of Population, nearly 89 percent of the state population reside in this region, and 10 of 11 Standard Metropolitan Statistical Areas are located within the regional boundaries. In their report, Dice and Wang remarked that "region C (same as region 3 in this study) draws heavily on the vast population as a market resource and has high patronage from the states directly south."¹¹ It is hypothesized that private campground development and use patterns in this region are different from those in the other two regions.

Assumptions

The basic assumptions underlying this study consist of two types. The first type includes general assumptions which may be viewed as premises for the study. The second type includes specific assumptions which are related to the analytical model particularly designed to solve the problem. Component parts of each type of assumptions are listed as follows.

General Assumptions

1. Private enterprises will continue to enter in the campground business and the public sector will continue

¹¹Ibid., p. 5.

to provide assistance to private enterprises in developing campground services.

2. The camper's behavior in engaging in camping activity will remain in the same trend as before and the camping consumption pattern will be constant over time.

3. Campground location is not a matter of indifference, and proper location choice is a necessary condition for a successful campground business operation.

4. Campground developers require relevant location information to evaluate prospective campground locations and deficiencies exist in the availability of such campground location information.

Specific Assumptions

 Campground operation is expected to be oriented toward a primary income generating enterprise and generation of profit will receive major emphasis in campground investment.

2. Campground developers' location decisions are economically "rational" and based upon past experience and knowledge of existing areal characteristics.

3. Economic and physical characteristics of an area are important in location decisions of private camp-ground establishments.

4. It is possible to correctly specify relevant independent variables and relationships in the framework of linear multiple regression analysis.

Organization of the Study

This study consists of three major parts. Part 1 discusses the data sources and describes methods used in the study. This can be seen in Chapter II. Part 2 provides a general description of private campground development in Michigan. Data are summarized and displayed in tables with proper descriptions to highlight the essence of the private campground industry in Michigan. This constitutes the main context of Chapter III. Part 3 is the core of this study. It provides an empirical analysis of campground distribution and location decision factors. Multiple regression analysis is employed to estimate relationships between campground performances and spatial characteristics involved in location decision. Statistical significance of the hypothesized relationships is also examined within the same analytical framework. The results are reported in Chapter IV and Chapter V. Finally, in Chapter VI, conclusions and implications are presented, and the study results summarized.

CHAPTER II

RESEARCH METHODS AND DATA SOURCES

Determination of research methods and data sources is of crucial importance to any research activities. There is a need for a special attention to the choice of research methods and data collection. This chapter will describe the methods and data sources involved within this study and discuss the rationale underlying choices of specific techniques. This discussion is intended to be general and focuses on the overall research framework rather than specific operating procedures. The operational procedure of a particular analytic technique will be described in more detail within the chapter in which it is applied.

A Brief Methodological Review

The importance of location in determining demand and supply of outdoor recreation opportunities has been recognized since the emergence of recreation economics. But rigorous research on the location problem of outdoor

recreation development is a relatively recent attempt.¹ During past years locational factors such as those relating to region, area, and site characteristics were often studied in conjunction with other socio-economic variables associated with recreationists. They were either used to construct attractiveness indices measuring the relative pulling power of recreation sites² or treated as spatial constraints on recreation travel. In many cases, distance measures between a recreation site and the location of customers are used to approximate the "prices" which are then employed to derive the basic demand curve for an outdoor recreation opportunity.³ In all these studies, locational factors are treated as demand factors and thus examined in the framework of consumer's choice or from the standpoint of the recreationist as a consumer.

Methodologically there are two general approaches to spatial allocation of recreational participation or

³See, for example, Marion Clawson and Jack L. Knetsch, "Economics of Outdoor Recreation" (Baltimore: The Johns Hopkins Press, 1966), pp. 61-85.

¹The investigator found, from a review of studies concerning location decisions and spatial analysis of outdoor recreation development, that only few studies on this aspect had been attempted before 1965. For further reference, see research reports and bulletins listed in the bibliography.

²Carlton S. Van Doren, "Destination Models: Development of a Camping Attraction Index for Michigan State Parks," in Department of Resource Development, Michigan State Univ., "Michigan Outdoor Recreation Demand Study," Technical Report Number 6, 1966, pp. 5.1-5.2, and 5.49-5.79.

demand.⁴ The first approach usually assumes that the location points of population and recreation resources are fixed, as are the channels of transportation, and conceives of space as a friction to the flow of recreation travel. Analytic models which are often used in this approach are gravity models and systems theory models.⁵ This approach is commonly undertaken in the studies which involve macrogeographic recreation planning and which have a common objective to estimate recreation travel flows in an origin-destination network system.⁶

The second approach can be denoted as a somewhat typical locational analytic approach. It emphasizes the heterogeneity of the spatial system and assumes that recreational resources and population are not scattered

⁵See, for a comparison, J. B. Ellis and C. S. Van Doren, "A Comparative Evaluation of Gravity and Systems Theory Models for Statewide Recreation Travel Flow," Journal of Regional Science 6(2): 57-70, 1972.

^oSee, for example, Michael Chubb, "Outdoor Recreation Planning in Michigan by a Systems Analysis Approach: Part III--The Practical Application of Program RECSYS and SYMAP," Resource Planning Series, Technical Report No. 12, Michigan Department of Commerce, 1967, 298 pp. Also see, M. E. Tadros and R. J. Kalter, "A Spatial Allocation Model for Projected Outdoor Recreation Demand: A Case Study of the Upstate New York Region," SEARCH-AGRICULTURE, Vol. 1, No. 5, New York State College of Agriculture at Cornell University, Ithaca, New York, 1971, 22 pp.

⁴Simply speaking, participation, as applied to a specific area or facility, means the total number of visitors, whereas demand, in a strict sense, means a schedule of quantity demand in relation to a price and other variables.

evenly and continuously over geographic space. Under such assumptions, recreation locational analysts seek to explain why recreational facilities and areas are located at one place rather than another. From the same reasoning, they attempt to determine the best location for development of a particular recreation activity. Analytic techniques being used in this approach vary, depending upon the nature of the problem under study. However, there are basic techniques such as comparative cost analysis,⁷ the economic rent approach,⁸ and various site evaluation techniques.⁹ In most cases, recreation researchers taking this approach tend to focus on the location problem at the individual firm level. Frequently they will base their analysis on some objective function which is to be optimized.

The analysis of recreation location is a relatively new field of research. Theoretical foundation and analytic tools particularly designed for analyzing location problems of recreation development are still at a developmental

⁷See, for example, Walter Isard, C. L. Choguill, J. Kissin, R. H. Seyfarth, and R. Tatlock, "Ecologiceconomic Analysis for Regional Development" (New York: The Free Press, 1972), 235 pp.

⁸See, for example, E. Boyd Wennergren and Herbert H. Fullerton, "Estimating Quality and Location Values of Recreation Resources," Journal of Leisure Research, 1972, 4(3): 170-183.

⁹See, for a discussion on this topic, Keith McClellan and Elliott A. Medrich, "Outdoor Recreation: Economic Consideration for Optimal Site Selection and Development," Land Economics 45(2): 174-182.
stage. However, there are potential sources of theoretical framework and analytic tools that can be applied in this field of inquiry. One such source is the locational and regional economic theory which can provide a sound methodological basis for scientific inquiry into the recreational location problem.¹⁰ Additionally, the conceptual frameworks and analytic techniques used by economic geographers in spatial analysis and description are also applicable to recreation location problems. Cartographic techniques, for example, can be used to enhance visual examination of spatial pattern and facilitate development of explanatory hypothesis for statistical testing.¹¹ Moreover, the statistical techniques commonly used in geographical research may help the recreation analyst understand the nature of spatial distribution and derive an inductive generalization concerning covariance between recreation development and other spatial characteristics.¹²

¹⁰See, for a concise statement of general approaches to regional and locational analysis, Harry W. Richardson, "Regional Economics" (New York: Praeger Publishers, 1969), pp. 5-7.

¹¹See, for example, Edwin N. Thomas, "Maps of Residuals from Regression," in Brian J. L. Barry and Duane F. Marble (eds.), "Spatial Analysis" (Englewood Cliffs, N.J.: Prentice-Hall, 1968), pp. 326-352.

¹²See, for a more detailed discussion, Leslie J. King, "Statistical Analysis in Geography" (Englewood Cliffs, N.J.: Prentice-Hall, 1969), pp. 117-164.

Methods for Spatial Description

Let us now focus on the specific techniques that are presently applied in the description of campground location patterns. The phrase "location pattern" as used in geographic literature is a concept consisting of locational arrangement and spatial distribution of various As King points out, there are two approaches often kinds. used by geographers to the definition of location patterns. First, they treat locations as points on a map and analyze the distances separating them, the density of points, the distribution and arrangement of points, and the degree of correspondence between different point patterns.¹³ This approach is often used by the geographer to describe and analyze locational data which involve spatial phenomena defined only at certain points on the earth's surface. The second approach treats a location pattern in terms of a set of areal units such as grid squares or county units.¹⁴ This approach is appropriate for describing and analyzing areal data which consist of observations of spatially continuous phenomena. Among the two approaches, it appears that the first one is more suitable to the present study in which observations made at each private campground are locationally discrete in

¹⁴Ibid., p. 88.

¹³Leslie J. King, "Statistical Analysis in Geography" (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1969), p. 87.

nature. We treat private campground locations as points on a map, analyze the distances separating them, and assess their density. To describe and analyze campground location data, computer-mapping techniques were employed. The use of mapping techniques in this study can be justified by three essential reasons. First, maps of various kinds have been used to enhance visual understanding of physical and socio-economic characteristics on land. To use a map as a tool for descriptive statements about spatial distribution is a fundamental practice in geographic research, and in fact, has been proved useful.¹⁵ Perhaps a map is one of the best descriptive tools to display and convey to others the end results of a study concerning spatially distributed phenomena. Second, it is possible to use a map as an analytic tool to enhance inquiry during the conduct of a study. Computer-prepared maps can be effectively used to develop, test, and evaluate alternative hypotheses and assumptions during the course of research.¹⁶ This allows researchers to select a

¹⁵Geographers have used maps for a long time to communicate and store their findings. They use maps to show vegetation distribution, topography, population density, social class distribution, land use activities, etc.

¹⁶See, for a more detailed discussion, Laboratory for Computer Graphics, "A Report on the Feasibility of Using Mapping Techniques as an Aid in the Processing of Mortgage Insurance Applications," Graduate School of Design, Harvard University, Cambridge, Mass., 1970, pp. 1-2.

better set of variables and improve the efficiency of inquiry.

Finally, a computer-mapping system is currently available for use with easy access and relatively low The computing system at Michigan State University cost. is capable of processing most mapping jobs, usually with satisfactory results. Along with the hardware system, there are many well-documented computer-mapping packages. The GEOSYS, an information system for the description and analysis of spatial data, currently maintained by the Computer Institute for Social Science Research at the University, contains a set of computer routines which allows users to manipulate, describe, and analyze data defined in terms of spatial locations or geographic coordinates.¹⁷ Users can select from the system one or more computer routines to generate maps and related statistical summaries so long as the locational coordinates are stored along with data values coded in machine readable form. There is considerable flexibility in most computer routines within the system to permit handling changes of size, content, and scale of the map as required by any study. With an aid from such a computer-mapping

¹⁷Robert I. Wittick, "GEOSYS: An Information System for the Description and Analysis of Spatial Data--Version 2," Technical Report Number 73-6, Computer Institute for Social Science Research, Michigan State University, 1973, p. 1.

system, the satisfactory maps can be produced with a reasonable cost.

Methodologically, a complete process of mapping can be viewed as a series of transformations involving selection of data from the real world, transformation of these data into a graphic map, and the retrieval of information through an interpretative map reading process.¹⁸ This process is further illustrated by Muehrche schematically as shown in Figure 2 below.



Fig. 2.--The Mapping Process

Conventionally when mapping the cartographer's task is to devise better approximations or transformation of raw data into a graphic map such that the map image can represent data input. In a computer mapping system, the

¹⁸Phillip Muehrche, "Thematic Cartography," Commission on College Geography Research Paper No. 19 (Washington, D.C.: Association of American Geographers, 1972), pp. 3-4.

investigator and computer-mapping routines together take the place of cartographer, and perform the mapping job. Therefore, the researcher using a computer-mapping system must realize that selecting an appropriate mapping routine is as important as choosing a skillful cartographer. Moreover, he must also emphasize interdependencies between data collection, mapping, and the map reading process so that maps produced from the system can give accurate images as intended.

Following the mapping process described above, the present study has created two types of maps for describing and analyzing private campground location patterns. The first type of map is generated by the program "SYMBOL" which is designed in such a way that a circle symbol is drawn at each interested point location on the Calcomp plotter.¹⁹ This type of map shows the location and relative sizes of private campgrounds in Michigan and is expected to give an image of locational arrangement in a point pattern. The second type of map is created by the "SYMAP" package which is the best known and most widely used line-printer computer-mapping.²⁰ The "SYMAP"

¹⁹This computer-mapping program was developed by Robert I. Wittick, Computer Institute for Social Science Research, Michigan State University. See Wittick, op. cit., pp. 41-42.

²⁰The name "SYMAP" is for SYnagraphic MAPping Program which was first developed in 1963 by Howard Fisher at Northwestern University. Fisher later established the Laboratory for Computer Graphics at Harvard University,

package offers three basic map outputs: contour map, conformant map, and proximal map. It contains some 35 options which allow users to change map size, data levels, external information to be printed on map, etc., and up to 10 levels of shading can be provided by superimposing two or more characters.²¹ But the maps created by the "SYMAP" package can only show overall patterns. They do not precisely represent the actual data set.²² In addition, in this study, areal interpolation was made with respect to some selected county data which were treated as points geographically central to each of the counties under Therefore, we use "SYMAP" outputs mainly for the study. purpose of comparing overall spatial patterns and to facilitate development of hypotheses rather than to display actual data.

In most cases, computer maps provide only an image of the overall pattern of spatially distributed phenomena. It is important that they are accompanied with statistical information that can provide a relatively precise statement

where the latest revision of "SYMAP" was maintained and improved.

²¹C. Young, "SYMAP" Technical Report No. 100, Computer Institute for Social Science Research, Michigan State University, 1972, p. 3 and pp. 30-47.

²²"SYMAP" mapping is based on an artificial grid rather than the actual areal units. Grids are interpolated by a sophisticated algorithm contained in the package.

about the exhibited spatial pattern. Therefore, in this study, the investigator has selected two statistical techniques to facilitate spatial description and analysis. First, an attempt is made, using a statistical analysis technique known as "Near-neighbor Analysis," to describe and analyze distribution patterns of private campgrounds in Michigan. Focusing upon distance measures between each point and its nearest neighbor, the near-neighbor analysis indicates the degree to which any observed distribution of points deviates from what might be expected if the points were distributed in a random manner within the same area.²³ In practice, a ratio known as "nearest-neighbor statistic" is computed such that: R = rA/rE, where R is the nearest neighbor statistic, \overline{rA} is the observed mean distance, and rE is the expected mean distance.²⁴ The ratio, R, provides a measure of the departure from randomness. It has a range in value from zero to 2.15 and is interpreted as follows:

²³The near-neighbor analysis was originally developed by plant ecologists who were concerned with the distribution patterns of species over the surface of the earth. See P. J. Clark and F. C. Evans, "Distance to Nearest Neighbor as Measure of Spatial Relationships in Population," Ecology 35(1954): 445-453.

²⁴By assuming that the n points in an area are distributed randomly in accordance with a Poisson Probability function with density λ , and the distribution of distance between points and their nearest neighbors is normal, the expected mean distance can be equal to $1/2\lambda^{-\frac{1}{2}}$. See Ibid., pp. 451-452.

| Magnitude of R | Nature of <u>pattern</u> |
|-------------------|--------------------------|
| R < 1 | clustered |
| R = 1 | random |
| R > 1 | uniform |

The Analysis Method

Multiple regression analysis was selected to analyze campground distribution and locational decision factors in this study. The basic purpose of using this method is to help "explain" the variance of campground distribution and occupancy as response variables. It does this, in part, by estimating the contributions to this variance of two or more spatial characteristics as independent variables.

There are two major reasons that support the selection of multiple regression analysis for the present study. First, multiple regression analysis is appropriate for this study because it is capable of analyzing both the collective and separate contributions of two or more independent variables to the variation of a dependent variable. As long as we accept the assumptions of the method, we can rely on the analysis method to estimate overall effects as well as individual relationships, and to test them within the same analytical framework. As such, the multiple regression analysis may generate satisfactory results consistent with the objective. Secondly, since the computer technology of both software and hardware has been highly sophisticated, the computational aspect of regression analysis is no longer a difficult problem. Many welldesigned computer programs for regression analysis efficiently provide options for researchers to experiment with a wide variety of problem conditions without making the use of them overly difficult or complicated. For example, the SPSS multiple regression program currently operating on the CDC 6500 computing system at Michigan State University combines standard multiple regression and stepwise regression in a manner which provide both considerable control over the inclusion of independent variables in the equation and sufficient flexibility for the researchers to experiment with different options.²⁵

Regression equations can take several different forms of which the linear type is most often used. As used here, the linear multiple regression model is most suitable for developing a working hypothesis and preliminary investigating relationships between variables simply because it is simple and easy to interpret. The basic form of a multiple linear regression equation can be expressed as follows:

 $Y_{j} = a + \sum_{i=1}^{D} b_{i}X_{ij} + U_{j}$ j = 1, 2, ..., N

²⁵See, for a detailed discussion of the program, Norman Nie, Dale H. Bent, and C. Hadlai Hull, "SPSS--Statistical Package for Social Science" (New York: McGraw-Hill Book Co., 1970), pp. 174-195; and also, Computer Laboratory, Michigan State University, "SPSS--6000: Revision Package, 5.5 Version" (based on SPSS 1973 Version, Northwestern University), pp. 184.1-188.2.

where Y_j is the dependent variable; a is the intercept of Y axis (or the constant); b_j 's are the partial regression coefficients for k independent variables; U_j is the error term associated with the dependent variable; and N is the number of observations.

There are three main types of regression models which are often used by researchers, the functional model, the control model, and the predictive model.²⁶ The functional model is considered for a problem situation where the true functional relationship between a dependent and the independent variables is known, whereas the control model is a functional model which contains variables under the control of the researcher. The predictive model is often obtained in a problem situation where the functional relationship is unknown or uncertain and the ability to obtain independent estimates of the effects of the control variables is limited. In their book, Draper and Smith describe the usefulness of the predictive model as follows:

The predictive models are very useful and under certain conditions can lead to real insight into the process or problem. It is in the construction of this type of predictive model that multiple regression techniques have their greatest contribution to make. These problems are usually referred to as "problem with messy data"--that is, data in which much intercorrelation exists. The predictive model is not necessarily functional and need not be useful for control

²⁶See, for a discussion, N. R. Draper and H. Smith, "Applied Regression Analysis" (New York: John Wiley & Sons, Inc., 1966), pp. 234-236.

purposes. This, of course, does not make it useless, contrary to the opinion of some scientists. If nothing else, it can and does provide guidelines for further experimentation, it pinpoints important variables, and it is a very useful variable screening device.²⁷

Comparing the problem situation presently under investigation, it is apparent that the regression model developed within the present study is a predictive model in nature. Within the framework of the predictive model, an attempt is made mainly to explain in a statistical way relationships that may exist between selected dependent variables and the independent variables. The model is not necessarily functional and may not be useful for control purposes.

To construct a regression model for prediction purposes often involves several phases. Draper and Smith suggest that three major phases--planning, development, and maintenance must be considered.²⁸ They emphasize in the planning phase that a regression analyst must carefully define the problem, select among all conceivable variables the appropriate set of dependent and independent variables, and establish goals for the analysis. In the development phase, they focus on the statistical skills that are required to estimate the parameters, to examine the residuals, and to select the regression equations. And

²⁸Draper and Smith, Ibid., pp. 236-241.

²⁷Draper and Smith, Ibid., p. 235.

finally, the fitted regression model must be verified for the stability of its coefficients and the practical meaningfulness and usefulness. The entire model building process, as it has been applied here, is illustrated in Figure 3 on page 37. Note that the process begins with definition of the problem and development of hypotheses. Simply put, the specific hypotheses under investigation in this study were that the campground location decisions can be substantially explained by the selected location characteristics. These hypotheses were developed both from the conceptual framework described earlier and from the existing body of knowledge concerning spatial phenomena of outdoor recreation development. Once hypotheses were developed they were then expressed as dependent and independent variables for empirical analysis. This part of study will be discussed in Chapters IV and V.

Once variables were properly specified, the investigator then determined data sources and selected appropriate methods for data collection. Since data were collected from mail-questionnaire survey, some of them were inconsistent and required careful examination. Usable data were then processed into machine readable form for computer calculation.

After carefully examining the data, the investigator moved on to conduct an initial regression calculation. The correlation matrix and other essential



Fig. 3.--A Flow Diagram Indicating Regression Model Building Process Used in this Study.

statistics of such a regression run was examined. This provided further insight into analytical problems and could conceivably eliminate many independent variables from additional analysis. A new regression equation was then formulated and final evaluation began. At this stage of investigation, the stepwise regression procedure was used to help select the "best" regression equation. This regression procedure involves re-examination of the variables already in the equation at every step of the regression when a new variable is included.²⁹ The stepwise regression method is a useful variable selection procedure, but it must be used with sufficient statistical knowledge and good subjective judgement. In many cases, it is desirable to consult experts for advice.

During the evaluation stage, the regression equation was continuously examined and modified until it has reached a satisfactory result. To be satisfactory, a regression equation must not only confirm the basic assumptions³⁰ but

²⁹See, for a detailed discussion, Draper and Smith, Ibid., pp. 171-172.

³⁰In order that the least-square estimates are unbiased, a regression equation must confirm or, at least, not exhibit a denial of the basic assumptions that, in the model: $Y_j = a + b_j X_j + e_j$, (1) e_j is a random variable with zero mean and constant variance, and (2) e_j and e_k are uncorrelated, $j \neq k$. The consistency of a regression equation with these assumptions may be examined by plotting and analyzing the residuals e_j . See, for a detailed discussion on this aspect, Draper and Smith, Ibid., pp. 17-35 and pp. 86-95.

also meet the pre-stated goal with respect to the level of statistical significance (α) and the allowable standard error of estimate. The statistically satisfied regression equation must then be examined for stability of the regression coefficients and consistency in the practical senses. In this study, however, we can only examine the practical sense of the model. Stability of the regression coefficients cannot be verified now because we lack timeseries data.

The computational method used here to select the "best" regression equation is the stepwise regression pro-The method recursively constructs a regression cedure. equation one independent variable at a time in a step-bystep fashion. The first step is to choose the single independent variable which has the highest simple correlation with the dependent variable. This is followed by adding the second independent variable to the regression The order in which the independent variables equation. are added to the equation is controlled by two pieces of The first is the F statistic which measures information. the significance of the regression coefficients. If the value of the F statistic for a regression coefficient is too small, then there is little reason to bring that variable into the equation. The second piece of information

is the value known as the tolerance.³¹ The stepwise regression procedure never adds an independent variable to the equation if the value of the tolerance is too small. Based upon these two pieces of information, the stepwise regression proceeds in a recursive fashion until no other variable will make a significant contribution to the improvement of the regression equation.

The stepwise regression is considered by many researchers the most powerful technique for selecting final regression equation.³² As the authors of the SPSS manual point out, "this procedure does not always yield the true optimum, but it usually does fairly well."³³

Data Sources for the Study

Data used in this study were of two major types, primary and secondary data. Primary data were obtained directly from a mail-questionnaire survey of private campground operators in Michigan. Secondary data were obtained

 33 Nie, Bent, and Hull, op. cit., p. 180.

³¹The tolerance is an index computed at each step during stepwise regression. It is used here to check singularity of the covariance matrix at each step. If the tolerance is too small, this indicates that the covariance matrix is nearly singular and the regression program would have a difficulty inverting it. Consequently, stepwise regression never brings a variable into the equation if the tolerance is too small than a specified level.

³²The stepwise regression is not as good as comparing <u>all</u> possible regression equations in k variables. However, it is much less expensive.

from a variety of sources including various publications of campground and trailer park directories, published and unpublished governmental statistical data records, and census publications. Each of the data sources will be discussed in more detail in the following sections.

Primary Data_Sources

As noted above, primary data were obtained from a mail survey of private campground operators in Michigan. The definition of a private campground used in this study is essentially that of Michigan Public Act 171, 1970. The act implies that a private campground means a parcel or tract of land which is under control of a private person or persons and upon which campground facilities are established for public camping services.³⁴ The services mentioned are offered primarily for the campers whose equipment consists of tent, travel trailer, camping trailer, motor home, or truck camper.

The source listing of private campgrounds in Michigan was compiled primarily from the Campground License Records of 1973, maintained by the Michigan Department of Public Health.³⁵ In addition, data were

³⁴See Michigan Act 171 of the Public Acts of 1970, Section 1(a) and 1(f).

³⁵Michigan Public Act 171, 1970 requires all persons planning to operate a campground in Michigan must obtain an annual campground license from the Michigan Department of Public Health. The license records provided

also obtained from various publications of commercial campground and trailer park directories. These include:

- Campground and Trailer Park Guide, Rand McNally & Company, 1973.
- (2) Outdoor Guide, Automobile Club of Michigan, 1973.
- (3) Campground Directory of Michigan Association of Private Campground Owners, 1973.

After a careful check on the consistency and accuracy of the names and addresses from various sources, a final listing of 530 private campgrounds was obtained.³⁶ Questionnaires (see Appendix I) were then sent to campground operators in an effort to obtain a complete survey of all private campgrounds which have ten or more campsites.³⁷ As indicated in Table 1 on page 43, 293 complete responses were received from the 530 private campgrounds

the best listing of private campgrounds for this survey research.

³⁶Campgrounds which have fewer than 10 campsites were excluded from the survey. This exclusion was based on the assumption that campgrounds smaller than this limit may not be operated with economic motivations.

³⁷The complete mail survey is selected for three essential reasons. First, with a population of 530 sample units, the census mail survey seems to cost less than any other survey methods, particularly the personal interview survey. Under the financial constraint, it was considered most appropriate survey method. The sample mail survey costs much less but it involves sampling error. Second, this survey is a survey of the facts rather than of an opinion. Hence, the bias toward high responses from those who strongly favor the subject of the survey may not exist. Third, certain techniques may be used to encourage response if non-response imposes a serious problem.

| Type of Responses | In Ma | Initial Mailing | | First* Follow-up | | ond* | | Total | |
|------------------------|----------|--------------------|-----|---------------------|-----|-------|-------------|-------|--|
| | No. | 5 | No. | 8 | No. | | NO . | Ð | |
| Complete response | 123 | 23.2 | 101 | 25.8 | 69 | 24.3 | 293 | 55.3 | |
| Incomplete response | 15 | 2.8 | 8 | 2.0 | 6 | 2.2 | 29 | 5.4 | |
| Total response | 138 | 26.0 | 109 | 27.8 | 75 | 26.5 | 322 | 60.7 | |
| Total non- response | 392 | 74.0 | 283 | 72.2 | 208 | 73.5 | 208 | 39.3 | |
| Total mailings | 530 | 100.0 | 392 | 100.0 | 283 | 100.0 | 530 | 100.0 | |

Table 1.--Summary of Survey Responses.

*The first follow-up questionnaires were sent to the non-respondents 20 days after the initial mailing, and the second follow-ups were sent 28 days after the first follow-up mailing.

F

surveyed, a 55 percent of response. This response rate is considered adequate for analysis and reporting.³⁸ Moreover, it is also important to recognize that the complete responses are fairly well representative of the total population in terms of regional distribution, campground types, and size classes. This is indicated in Table 2 in which the frequency distributions of the complete responses and the total campgrounds surveyed are compared.

| Distribution | Con Res | plete sponse | All Campground Surveyed | | |
|--------------------------|------------|-----------------|----------------------------|-------|--|
| | No. | 8 | No. | 8 | |
| By Region: | | | | | |
| Region 1 | 37 | 12.6 | 65 | 12.3 | |
| Region 2 | 117 | 39.9 | 202 | 38.1 | |
| Region 3 | 139 | 47.4 | 263 | 49.6 | |
| By Campground Type: | | | | | |
| Seasonal Campground | 197 | 67.2 | 390 | 73.6 | |
| Year-round Campground | 96 | 32.8 | 140 | 26.4 | |
| State Total | 293 | 100.0 | 530 | 100.0 | |

Table 2.--Distribution of Complete Responses and All Campgrounds Surveyed.

³⁸According to Babbie, "a response rate of at least 50 percent is adequate for analysis and reporting. A response rate of at least 60 percent is good. And a response rate of 70 percent is very good." This suggestion is, of course, based on his personal judgement rather than any particular statistical principle. See Earl R. Babbie,

In Table 3 (see page 46) it can be seen that the percentage distribution of complete responses among size classes is fairly close to that of the total campgrounds surveyed. This could mean that the survey has received complete responses which can reasonably represent each of the size classes. However, it should also be admitted that the relatively high average of campsites in the non-response group may indicate that we could have left out some large campgrounds.³⁹

Data originally proposed to be obtained from the survey were included in four major categories. They are: (1) general characteristics of campground operation, (2) locational characteristics, (3) spatial relationships, and (4) financial information. The responses to the first three categories are fairly complete, and perhaps more consistent as compared to data in other similar surveys.⁴⁰ The last category was poorly responded to because most private campground operators are reluctant to disclose their financial data. For the same reason, even those

"Survey Research Methods" (Belmont, Calif.: Wadsworth Publishing Co., Inc., 1973), p. 165.

³⁹We were able to check the size distribution of non-respondents from other data sources such as Campground License Records and Campground Directories.

⁴⁰Two similar surveys of private campgrounds were conducted in 1972, one was conducted by Roger D. Murray, and the other was by Eugene F. Dice, both of the Department of Park and Recreation Resources, Michigan State University, East Lansing, Michigan.

| Size | Complete Response | | te All Non- se Response | | | All Campground Surveyed | | |
|-----------------------------------|----------------------|-------------------|----------------------------|-------|------------------|----------------------------|--|--|
| CIASS | No. | 8 | No. | | No. | | | |
| 10 - 30 | 108 | 36.9 | 72 | 34.6 | 201 | 37.9 | | |
| 31 - 60 | 85 | 29.0 | 55 | 26.4 | 145 | 27.4 | | |
| 61 - 90 | 40 | 13.6 | 25 | 12.0 | 68 | 12.8 | | |
| 91 - 120 | 38 | 13.0 | 31 | 14.9 | 69 | 13.0 | | |
| 121 - 150 | 8 | 2.7 | 12 | 5.8 | 20 | 3.8 | | |
| 151 - 180 | 6 | 2.0 | 5 | 2.4 | 11 | 2.1 | | |
| 181 - 210 | 0 | . 0 | 2 | 1.0 | 2 | . 4 | | |
| 211 - up | 8 | 2.7 | 6 | 2.9 | 14 | 2.6 | | |
| Total | 293 | 99.9 ^a | 208 | 100.0 | 530 ^b | 100.0 | | |
| Average CS per CG ^C | 6(| 0.63 | 67 | .25 | 61. | 72 | | |

Table 3.--Distribution of Complete Responses Among Different Size Classes.

^aBecause of rounding error, the total percentage is not exactly equal to 100.

^bThe sum of the numbers of complete responses and the non-responses is less than the number of total campgrounds surveyed because 29 incomplete responses are not included for tabulation.

^CAverage CS per CG = average numbers of campsites per campground in each category. cases of response, one must be suspicious that answers may not be accurate enough for analysis and reporting. Consequently this category was dropped from the analysis.

Data obtained in this survey were used primarily in the analysis of relationships between campground business performances and the locational factors that might affect them. They were processed into a form appropriate for regression analysis. Procedures and results of the analysis are discussed in Chapter V where the campground location-performance relationships are discussed.

Secondary Data Sources

In addition to obtaining data from the mail survey, this study also required data from various secondary sources. The most important sources were, of course, various commercial campground and trailer park directories. Most directories currently available provide information concerning location, size, operational season, and physical facilities of the campgrounds for a given year. Once the problems of incompleteness and occasional errors are solved, the directories can together provide reliable data for spatial description and analysis.

A second source was the information brochures published by the individual campgrounds. Although these brochures often provide information similar to that indicated in the commercial campground directories, they

usually describe in great detail the exact location of the campground. The brief road map printed on the brochure was extremely helpful to the investigator in determining the campground location coordinates necessary for computer mapping. Besides, the information brochures can provide a basis for checking on consistency and accuracy of the campground information obtained from various sources.

The third source was census publications which included the 1970 Census of Population and the 1969 Census of Agriculture. They provided part of the county data needed to analyze spatial patterns of private campground development. In some cases, census data were used directly in the analysis. In other situations, they required processing to generate a specific value for a variable included for the study.

In addition to census publications, county data required for analysis of location patterns were also drawn from various published and unpublished governmental reports and statistical records which were relevant to this study. A complete listing of data obtained from these sources may be found in Appendix IV.

As noted above, data used in the analysis of campground location patterns were obtained mostly from a variety of secondary sources. This made it very difficult to examine the nature of the errors that might exist in the data, and thus impossible to determine the accuracy of

the analytical results. However, like most studies using secondary data, one must believe that the data employed are reasonably accurate, and thus assume that variation in the response variable is a reflection of the actual variations in the specified set of the input variables and not due to the measurement and observation errors of the data.

CHAPTER III

PRIVATE CAMPGROUND DEVELOPMENT

IN MICHIGAN

The foregoing serves to define the research problem and provides a discussion of the research methods and data sources used in the present study. Let us now describe some general characteristics and spatial patterns of private campground development in Michigan. In doing so, we have used computer mapping and statistical techniques along with descriptive analysis to provide an overview of private campground development in Michigan. The effort made in this chapter should provide a better understanding of the rigorous statistical analysis in the following chapter.

Growth in Campground Industry

The development of private campgrounds for commercial purposes has a long history. According to the survey, the oldest private campgrounds provided for commercial purposes were established during the 1930s. But large-scale developments in the campground industry are a relatively recent phenomenon. In particular, during last

decade, campground enterprises in Michigan were growing both in size and scale. For example, as shown in Table 4 below, about 50 percent of private campgrounds in Michigan were established or licensed in 1970 and after, which is approximately two times larger than those established or licensed in 1964 and before. The growth of the private campground industry may be characterized by a certain pattern in various stages of development. As observed by Bevins, like many other industries, the private campground enterprises will pass through at least three stages of growth enroute to maturity. Bevins explained the three stages as follows:

| Time | Time By Campgrour | | By Car | mpsite | Avg. Sites | | |
|--------------------|-------------------|-------|--------|--------|------------|--|--|
| Period | No. | | No. | 8 | per Camp. | | |
| 1964 and before | 103 | 19.4 | 4666 | 14.3 | 45.3 | | |
| 1965-69 | 159 | 30.0 | 10255 | 31.4 | 64.5 | | |
| 1970-73 | 268 | 50.6 | 17768 | 54.3 | 66.3 | | |
| Total ^b | 530 | 100.0 | 32689 | 100.0 | 61.7 | | |
| | | | | | | | |

Table 4.--Growth in Private Campground Industry in Michigan.

^aThis table was compiled from the following data sources: (1) private campground license records, Michigan Department of Public Health, 1973; (2) campground and trailer park guide, Rand McNally & Co., 1966 and 1973; and (3) private campground mail survey of the present study.

^bCampgrounds which consist of 10 or less campsites were not included in the tabulation.

. . . The first stage is development characterized by rapid growth, wide experimentation and considerable amount of trial and error. This happens in all industries. During this period we have general inefficiency. I think the campground industry has passed through this stage. This was the decade of the 60s.

Now, in 1972, the campground industry has pretty much moved into developmental stage two. Still growing fast. However, we now see greater enterprise refinement and differentiation of product. Innovations are taking place. Campground managers are developing new techniques. Sure it's competition

An eye to the future sheds some light on what's ahead in the developmental stage three, which as some people see it will come about eight years from now, somewhere around 1980. Rapid growth will be over, individual enterprises will be large, capital requirements are going to be extensive. The small, inefficient operators will have been left by the wayside. Those remaining are going to be highly-skilled people . . . I

The implication of this observation is important. As it is in the second developmental stage, the private campground industry in Michigan will face a great challenge of business innovation and more competition. Some painful shifting will take place; there will be numbers of ownership changes or even some going out of business. But there also will continue to be new entrants into the business. It can be expected that these new entrants will be well-organized and develop relatively large-scale operations. In contrast to previous investors, they are also expected to seriously consider their campground

¹Malcolm I. Bevins, "Focusing on the Future," <u>in</u> Eugene F. Dice (ed.), "The Private Campground Business: A Forward Focus," Proceedings of the Michigan Campground Business Seminar at Michigan State University, East Lansing, MI, 1972, p. 13.

location choice. During early stages of campground development, many campground enterprises joined the business without taking a critical step to rationalize their location choice. They either developed their campgrounds on marginal land or retired farmland which had few uses.

Types of Campground Operation

Private campgrounds in Michigan come in a variety of types, depending upon: (1) the function they serve; (2) the facilities they provide; or (3) the length of operating season. As Dice suggests, private campgrounds in Michigan may be grouped into three types according to the function they serve. They include: (1) overnight campgrounds--those which are mostly for a night's rest or short stays by campers; (2) destination campgrounds--those which function as away-from-home vacation headquarters and provide the family or group campers with opportunities for a variety of experiences; and (3) semi-summer-residence campgrounds--those which function as temporary residential units and offer services, mostly on seasonal basis, for those who commute back and forth to work.² This classification is conceptually sound and provides a better understanding of the campground functions, but it is not

²Eugene F. Dice, T. W. Chiang, and Timothy Smythe, "An Introductory Study on Privately Operated Campgrounds in Michigan," Natural Resources Series Ext. Bul. E-717, Coop. Ext. Service, Michigan State University, East Lansing, MI, 1971, pp. 3-4.

operational for data collection or grouping purposes. In actuality, the campground types are not as clear-cut as this classification indicates, even though we realize that there exist different campground functions. In fact, a campground may serve both overnight and destination campers, and this causes a difficulty to group the campgrounds by functions.

Campgrounds may be also classified into two basic facility types, primitive campgrounds and modern campgrounds. Generally speaking, a modern campground is one which offers electricity, water under pressure, and sewage disposal systems, whereas primitive campgrounds only provide the basic hand pump water supply and pit toilet facilities. According to this definition, most private campgrounds would be classified as modern campgrounds.³ They tend to focus on providing improved facilities and sophisticated indoor and outdoor recreation activities at the campground. This trend toward more modern facilities may be encouraged by the fact that people have increasingly used campgrounds as substitutes for motel facilities. The better facilities would make a campground more like a motel and thus attractive to more campers.

³To say a campground is modern only implies that the majority of the campsites on the campground are modern campsites. Many campgrounds which are considered to be modern campgrounds do provide certain primitive campsites along with the modern ones.

Private campgrounds may also be distinguished from each other by the nature of seasonal operation. Some private campgrounds are referred to as seasonal campgrounds if they only operated in a particular season of the year. Others are considered year-around campgrounds since they operate throughout the entire year. According to campground directories and license records, the majority of private campgrounds in Michigan are operated on a seasonal basis. One reason for this may be that camping is a seasonal activity which usually takes place during the warm months (i.e., June, July, and August) in Michigan.

Campground Distribution

There were 975 campgrounds which provided a total of 62,761 campsites in Michigan in 1973. Among the total number of campsites, 52 percent were provided by the private sector. As we shall see in the following discussion, the private campgrounds in Michigan are not distributed the same as those publicly owned. A sharp distinction between them is that publicly owned campgrounds tend to concentrate in northern regions of the state, whereas privately operated campgrounds are more clustered in southern Michigan where population is highly concentrated. Table 5 on pages 56 and 57 shows the distribution of private and public campgrounds by regions in the state. As indicated in the table, about 90 percent of total private campsites were located in Region 2 (northern Lower

| Region | Priv Campgr No. CG ^D | ate ound No. CS ^b | F Park No. CG | Public Campground Park CG ^C Forest CG ^C No. CG No. CS No. CG No. CS | | | | All Campground No. CG No. CS | |
|-------------------------|---------------------------------------|------------------------------------|---------------------|---|-----|------------------|-----|------------------------------------|--|
| Region 1 | 70 | 2733 | 49 | 4161 | 108 | 1989 | 227 | 8883 | |
| % Distrib. ^d | | 8.3% (30.8%) | | 16.4% (46.8%) | | 43.8% (22.4%) | | 14.2% (100.0%) | |
| AVG ^b per CG | | 39.1 | | 132.1 | | 19.7 | | 64.4 | |
| Region 2 | 208 | 12593 | 85 | 11972 | 116 | 2430 | 409 | 27001 | |
| <pre>% Distrib.</pre> | | 38.3% (46.6%) | | 47.2% (44.4%) | | 53.5% (9.0%) | | 43.0% (100.0%) | |
| AVG per CG | | 60.5 | | 140.9 | | 20.9 | | 66.0 | |
| Region 3 | 274 | 17527 | 58 | 9229 | 7 | 121 | 339 | 26877 | |
| % Distrib. | | 53.4% (65.2%) | | 36.4% (34.3%) | | 2.7% (0.5%) | | 42.8% (100.0%) | |
| AVG per CG | | 64.0 | | 159.1 | | 17.3 | | 79.3 | |

| Table 5 Regional Distribution of Camperounus in Michigan | Table | 5Regional | Distribution | of | Campgrounds | in | Michigan | a |
|--|--------------|-----------|--------------|----|-------------|----|----------|---|
|--|--------------|-----------|--------------|----|-------------|----|----------|---|

-

Table 5.--Continued.

| Region | Priv Campgr | ate ound | P Park | Public Car CG ^C | mpground Fores | t CG ^C | Al Campo | Ll ground |
|------------|---------------------|---------------------|-----------|-------------------------------|-------------------|-------------------|-------------|-------------------|
| - | No. CG ^b | No. CS ^D | No. CG | No. CS | No. CG | No. CS | No. CG | No. CS |
| All State | 552 | 32853 | 192 | 25362 | 231 | 4546 | 975 | 62761 |
| % Distrib. | | 100.0% (52.4%) | | 100.0% (40.4%) | | 100.0% (7.2%) | | 100.0% (100.0% |
| AVG per CG | | 59.5 | | 132.1 | | 19.7 | | 64.0 |

Sources of Data:

(1) 1973 Campground License Records, Michigan Department of Public Health, September, 1973.

(2) Michigan Outdoor Guide, Automobile Club of Michigan, 1973.

(3) 1973 Campground Directory, Michigan Association of Private Campground Owners.

(4) Campground and Trailer Park Guide, Rand McNally & Co., 1973.

^aThe information indicated in this table was summarized from Appendix II which contains a table showing the distribution of private and public campground facilities by counties with regional and state totals. See Appendix II for county statistics.

^bCG = campground CS = campsite AVG = average number of campsites

^CPark campground category includes those campgrounds which are operated by state, county, township, or municipal authority and are located in a park. Forest campground category includes both state and national forest campgrounds.

^dThe percentage figures in the parentheses are computed on the basis of row totals.

Peninsula) and Region 3 (southern Lower Peninsula), and only less than 10 percent were in Region 1 (the entire Upper Peninsula). Public campgrounds, on the contrary, were located more in Regions 1 and 2 where woods, waters, and natural scenery are more attractive to a great many people. Region 2 is unique. It has both public and private campgrounds in an even distribution. Perhaps this can be explained by the fact that Region 2 is not only unique in its natural setting but also reasonably accessible to large population concentrations in the state.

Regional Characteristics

Campground development in Michigan is characterized by its regional differences. In this section, we are to discuss these differences on the basis of campground size, seasonal operation, and selected spatial relationships.

The number of campsites on a campground can be used as an indicator of its scale of business operation. Different scales of operation usually require different locations with access to markets of various sizes. In Michigan, large market areas are located in the southern region where population is concentrated. Hence, it is expected that campgrounds in this region will be large in size as compared to other regions. From an examination of survey data, we have found some truth to this argument. As noted in Table 5 on pages 56 and 57, and Figure 4 (see page 59) Region 1 which is far removed from the major



Fig. 4.--The Distributions of Private Campgrounds and Major Municipalities in Michigan. This map was drawn by the computer mapping routine, "SYMBOL," and includes 530 private campgrounds and 130 major municipalities with population 5,000 or more.
population centers in the state does have the smallest average campground size among all regions. In contrast, Region 3, which is close to large population concentrations, has the largest average campground size, compared to all other regions.

The regional differences in private campground distribution can also be examined in terms of some important statistical measures associated with campgrounds. An inspection of Table 6 on pages 61 and 62 reveals that seasonal campgrounds tend to concentrate in Region 3, whereas year-around campgrounds are more heavily represented in Region 2. The reason for this may be that Region 2 has more winter recreation resources and sport activities such as snow-skiing and deer hunting which attract a great many of visitors. But for the level of facility improvement, Region 3 seems to have a slightly higher percentage of modern campsites on each campground than any other region. Moreover, from Table 6 we can see that the average increase in the number of campsites is also higher in Region 3, and this indicates that private campground development has grown faster in Region 3 during past years.

Now let us take a look at some distance measures which are often used to express spatial relationships. The average distance from a private campground to its nearest private neighbor is 6.7 miles for the state, but

| Items | Region l | Region 2 | Region 3 | All State |
|--|--------------------|--------------|--------------|--------------------|
| 1. Total number of campground | 65 | 202 | 263 | 530 |
| Percent of seasonal camp- | 12.5% | 33.1% | 54.4% | 100.0% |
| ground | (49) ^a | (129) | (212) | (390) |
| Percent of year-round | 11.5% | 50.9% | 36.6% | 100.0% |
| campground | (16) | (73) | (51) | (140) |
| Average percent of modern | 62.1% | 70.6% | 74.1% | 68 .9 % |
| campsites per campground | (37) | (117) | (139) | (293) |
| 5. Average number of campsites | 8.4(sites) | 9. 3 | 15.8 | 11.2 |
| differed since established ^b | (37) | (117) | (139) | (293) |
| 6. Average number years a campground has been in operation | 6.9(years) (37) | 6.6 (117) | 8.3 (139) | 7.4 (293) |
| 7. Average distance to nearest private campground ^C | 8.2(miles) | 7.0 | 5.6 | 6.7 |
| | (37) | (117) | (138) | (292)d |
| Average distance to nearest | 12.9(miles) | 9.4 | 16.0 | 12.8 |
| public campground ^C | (36) | (114) | (129) | (282) ^d |
| 9. Average distance to nearest national lake | 1.4(miles) | 2.2 | 1.9 | 1.9 |
| | (36) | (114) | (134) | (284) |

Table 6.--Regional Characteristics of Private Campground Distribution.

Table 6.--Continued.

| Items | Region l | Region 2 | Region 3 | All State |
|--|------------|------------|----------|-----------|
| 10. Average distance to nearest primary highway ^C | 2.7(miles) | 4.8 | 3.2 | 3.7 |
| | (37) | (117) | (139) | (293) |

Sources:

(1) Data sources for item 1, 2, and 3 are as follows:

- (a) Private Campground License Records, Michigan Department of Public Health, 1973;
- (b) Campground and Trailer Park Guide, Rand McNally & Co., 1966 and 1973;
 Campgrounds with less than 10 campsites are not included in this

Table.

(2) Data for item 4 through 10 are obtained from the mail survey of private campgrounds particularly designed for this study.

^aThe figures in the parentheses are the number of valid observations used to compute the statistic.

^DThese numbers were computed by taking an average for all campgrounds in a region the differences between the number of campsites initially established and that available in 1972.

^CThe distances were measured in the actual mileage as reported by respondents.

^dSome respondents did not completely report the information and thus, were not taken into computation.

only 5.6 miles for Region 3 which is the shortest among all regions. Average distance from a private campground to its public neighbor is generally higher as compared to that to the private neighbor. The shortest distance on average between private and public campgrounds is in Region 2 where a relatively large number of public campgrounds are evenly distributed. Data also reveal that Region 1 has the shortest average distance measuring from a private campground to its nearest natural lake or primary highway. One possible explanation for this may lie in the fact that since Region 1, the Upper Peninsula, is located remote from major population centers, private campgrounds in this region must be located close to major highways to catch more overnight campers or near a scenic lake area to attract more destination customers.

Spatial Patterns of Campground Development

This section consists of a description of spatial patterns of private campground development, using computer maps. In this part of the analysis, campgrounds were treated as points on a map, and distances separating them were measured and analyzed. Two techniques commonly used by geographic researchers were used here, and the results are discussed in the following paragraphs.

First, the computer program, "LOCATE," was employed to establish a system of zones around a selected base

point and to count the number and the percentage of campsites falling in each zone.⁴ From this, we are able to describe the campground distribution pattern in terms of spatial diffusion about an origin. The base point chosen here to determine the zones and the values is the populationweighted geographic mean center of the Detroit Metropolitan Area, which is approximately located at the center of the Highland Park City.⁵ The computational results are presented in Table 7 on page 65 and Figure 5 on page 66. It is interesting to note from Table 7 that three-fourths of the total private campsites are located within 196 miles straight-line distance from the Detroit Metropolitan Area, an area which includes about 40 percent of the state total population. If the driving speed is constant at 55 miles per hour, this can be interpreted to mean that the majority

⁴The computer program, "LOCATE," was originally developed by D. F. Marble, Department of Geography, Northwestern University. For further reference, see R. I. Wittick, "GEOSYS"--An Information System for the Description and Analysis of Spatial Data, Version 2," Technical Report No. 73-6, Computer Institute for Social Science Research, Michigan State University, East Lansing, Michigan, 1973, pp. 16-17.

⁵The basis point was determined by the computer program, "CENTRO," with inputs of Cartesian coordinates and population data of 42 municipalities in Detroit Metropolitan Area. For further reference on this computer program, see R. I. Wittick, Ibid., pp. 18-20.

| Zone Number | Distance from basis point ^a | Number of campsites | <pre>% campsites of total</pre> | Cumulative percentage |
|----------------|---|---------------------|-----------------------------------|--------------------------|
| 1 | 28(miles) | 195 | . 60 | .60 |
| 2 | 56 | 3565 | 10.96 | 11.56 |
| 3 | 84 | 3879 | 11.93 | 23.49 |
| 4 | 112 | 2171 | 6.68 | 30.17 |
| 5 | 140 | 4630 | 14.24 | 44.41 |
| 6 | 168 | 5997 | 18.44 | 62.85 |
| 7 | 196 | 3910 | 12.02 | 74.87 |
| 8 | 224 | 3054 | 9.36 | 84.26 |
| 9 | 252 | 2287 | 7.03 | 91.29 |
| 10 | 280 & up | 2834 | 8.71 | 100.00 |

Table 7.--Diffusion of Private Campground Development.

Data Sources:

- 1973 Campground License Records, Michigan Department of Public Health, September, 1973.
- (2) Michigan Outdoor Guide, Automobile Club of Michigan, 1973.
- (3) 1973 Campground Directory, Michigan Association of Private Campground Owners.
- (4) Campground and Trailer Park Guide, Rand McNally & Co., 1973.

^aThe distances are measured in straight-line distance in miles from the basis point (BP) to the outer boundary of each zone.

^bThe small campgrounds with less than 10 campsites are not taken into consideration.



Fig. 5.--Diffusion of Private Campground Development. The diffusion of private campground development from the Detroit Metropolitan Area considered as base point. The map is based on the information presented in Table 7. of Michigan private campsites are within the reach of 3.5 hours or less driving from the major population centers.⁶

In Table 7 (see page 65), it can also be observed that there is an intensive campground development in zone 2 which immediately surrounds the Detroit Metropolitan Area. This zone is attractive to private campground developers not only because it is located at the door of a large market area but also because it abounds in high quality recreational water resources. This zone consists of a large portion of Oakland and Livingston counties. In contrast to zone 2, zone 4 has only few private campground developments, even though it is located less than two hour driving distance from Detroit. This can probably be explained by the fact that this zone is characteristic of productive farm land rather than recreational resources. In this particular case, agricultural production may compete favorably with campground development for the use of land resources.

The location pattern of private campground development may change over time. In order to examine such a change, a series of maps showing locations and sizes of private campgrounds were constructed. These maps were drawn by the computer mapping program, "SYMBOL," with inputs of data point values and Cartesian coordinate data

⁶Since straight-line distance was used to determine zone boundaries, this calculation may underestimate actual driving time.

provided by the investigator.⁷ Coordinate data for the state outline and the campground location points were obtained by reference to a series of county general highway maps overlaid with transparent grid paper.⁸ The scale of the base maps is at 1" = 2.8 miles, and the minimum grid size is one-tenth of an inch.

The point symbolic maps developed here can facilitate a visual understanding of private campground location patterns. In a more direct way these maps provide a clear statement of the distribution of private campground development at a given time so that a map at one time can be compared to a map at another time. This is illustrated in Figure 6 (see page 69), Figure 7 (see page 70), and Figure 8 (see page 71); each represents a location pattern at a given time period.

As noted on the maps, the specific years presently considered for comparison purposes are 1964, 1969, and 1973.⁹ The distribution pattern for 1964, as it is shown

⁷Robert I. Wittick, Ibid., pp. 41-42.

⁸The whole set of the base maps was made available by courtesy of the Michigan Department of State Highways.

⁹To select these years for comparison is somewhat arbitrary. However, like many other economic activities, growth of the private campground business has been gradual. The determination of observation years may be justified by reference to stages of business growth. In the early sixties and before, private campground development was characterized by wide experimentation, a series of trials and errors, and small scale of operation. It was made mainly by the private sector with very little assistance



Fig. 6.--Distribution of Private Campgrounds in Michigan, 1964. This map was drawn by the computer mapping routine "SYMBOL," and was based on data compiled from: (1) Private Campground License Records, Michigan Department of Public Health; and (2) Private campground mail survey designed for this study. The map includes 103 private campgrounds which were established or registered in and before 1964. Small campgrounds with less than 10 campsites were not included.



Fig. 7.--Distribution of Private Campgrounds in Michigan, 1969. This map was drawn by the computer mapping routine, "SYMBOL," using data compiled from: (1) Private Campground License Records, Michigan Department of Public Health; (2) 1969 and 1973 Campground and Trailer Park Guide published by Rand McNally & Co.; and (3) Private campground mail survey designed for this study. The map includes 262 private campgrounds which were established or registered in and before 1969. Small campgrounds with less than 10 campsites were not included.



Fig. 8.--Distribution of Private Campgrounds in Michigan, 1973. This map was drawn by the computer program, "SYMBOL," using data compiled from the same sources as Figure 7. The map includes 530 private campgrounds and omitted small campgrounds having less than 10 campsites.

in Figure 6 on page 69, seems to have a tendency toward concentration. An examination of Figure 7 on page 70, and Figure 8 on page 71 reveals that this tendency did occur and it appears that private campground development in later years for the most part expanded from initially concentrated areas rather than uniformly spreading over the entire state. As a result, distribution of private campgrounds has become concentrated in some areas but remained sparse in many other areas.

At this point, it seems logical to ask whether such a distribution pattern has occurred randomly or has been influenced by some identifiable forces. In order to test for randomness, a statistical technique known as the "nearneighbor analysis" was employed to provide an index of the degree of departure from randomness.¹⁰ The index (R), known as nearest-neighbor statistic is a ratio of the mean observed distance ($\bar{r}A$) between each point and its nearest

¹⁰See page 31 of this report for a discussion on the concept of near-neighbor analysis.

and encouragement from the public sector. However, after 1962, the government became interested in promoting private outdoor recreation development to cope with the rapidly growing demand at that time. The federal government, for example, has established a number of programs for assistance to private outdoor recreation developers. This assistance included credit, technical aid, educational services and research. Consequently, both public and private campground developments grew rapidly. Then in the seventies, the campground business became larger and more complex. Development at this stage was characterized by an improved management and product differentiation. Rapid growth continues.

neighbor to the expected mean distance ($\bar{r}E$) obtained in the same relationship from a random distribution.¹¹ The ratio has a range in value from zero to 2.15 and is less than, equal to, or greater than one, depending upon whether the pattern tends to be clustered, random, or uniform respectively. As previously indicated, the computed values of the nearest-neighbor statistic R are presented in Table 8 on page 74.

An examination of Table 8 reveals that the computed values of the nearest-neighbor statistic R for regional subdivisions and for selected years are all less than one. This does confirm the tendency toward a clustered campground location pattern as expressed on the point symbolic maps. Intuitively it was also expected that values of R would vary in magnitude from one region to another, for it would seem that variations in physical geography, economic base, and transportation infrastructures would likely to influence the spacing of private campground development. As we see from Table 8, the empirical results seem to support the intuitive reasoning, but the interregional variations in R is not as significant as it was expected. Such insignificant variation in the values of the regional nearest-neighbor statistic may have resulted from the possible association of private

¹¹For computation of $\overline{r}E$, see footnote 24 on page 31.

| Year or Region | Number of Observations | Observed ^b Mean Distance (mile) (rA) | Expected Mean Distance (mile) (rE) | Near- Neighbor Statistic (R) | Nature of Pattern |
|-------------------|------------------------------|--|---|---------------------------------------|----------------------|
| By year, all s | state: | | | | |
| 1964 | 103 | 9.694 | 17.648 | 0.549 | clustered |
| 1969 | 262 | 5.989 | 11.522 | 0.520 | clustered |
| 1973 | 530 | 4.270 | 8.347 | 0.512 | clustered |
| By region, 197 | 73: | | | | |
| Region I | 66 | 6.398 | 11.676 | 0.548 | clustered |
| Region II | 202 | 4.402 | 6.731 | 0.654 | clustered |
| Region III | 262 | 3.693 | 6.919 | 0.534 | clustered |
| All state | 530 | 4.270 | 8.347 | 0.512 | clustered |

Table 8.--Nearest Neighbor Measures of Private Campground Locations.^a

^aThe distance measures and near-neighbor statistics shown in the above table were computed by the computer program, "NABOR," which was originally developed by Dierk Rhynsburger, Department of Geography, University of Michigan, and modified by R. I. Wittick, Department of Geography, Michigan State University to operate on MSU CDC-6500 Computing System. For further reference, see R. I. Wittick, "GEOSYS--An Information System for the Description and Analysis of Spatial Data, Version 2," Technical Report No. 73-6, Computer Institute for Social Science Research, Michigan State University, 1973, pp. 21-22.

^bDistances are measured in straight-line mileage between a pair of points.

campground locations with some areal characteristics which are common in all regions. An inquiry into this question and the factors influencing clustering of private campground development will be carried out in the next chapter wherein the spatial relationships are considered.

CHAPTER IV

ANALYSIS OF PRIVATE CAMPGROUND DISTRIBUTION

In the foregoing discussion, it has been found that the distribution of private commercial campgrounds tends to be more clustered than random. This can be interpreted to mean that some areas have been more attractive to private campground development than any other areas. If such is the case, certain areal characteristics may be used to describe and explain spatial variations in private campground distribution. But which areal characteristics are to be used in such description and analysis? What are the relationships between selected areal characteristics and the spatial pattern of private campground distribution? Answers to these questions take the form of hypotheses which may be posed for testing. Therefore, in this chapter, an attempt is made, using multiple regression analysis techniques, to identify significant areal characteristics and analyze the degree and direction of their relationships with spatial variations in private campground distribution.

Geographic Unit for Analysis

The geographic unit chosen for analysis in this chapter is the county. This determination was arrived at from the following reasons: (1) The county is a convenient subregional grid which retains reasonable homogeneity with respect to area characteristics for purposes of outdoor recreation analysis. (2) The county has authority to influence land use within its territory. If a county authority decides to encourage outdoor recreation activities, this would create a favorable "climate" for private campground development, and vice versa. (3) Most data concerning area characteristics are collected on the county basis. To select the county as the geographic unit for analysis does, to a great extent, ease data collection efforts. (4) The 83 counties of Michigan form a reasonable grid system for description and analysis of spatial data by computer-mapping techniques. As we shall see, computermapping techniques are used to facilitate development of hypotheses for statistical testing.

On the other hand, the county also has some limitations when used as the observation unit in analysis. First, differences in size among counties may introduce statistical bias because it may disturb randomness of the observations. That is, large county units may have a greater change for private campground development than small ones. If such is the case, the accuracy of regression

estimates would be reduced. Second, the campground development in a specific county may, in fact, be influenced by area characteristics spread across county boundaries. As a result, the accuracy of statistical inference would be reduced.

Developing Hypotheses

The spatial pattern of private campground development is a composite result of numerous physical, cultural, and socio-economic "influences." Because of the complexity of the problem, it seems unlikely that anyone could completely understand relationships between them. It is possible, however, that one may sort out what seems likely to be dominant factors by analyzing hypotheses developed from intuitive reasoning, existing knowledge and past experiences. And operationally, the "SYMAP" mapping routine can be used to facilitate development and selection of hypotheses for analysis. The following is a listing of selected hypotheses and a discussion of the rationale and component parts of each hypothesis under consideration.

 Private campgrounds tend to be located in areas where recreational water resources are available.

The rationale underlying this hypothesis is simply that water resources are the essential base for most outdoor recreation activities. A lake, stream, river, or

shoreline is frequently the center of outdoor recreation activities. In campground development, size and quality of the water resources base for recreation may govern the types of activities to be provided and scale of operation to be established at a campground. As generally conceived, the water resource base with high recreation quality tends to attract more private campground development. It is expected that the water resource base will have a positive relationship with private campground development. To test this hypothesis, we considered its component parts represented by such county statistics as: (1) number of inland water bodies, (2) acres of inland water bodies, (3) miles of streams, and (4) miles of great lake shoreline.

The selection of variables to represent the hypothesis for analysis was made by considering the practical meaning of the variables and by comparing the maps created by the "SYMAP" package. Figure 9 on page 80, for example, contains two maps showing spatial patterns of water surface acreage and private campsite distribution. By comparing the maps, it is possible to obtain a rough image of how the two variables are related. This practice was applied to every possible variable during the hypothesis development stage.

(2) Private campground development tends to orient to the area where tourist attractions and highly desirable public recreation areas are located.

Fig. 9.--Maps Showing Water Surface and Private Campsite Distribution Patterns. These maps were developed by the "SYMAP" routine with the county geographic centers as data points. They provide an approximate image of how the two variables were related, and thus are helpful to variable selection. However, these maps can only show overall spatial pattern, and must not be viewed as precise representation of the actual data.



The rationale underlying this hypothesis is that private campgrounds may be served as away-from-home vacation headquarters which allows campers to visit tourist attractions in the area and enjoy a variety of leisure activities with little additional cost. A campground located in or near an area of land having distinctive natural characteristics, historical significances, and cultural activities usually has the added advantage of complementary attractions. Such an area would have great appeal to campground developers if it is available for private campground development at a reasonable price. For empirical testing, this hypothesis may be represented by a set of independent variables such as acres of public recreation land in the county, availability of public and private recreation facilities in the county, and number of tourist attractions in the county.

(3) Private campgrounds tend to be located in the area of land having highway convenience and easy access to major population centers.

The rationale underlying this hypothesis is that accessibility is an important factor in determining demand and supply of outdoor recreation services, and that transportation convenience affects time and monetary costs of

travel as well as the character of recreation experience.¹ Travel from home to the campground and back requires time and money. A campground with poor access to potential users and inconvenient transportation incurs relatively large time and monetary costs of campers, as well as sometimes causing them discomfort. If campers rationalize their expenditures, it can logically be expected that accessibility will bear a positive relationship with the intensity of private campground development in an area. To examine this hypothesis, we may consider such county data as: (1) distance from the geographic center of a county to the population center of the Detroit Metropolitan Area, (2) the density of highways (including county, state, interstate, and federal highways) in a county, and (3) major regional subdivisions. Preliminary screening was made to select a set of variables which are considered most representative of the hypothesis. Figure 10 on page 83 contains two maps showing spatial patterns of highway density and private campsite distribution. It provides an example of how visual comparison of maps created by the "SYMAP" package was implemented.

(4) Private campground development tends to orient away from the area where land costs are high.

¹For a more extended discussion as to how transportation affects outdoor recreation, see Marion Clawson and Jack L. Knetsch, "Economics of Outdoor Recreation" (Baltimore: The Johns Hopkins Press, 1966), pp. 96-102.

Fig. 10.--Maps Showing Highway Density and Private Campsite Distribution Patterns. These maps were developed by the "SYMAP" routine with the county geographic centers as data points. They provide an approximate image of how the two variables were related, and thus are helpful to variable selection. However, these maps can only show overall spatial pattern, and must not be viewed as precise representation of the actual data.



The rationale underlying this hypothesis is that land is a substantial part of campground business invest-If land costs are high, campground investment would ment. involve large initial capital and high opportunity costs. Associated with high land costs may be also higher property taxes which represent an additional annual cost of operating a campground. In an area of land having high costs, land owners may attempt to seek more lucrative uses for their land and other resources rather than for campground development. On the other hand, prospective campground developers may hesitate to establish campground facilities in that area because of high land costs. Accordingly, we can hypothesize that the higher the land costs of an area, the fewer the private campgrounds expected to be located in the area. Variables considered relevant to the test of this hypothesis include: (1) average dollar value of farm land per acre in a county, (2) average property tax per acre of land in a county, and (3) annual increase in real assessed value in a county.

(5) Private campground development tends to orient away from an urbanized and/or industrialized area.

Like any other economic activity, private campground development must compete for land resources with other land use alternatives. In a market economy, land resources under competition usually go to the use which

has the highest productivity and thus can bid the highest price. In order to compete for use of land resources, private campground enterprises must be able to produce a return that will enable them to bid the highest price. However, in urbanized and industrialized area where land use competition is often intense, extensive enterprise such as the campground business have difficulty competing for use of land resources with intensive land use activities. Therefore, the greater the degree of urbanization and industrialization, the less likely it will be developed into campground use. Moreover, from an esthetic point of view, an urbanized or industrialized area does not seem to provide the atmosphere desirable for camping activities. Examples of county data relating to this hypothesis include: (1) number of political subdivisions in a county, (2) county population density, (3) percentage of urban population to total county population, and (4) ratio of industrial employment to farm employment in a county.

The Analytical Model

The analytical method selected for investigating the above hypotheses is multiple regression analysis, which is capable of isolating the collective and separate contributions of two or more independent variables towards explaining variation in a dependent variable. Structure of the regression model designed for the present study is as follows:

$$Y_{j} = a + \sum_{i=1}^{k} b_{i} x_{i} + U_{j} \qquad j=1,2,...N \text{ and } i=1,2,...K$$

where:

- Y is the dependent variable representing the number of total private campsites in a county,
- x_{ij} is an independent variable; each represents a county characteristic (a detailed description of each variable will follow),

a is the Y-axis intercept,

- U_j is the error term associated with each estimated value of the dependent variable,
- i is the subscript representing a specific independent variable,
- j is the subscript representing an observation,
- N is the number of observations, i.e., the total county units under investigation, N = 83, and K is the number of independent variables to be anal-

The Dependent Variable

yzed, K = 13.

The dependent variable selected for analysis is the number of campsites provided by the private sector in each county. The number of private campsites in a county is assumed to reflect the private campground locational pattern which is an outcome of aggregate location decisions of private campground enterprises. If location decisions of private campground developers were economically "rational" and were based on past experiences and knowledge of existing area characteristics, it is possible to establish a meaningful relationship between the number of private campsites and the selected county characteristics. For this reason, the investigator considered that the number of private campsites would be an appropriate dependent variable for analysis of campground areal associations.

Independent Variables

In order to examine the relationship between private campground development and county characteristics, a set of county data was developed into 30 independent variables which were considered indicative of the hypotheses discussed above.² Moreover, through a preliminary screening process, thirteen (13) variables among them were considered appropriate for final regression analysis. The selection was made by a pairwise comparison of simple correlation coefficients between independent variables and by a visual comparison of the maps created by the "SYMAP" computer mapping program as mentioned before. If two

²See Appendix III for the listing and descriptions of the 30 variables originally considered for the county model.

independent variables were highly correlated (i.e., $r_{ij} = 0.7$), only the one most closely related to the dependent variable was selected. Table 9 on pages 89 and 90 lists and describes the 13 independent variables included.

The Statistical Findings

As mentioned above, the statistical method used to estimate coefficients associated with independent variables and in testing the hypotheses is the SPSS Stepwise Multiple Regression Program currently operating on the CDC 6500 computing system of Michigan State University. The final equation was determined at the .10 level of statistical significance,³ and the results are presented in Table 10 (see pages 91 and 92).

 $^{^{3}}$ The selection of the statistical significance level is one of many controversial statistical problems. Although some criteria for selection significance level have been suggested (see Sanford Abovitz, "Criteria for Selecting a Significance Level: A Note on the Sacredness of .05," in Denton E. Morrison and Raman E. Henkel, "The Significance Test Controversy" (Chicago: Aldine Publishing Co., 1970), pp. 166-171), there is no rule of thumb for selecting an appropriate significance level. The level of significance selected here for testing hypotheses is .10 which is larger than the conventional levels of significance such as .05 and .01. The selection of relatively large level of significance for this study can be justified by three essential reasons: (1) From the standpoint of practical consequences, errors incurred in establishing the relationship between campground development and area characteristics have few long lasting and extreme effects on policy decision-making. (2) The present study focuses primarily on the exploration of a set of interrelations in private campground location decisions. In this exploratory stage, a large significance level increases the probability of accepting the investigator's hypotheses which may well become a scientific basis for further study. (3) Power of the test varies directly with sample size,

| Variable Notation | Variable Description | Unit of Measurement |
|----------------------|---|----------------------------------|
| Water Reso | ources: | |
| x ₁ | Inland water bodies over 200 acres | number |
| ×2 | Total length of streams | miles |
| x ₃ | Total length of Great Lake shoreline | miles |
| Other Recr | eation Resources (areas and facili | ties): |
| ×4 | Publicly owned campsites (including both park and forest campgrounds) | number |
| x ₅ | Acreage of public recreation land | acres |
| ^х 6 | Nationally significant tourist attractions | number |
| Accessibil | ity: | |
| ×7 | Distance from the geographic center of each county to the population center of the Detroit Metropolitan Area | miles |
| x ⁸ | Density of highways (including county, state, federal, and interstate highways) | miles per sq. mile of area |
| ×9 | Total length of state, inter- state, and federal highways | miles |
| Land Costs | : | |
| ×10 | Average value of farm land | dollars per acre (1969) |

| Table | 9The | Independent | Variables | Included | in | the |
|-------|------|-------------|-----------|----------|----|-----|
| | Cour | ity Model. | | | | |

Table 9.--Continued.

| Variable Notation | Variable Description | Unit of Measurement |
|------------------------|--|-------------------------|
| Level of U | Irbanization: | |
| x ₁₁ | Population density, 1970 | persons per sq. mile |
| ×12 | Proportion of land in farm and forest | percentage |
| Employment | Condition: | |
| x ₁₃ | Average unemployment rate (1969-1972) | percentage |
| Fo | or data sources, see Appendix IV. | |

| Variable Number | Variable Description | Regression Coefficients ^b | Beta Weights | STD error of reg. coeffi. |
|------------------------|---|---|-----------------|------------------------------|
| Water Res | ources: | | | <u>~~</u> |
| x ₁ | No. of ponds and lakes over 200 acres | 25.196 | .418 | 5.795 |
| x ₂ | Miles of streams | POS-NS | | |
| x ₃ | Miles of GL shoreline | POS-NS | | |
| Other Rec | reation Resources: | | | |
| ×4 | No. of public campsites | POS-NS | | |
| × ₅ | Acre of public land | POS-NS | | |
| x ₆ | No. of nat'l. tourist attractions | 39.309 | .244 | 19.978 |
| Accessibi | lity: | | | |
| x ₇ | Distance from county to Detroit | NEG-NS | | |
| x ₈ | HWY densityM. per sq. mile | 481.443 | .868 | 81.380 |
| x ₉ | Milesmajor HWY | POS-NS | | |
| Land Cost | .5: | | | |
| x ₁₀ | AVG. dollar value per acre of farmland | -9.562 | 562 | 2.897 |

Table 10.--A Summary Table of Regression Results.^a

Table 10.--Continued.

| Variable Number | Variable Description | Regression Coefficients ^b | Beta Weights | STD error of reg. coeffi. |
|--------------------|------------------------------------|---|-----------------|------------------------------|
| Degree of | Urbanization: | | | |
| x ₁₁ | Population density | NEG-NS | | |
| x ₁₂ | Percent of land in farm and forest | POS-NS | | |
| Employment | Condition: | | | |
| x ₁₃ | AVG unemployment rate | POS-NS | | |
| | ~ ~ | | | |
| Constant | : | -450.890 | | 131.303 |
| Number c | of valid observations = 81 | | | |
| Multiple | e regression coefficient (R) | = .612 | | |
| Multiple | e determination coefficient | $(R^2) = .374$ | | |
| Standard | l error of estimate = 284.36 | 58 Overal | .l F value = | = 11.366 |

^aFigures are rounded to 3 decimal places. See Appendix V.

^bThe variables not significant at .10 level are indicated only by the direction of relationship. POS = positive relationship, NEG = negative relation-ship, and NS = not significant at .10 level (F value of 2.79).

As Table 10 on pages 91 and 92 shows, the coefficient of multiple determination, R^2 , a measure of the overall statistical explanation power of the regression equation, for the equation including four significant variables was .374. This means, in practice, that about 37 percent of variation around the mean in the number of campsites provided by the private sector was accounted for by the four variables in combination.

The same table also indicates the regression coefficient and beta weight for each of the four independent variables significant at the .10 level. The regression coefficient measures the impact of each individual variable, whereas the beta weight is used to compare the relative importance among the variables. These measures will make sense only when there is no severe multicolinearity problem involved in the estimates because oftentimes such a problem restricts our ability to determine the separate impact of variables. However, an examination of the correlation matrix obtained from the regression calculation in this study reveals that only X_{11} (population density) is highly correlated with X_{10} (average dollar

that is, as N increases there is a greater probability of correctly rejecting the null hypothesis, as compared to an alternative hypothesis. For these reasons, we considered the larger significance level appropriate. Moreover, since data used for this regression analysis were obtained mostly from census sources, it should be noted that the test significance in this case may not be as meaningful as in well-designed experimental research.

value of farmland per acre) and X₆ (number of tourist attractions with national significance).⁴ This suggests that the intercorrelation between independent variables does not create serious problems in assessing their individual impacts.

Discussion and Conclusions

According to the regression results, the variation in the number of campsites provided by the private sector is significantly related to four county characteristics: highway density, average dollar value per acre of farmland, number of lakes with size over 200 acres, and number of tourist attractions with national significance, in that order. The consistency in sign and significance of various statistics shown in the regression results seem to support the basic hypotheses regarding the orientation of private campground development. The following conclusions can be drawn from the regression analysis:

(1) Highway convenience and accessibility appear to be the most important factors associated with the distribution of private campground facilities. Private campgrounds tend to be developed in an area where highway transportation is convenient, other things being equal.

⁴If two independent variables have a simple correlation coefficient of .6 or more, they are considered here as highly correlated. In this case, only $r(x_{11}, x_6) = .74485$ and $r(x_{11}, x_{10}) = .77098$ are above .6 level.

This statement is also strongly supported by the survey results which, as presented in Table 11 on page 96, show that about one-third of the respondent campgrounds are located within one mile distant from a state or federal highway, and up to 82.6 percent are within 5 miles of the distance. There are also good reasons to believe that such an association exists. Campgrounds located near a highway or in an area where highway density is high are likely to receive more campers, particularly those wanting to stop for a night's rest and perhaps limited sightseeing. Also, campground developers have realized that highway convenience and good access could mean savings in both time and monetary costs, and oftentimes comfort, for a camper traveling by automobile with trailer and other camping equipment, and accordingly they establish campgrounds in areas convenient to highways. In this case, if we assume that campers are rational and hence try to minimize their time and monetary costs, it is reasonable to say that orientation of private campground development toward highway access is consistent with the rational behavior of campers.

(2) As hypothesized, the number of campsites provided by the private sector in a county is negatively related to the dollar value per acre of farmland in that county. High dollar value of land means high land cost to the campground developer. As this cost increases, the
| Distance ^a in Miles | Number of Observations | Percent Distribution | Cumulative Percent |
|-----------------------------------|---------------------------|-------------------------|-----------------------|
| 1.0 - less | 105 | 35.8 | 35.8 |
| 1.1 - 5.0 | 137 | 46.8 | 82.6 |
| 5.1 - 10.0 | 36 | 12.3 | 94.9 |
| 10.1 - 15.0 | 6 | 2.0 | 96.9 |
| 15.1 - 20.0 | 4 | 1.4 | 98.3 |
| 20.1 - 30.0 | 3 | 1.0 | 99.3 |
| 30.1 - up | 2 | .7 | 100.0 |
| Total Valid Observations | 293 | 100.0 | |
| Average 3. Distance | 751 miles | Standard Deviation | 7.387 miles |

| Table | 11Distances | from | Private | Campgrounds | to | State | or |
|-------|-------------|--------|---------|-------------|----|-------|----|
| | Federal H: | ighway | Y • | | | | |

Source: Based on responses from the private campground survey conducted as part of this study.

^aDistances are measured in actual mileage as reported by campground operators.

campground developer's initial capital investment and annual property taxes also tend to increase. For a business with modest financial return such as a campground operation, developers would hesitate to establish campgrounds in a high land-cost area. Moreover, in an area where land values are high, land owners would be expected to seek uses for their land and other resources more lucrative than campground development. Consequently, it may be expected that few campgrounds would be developed in high land-cost areas.

(3) As expected, those variables (see Table 10 on pages 91 and 92) indicative of a water resource base showed a positive relationship with the number of campsites provided by the private sector. However, among the three selected variables, only the number of inland water bodies over 200 acres was statistically significant. This may be due to the fact that sizable lakes are more flexible for various water-oriented activities, and thus more attractive to private campground development. Moreover, it is also possible that relatively restrictive use of Great-Lakes shoreline has limited its possibility for private campground development.

The importance of water resources to campground development is shown by the results of the survey. As indicated in Table 12 on page 98, about two-thirds of the total respondent campgrounds are located adjacent to either

| Type of Adjacent Water Bodies ^a | Number of Observations | Percent Distribution | | | |
|---|---------------------------|-------------------------|--|--|--|
| Natural lake | 147 | 50.5 | | | |
| Artificial lake | 36 | 12.4 | | | |
| River | 30 | 10.3 | | | |
| Small stream | 34 | 11.7 | | | |
| Not adjacent to any water body | 44 | 15.1 | | | |
| Total Valid Observations | 291 | 100.0 | | | |

Table 12.--Summary of Private Campground Distribution by Different Adjacent Water Bodies.

Source: Based on the responses from the private campground survey conducted as part of this study.

^aThe term, "adjacent" refers to a distance measure which is 200 feet or less between two relevant location points. natural or artificial lakes, and only 15 percent of the total respondents are not located adjacent to any water body. In referring to types of activity provided by private campgrounds, the survey (see Table 13 on page 100) also indicates that most respondent campgrounds have provided one or more water-oriented activities listed in the questionnaire, and only 12 percent of them have not provided any of the listed water-oriented recreation activities. Based upon both regression analysis and survey results, we may conclude that camping has been usually associated with water, and private campground development tends to orient toward recreational water resources.

(4) As the analytical results indicate, there could be a complementary relationship between private campground development and other recreational resources such as public campground facilities, public recreation land areas, and tourist attractions. However, among these variables, only the number of tourist attractions with national significance was found to be statistically significant at .10.⁵ Public park resources and campground facilities add to the general attractiveness of an area, but at current state of development, they do not seem to

⁵The tourist attractions considered here include both unique natural features and cultural facilities and activities. The ranking of significance of a tourist attraction was suggested by Mr. Charles E. Budd, Tourist Promotion Manager, Michigan Tourist Council, on the basis of frequencies of tourist inquiry for the attraction and his personal judgement.

| Water-Oriented Activities | Number of Observations ^a | Percent Distribution ^b | Total Valid Observations |
|------------------------------|--|--------------------------------------|-----------------------------|
| Motor boating | 140 | 48.1 | 291 |
| Water skiing | 104 | 35.7 | 291 |
| Canoeing | 161 | 55.7 | 291 |
| Swimming | 204 | 70.1 | 291 |
| Fishing | 228 | 78.4 | 291 |
| Row boat & paddle boat | 191 | 65.6 | 291 |
| None of the above | 36 | 12.4 | 291 |

Table 13.--Water-Oriented Recreational Activities Provided by Private Campgrounds.

Source: Based on the responses from the private campground survey conducted as part of this study.

^aOne campground may provide more than one activity.

^bBased on the total valid observations of each activity.

impose a significant influence upon spatial distribution of private campground industry.

(5) As hypothesized, population density was found to have a negative relationship whereas the percentage of land in farm and forest had a positive relationship with the number of campsites provided by the private sector in the county. Both variables were selected to indicate the degree of urbanism or ruralism of the county. Although not statistically significant, their relationship with the dependent variable may have some practical implications. First, since competition for land and other resources is more intense in urbanizing areas, extensive enterprises such as campgrounds would have difficulty competing as a In addition, because camping for many resource use. people is to experience outdoor living in close association with nature, the orientation of private campground development to rural areas may be considered a reflection of the desirability of such an environment for camping activity.

Throughout this chapter we have described and analyzed in considerable detail the spatial pattern of the private campground industry in Michigan. Summarizing, it can be said that the spatial distribution of private campgrounds in Michigan is more clustered than random. There have been locational forces at work to shape the existing distribution pattern. From the results of our survey and analysis, we have found that private campground development

has been oriented to those areas where highway transportation is convenient, and where recreational water resources and significant tourist attractions are available. Moreover, since campground operations are extensive enterprises with modest financial returns, land costs have been important constraints on the choice of private campground locations.

CHAPTER V

FACTORS IN THE PRIVATE CAMPGROUND LOCATION DECISION

The conceptual basis and analytical method for determining private campground location decision factors have been discussed in previous chapters relating to hypothesis development and research method. In this chapter we focus on the empirical analysis that was designed to: (1) isolate a set of key variables associated with the location of private campground development; (2) test the hypothesis that the profit-motivated campground location decision can be substantially explained by spatial characteristics; and (3) investigate the hypothesis that solution to the campground location decision will depend on a combination of various spatial characteristics which act as inputs to, parameters in, or constraints to the production function rather than any single individual factor that dominates the decision. The analytical model, including its dependent and independent variables, and the empirical results will be systematically presented in the following sections.

The Analytical Model and Its Variables

In an attempt to carry the concepts of location decision-making a step further for statistical analysis, we have formulated a campground developer conceptual model. Figure 11 on page 105 illustrates the elements which are believed important to the campground developer's location decision. These elements were developed into measurable variables so that they would be suitable for statistical analysis.

As previously mentioned, the method employed in this analysis to determine campground location decision factors is multiple regression. The basic form of regression equation used here can be written as follows:

 $Y = a + b_1 X_1 + b_2 X_2 + \dots + b_i X_i + \dots + b_n X_n + e$

where:

- Y = the dependent variable represented by occupancy rate (in percentage),
- a, and b_i = parameters; a is the intercept of Y axis, and b_i are partial regression coefficients which determine the slope of the equation, and
- e = the error term.



Fig. 11.--Elements in the Campground Developer's Location Decision Model.

The Dependent Variable

The only dependent variable selected for the present analysis is the percentage occupancy rate. This form of occupancy rate has been used in many campground studies as an indicator of campground performance or camper preferences.¹ Conceptually, such an occupancy rate is defined as the ratio of total number of campsite-days sold during a specific time period to the total number of campsite-days available in a campground for rent during the same period of time. For example, if a campground has 100 rental campsites available in June, the total number of campsite-days available for rent in that month would be 3000 (30 days x 100 campsites). Accordingly, if the operator of that campground has rented out 1800 campsites-days during that month, then the occupancy rate of his campground in June would be .60 or 60 percent.

As stated, computation of the occupancy rate seems very easy. In fact, it is, but the real data for computing such an occupancy rate are difficult to obtain either because campground operators did not keep occupancy records or because they were unwilling to disclose their records. Therefore, in this study, we did not ask for the direct campsite-day records from campground operators.

¹For example, see David W. Lime, "A Spatial Analysis of Auto-Camping in the Superior National Forest of Minnesota: Models of Campground Selecting Behavior" (unpublished Ph.D. dissertation, University of Pittsburgh, 1969), pp. 43-58.

Instead, we asked for their estimates of monthly occupancy rate, and from these monthly estimates, we derived the seaschal average for each respondent campground. In doing this, we implicitly assumed that each respondent understood the concept of relative occupancy rate and reported their estimates consistently and accurately.²

Data used in computing the dependent variable were restricted to a three-month season including June, July, and August of 1972. The reason that only seasonal data were considered is that camping is a seasonal activity in Michigan, and it takes place mostly during the summer months.³

Independent Variables

There are a number of campground operating and spatial characteristics which may, to a variable degree, affect the desirability or performance of a campground. However, previous studies have suggested that three general factors are most important. These are (1) accessibility,

²The investigator tested this assumption by asking many campground operators attending the campground owners conference held at Michigan State University and found that the concept of relative occupancy rate used in this study was generally understood.

³As stated in the report of "Michigan State Park Camper Study," approximately 85 percent of the campers visited state campgrounds during the warmest months which in Michigan include June, July, and August. See Michigan State University and Michigan Department of Conservation, "Michigan State Park Camper Study," unpublished manuscript, 1967, p. 54.

(2) unique natural environment, and (3) cultural or manmade environment.⁴ Based upon these findings and survey data, we developed a set of 34 variables for the present analysis. They are described as follows.

Campground Operating Characteristics

- X₁--Years in business: measured by the number of years the campground has been in operation, counting from the date of establishment to December 31, 1972, rounded to the nearest tenth of a year.
- X₂--Size of campground: measured in number of campsites available for rental during the 1972 season.
- X₃--Proportion of modern facilities: measured in percentage of modern campsites to total campsites in 1972.
- X₄--Daily rental charge: measured to the nearest tenth of a dollar. This was the basic fee charge per site per day during the 1972 season. If the fee charge varied according to site location or facility type, the average rate for the campground was used.

⁴For further discussion, see Carlton S. Van Doren, op. cit., p. 5.2 and David W. Lime, op. cit., pp. 61-68.

Proximity to Recreational Water Body

- X₅--Proximity to a natural lake: coded as 1 if the campground is located adjacent (i.e., within 200 feet of distance from the campground) to a natural lake, and as 0 if not.
- X_6 --Proximity to a river: coded as 1 if the campground is located adjacent to a river, and as 0 if not.
- X₇--Proximity to an artificial (man-made) lake or pond: coded as 1 if the campground is located adjacent to an artificial lake or pond, and as 0 if not.
- X₈--Proximity to a small stream: coded as 1 if the campground is located adjacent to a small stream, and as 0 if not.

Availability of Various Water-Oriented Recreation Activities

X₉--Availability of motor-boating: coded as 1 if motor-boating is available at the campground, and as 0 if not.

- X₁₃--Availability of water-skiing: coded as 1 if waterskiing is available at the campground, and as 0 if not.
- X₁₄--Availability of row or paddle boating: coded as 1 if row or paddle boating is available at the campground, and as 0 if not.

Availability of Golfing or Campground Facilities in the Immediate Surrounding Area

- X₁₇--Availability of private campgrounds: measured in number of privately operated campsites within 15 miles of the campground.

Accessibility to Nearest Neighbor and Primary Highway

- X₁₈--Distance to nearest public campground: measured to the nearest tenth of a mile.
- X₁₉--Distance to nearest private campground: measured

to the nearest tenth of a mile.

X₂₀--Distance to state or interstate highway: measured from the campground to the nearest exit of a state or interstate highway, and rounded to the nearest tenth of a mile.

Population of the Immediate Surrounding Area

- X₂₁--Township population density: measured in number of persons per square mile of the township area in which the campground is located.
- X₂₂--Population of nearest city: measured in number of persons resident in the nearest city. Population was weighted by the reciprocal of the distance in miles from the campground to the center of the nearest city.⁵

Selected County Characteristics

- X₂₃--National tourist attractions: measured in number of nationally significant (as defined by the Michigan Tourist Council) tourist attractions in the county.
- X₂₄--State-level tourist attraction: measured in number of state-level (as defined by Michigan Tourist Council) tourist attractions in the county.
- X₂₅--Inland Water Body: measured in number of inland water bodies 200 acres or more in the county.

⁵The development of this variable was based on the concept of gravity as applied in spatial interaction analysis. According to this concept, one would expect the effects of events or conditions to be smaller the greater the distance between the two points concerned.

- X₂₆--Stream length: measured in number of miles of stream in the county.
- X₂₇--Great Lake shoreline: measured in number of miles of Great Lake shoreline in the county.
- X₂₈--Public Recreation Land: measured in acreage of public recreation land in the county.
- X₂₉--Highway density: measured in mileage of highways (including county, state, and interstate highways) per square mile of the county area.

Selected Characteristics of Nearest Neighbor

- X_{30}^{--Size} of nearest public campground: measured in number of campsites weighted by the reciprocal of the distance in miles between the campground and the nearest public campground.⁶
- X₃₁--Occupancy of nearest public campground: measured in the 1972 percentage occupancy rate weighted by the reciprocal of the distance in miles between the campground and the nearest public campground.⁶
- x_{32}^{--Size} of nearest private campground: measured in number of campsites weighted by the reciprocal of the distance in miles between the campground and the nearest private campground.⁶
- X₃₃--Occupancy of nearest private campground: measured in the 1972 percentage occupancy rate weighted by

⁶For explanation, see footnote 5 on page 111.

the reciprocal of the distance in miles between the campground and the nearest private campground.⁷

Regional Location

X₃₄--Regional location: coded as 1 if the campground is located in southern Lower Peninsula (Region 3), as 0 if the campground is located in northern Lower Peninsula (Region 2), and as -1 if the campground is located in Upper Peninsula (Region 1).

Statistical Findings

After data were assembled and prepared into machine readable form, they were analyzed by the SPSS Stepwise Multiple Regression Program to estimate the coefficients associated with the independent variables and to determine the statistical significance of the model and of each individual variable. The final equation was determined at the .10 level of statistical significance and the results are summarized in Table 14 (see pages 114 and 115).

Inspection of Table 14 reveals that there exists a significant relationship at the .10 level of probability between the private campground occupancy rate as dependent variable and six hypothesized independent variables including: (1) proximity to natural lake, (2) availability of water-skiing, (3) township population density, (4) size of nearest public campground, weighted by distance,

⁷For explanation, see footnote 5 on page 111.

| Variable Notation | Variable Description | Regression Coefficients | Beta Weights | STD error Regression Coefficients |
|----------------------|--|----------------------------|-----------------|---|
| x_1 | Year in business ^a | . 674 | . 211 | . 272 |
| × ₅ | Proximity to natural lake | 13.262 | .254 | 4.304 |
| × ₁₃ | Availability of water- skiing | 13.797 | .239 | 4.876 |
| × ₂₁ | Township population density | .036 | .144 | .019 |
| х ₃₀ | Size of nearest public campground, weighted | .193 | .653 | .050 |
| × ₃₁ | Occupancy rate of nearest public campground, weighted | 879 | 744 | .202 |
| x ₃₃ | Occupancy rate of nearest private campground, weighted | .027 | .161 | .013 |
| ×34 | Regional location ^a | 6.932 | .173 | 3.246 |
| Constant | | 34.545 | | 3.619 |
| Number of | complete observation | | | 128 |
| Multiple 1 | regression coefficient | | | 522 |

Table 14.--Summarized Regression Results of Significant Variables for the Campground Model.

| Variable Notation | Variable Description | | C | Req oei | gre: Efic | ss: cie | ion ent: | 5 | | I We | Bet eiç | :a ghi | ts | |) Ci | SI Reg oef | 'D error ression ficients |
|----------------------|-------------------------|---|-----|------------|--------------|------------|-------------|---|---|---------|------------|-----------|----|---|---------|------------------|---------------------------------|
| Multiple deter | mination coefficient | • | • • | • | | • | | • | • | • | • | • | • | • | • | • | . 305 |
| Standard error | of estimate | • | | ٠ | • | • | | • | • | • | • | • | • | • | • | • | 23.671 |
| Overall signif | icance (F-value) | • | | • | • | • | | • | • | • | • | ٠ | • | • | • | • | 8.913 ^b |

^aVariable X₁ was significant at .10 before X₃₀ entered into the equation, and the significance of variable X_{34} reduced from .04 to .14 level when X_{33} entered into the equation. They are presented here along with other significant variables in the above table for they are considered to be consistent with the prevailing hypothesis, even though their level of significance is slightly lower than the others.

^bThe least highly significance value of F (P = .01) with 128 and 6 degrees of freedom is approximately 2.95.

(5) occupancy rate of nearest public campground, weighted by distance, and (6) occupancy rate of nearest private campground, weighted by distance. Together these variables explain about 30 percent of the variation in campground occupancy rate as dependent variable. All other independent variables were found to be statistically nonsignificant and to add only infinitesimally to the explanatory power of the total model.

It may be noted that the coefficient of determination, R^2 , is only .305 which is rather low, even though the overall F-statistic is significant at the onepercent level. The low coefficient of determination is not in itself particularly disconcerting; it is not the purpose of present analysis to "maximize R^2 ," but rather to investigate the effect of certain spatial characteristics as independent variables upon campground occupancy rate as the dependent variable.⁸

The value of the regression coefficient of each significant variable indicates the existence and degree of association of that variable with the campground occupancy rate, when variations in the other variables are held constant. However, since the independent variables were measured in different units, it is difficult to use this

⁸However, it is obvious that certain variables which do affect campground occupancy have been omitted from the model. It is believed that if the model is extended to include some measurable management variables, the coefficient of determination would be increased considerably.

coefficient to ascertain the relative importance of each variable in influencing campground occupancy. One way to access such a relative importance is to use beta coefficients indicated in Table 14 on pages 114 and 115 as beta weights. Beta coefficients are merely net regression coefficients adjusted by expressing each variable in units of its own standard deviation. This adjustment eliminates the effects of the different measurement units and types of the variables and puts regression coefficients on a comparable basis. Based on this concept, it is clear from Table 14 on pages 113 and 114 that X_{31} and X_{30} have a greater effect on the campground occupancy than any other variables, and X_1 , X_5 , and X_{13} are approximately at an equal level of importance.

Finally, it should be noted that the standard error of estimate is approximately 23.7 percent. This is the average amount of error incurred when the equation is used as a description of the campground occupancy rate. This amount of error is rather high in that it represents almost one half of the mean campground occupancy rate estimated directly from mail survey data. Imperfect specification of the model and omission of certain influential variables likely contributed to such a high standard error of estimate.

Discussion

In the present analysis, we have investigated some hypothesized relationships between spatial characteristics and the private campground occupancy rate. As regression results indicate, there are only eight hypothesized relationships found to be statistically significant. Generally speaking, empirical results support the prevailing hypothesis that a high campground occupancy is closely related to high quality recreation water resources and access to population concentration. Looking closer at the significant variables, we find that proximity to a natural lake and availability of water-skiing, both quality indicators of water resources for recreation, have a positive relationship with campground occupancy. This implies that the occupancy rate tends to be higher for a campground locating adjacent to natural lake having sufficient capacity for motor-boating and water-skiing activity. Positive coefficients of these two variables substantiate the prevailing hypothesis about the support of water resources in Michigan's campground development.

Michigan public campgrounds are often found in areas where woods, water, and natural scenery are abundant. It is also generally true that relatively large public campgrounds tend to be established at those locations where natural wonders are unique. Accordingly, a large size public campground at a particular location may be good

indicator of availability of unique natural characteristics or an important tourist attraction at that location. Based upon such an inference, we may interpret the positive coefficient for the size of nearest public campground to mean that a private campground may share the advantages of natural wonders with the public campground by locating close to it. But there is a limit to this. The negative coefficient for the occupancy rate of nearest public campground implies that private and public campgrounds are competing for campers. If its nearest public neighbor provided high quality services to attract more campers, this may result in loss of customers for the private campground. The negative coefficient associated with the occupancy rate of the nearest public campground does not support the prevailing hypothesis that a private campground may enjoy the overflow of campers from its public neighbor.

The positive coefficient for the occupancy rate of the nearest private campground implies that increasing occupancy rate of a private campground may benefit its nearest neighbor, and the closer they are, the greater this effect will be. In theory, firms locating close to each other may enjoy external benefits from each other's sale promotion. It is also likely in campground operation that a private campground may benefit from its nearest neighbor's intensive sales-promotion. But this situation seems rare. It is doubtful whether such a positive

coefficient is a true relationship. Perhaps there may be an unknown third factor which has worked to influence the occupancy rate for both related campgrounds and thus contributed to such a strong positive relationship.

The coefficient for township population density is positive. This implies that campground occupancy rate tends to be higher for those campgrounds which are located close to population concentrations. As indicated earlier, camping is a short-term experience, and in most cases, camping itself is not the only purpose of the trip. Many people use a private campground as a stop for overnight rest or as a vacation headquarters which will conveniently allow them to visit friends and relatives, as well as various tourist attractions. They often find campgrounds in populated areas more convenient for their cultural or social activities. The positive coefficient for township population density is consistent with our conclusions concerning campground orientation discussed in the last chapter.

In addition to variables mentioned above, the number of years in business and the regional location are also helpful in explaining the campground occupancy rate. The positive coefficient for the number of years in business implies that campground occupancy rate tends to be greater for those campgrounds which stay longer in the business. This relationship is self explanatory. As is

true in many other businesses, time is always required to build up management experience and customer relations.

The positive coefficient for regional location is as expected. According to the way the variable was coded,⁹ this implies that campgrounds locating in Region 3, the southern Lower Peninsula, tend to have a higher occupancy rate than the other regions.¹⁰ A positive coefficient, in this case, provides strong support for the hypothesis concerning the population effect on campground occupancy because nearly 89 percent of the Michigan population is concentrated in Region 3.

Now let us compare statistical findings to results of the mail questionnaire survey. Surveyed campground operators were asked to give their opinions about location

¹⁰Data collected by mail questionnaire survey, indicates that the average campground occupancy rates for each region are as follows:

| Occupancy Rate 3-Month Season | in Percentage 5-Month Season |
|----------------------------------|--|
| 46.06 | 34.39 |
| 46.43 | 37.79 |
| 55.69 | 52.49 |
| 49.33 | 41.49 |
| | Occupancy Rate 3-Month Season 46.06 46.43 55.69 49.33 |

⁹The regional location variable, X_{34} , is a category variable which was coded as 1 if the campground is located in Region 3, as 0 if the campground is located in Region 2, and as -1 if the campground is located in Region 1.

decision factors. Among other things, respondents were shown a list of ten locational factors and asked to identify and rank those three they considered most crucial in locating their campground. As indicated in Table 15 on pages 123 and 124, for both those who developed their own land into campgrounds and those who rented or purchased land for campground development at the time of investment, availability of quality water resources was most frequently mentioned as their first choice. Personal preference was second in the order of frequency. Easy access to primary highway and proximity to population centers were far less important campground locational factors, compared to water resources and personal preference. However, it should be noted that personal preference was less frequently mentioned for those who rented or purchased land for campground development than those who developed their own land into a campground. This seems to imply that the former is more serious about campground locational choice than the latter.

These survey results reveal a predominant role of quality water resources in determining campground location. Although variables relating to quality water resources were found to be extremely important in the statistical analysis,¹¹ the investigator still feels that existing

¹¹Variables including both proximity to natural lakes and availability of water-skiing account for 13.92 percent of the variation in the campground occupancy rate which is nearly half of the total variation explained by the final equation.

| Campground Locational Factors | As Devel Land | Viewed by oped Own into CG | All Operators | | | |
|---|---------------------|----------------------------------|------------------|--------|-----|--------|
| Proximity to a population center | 5 | 3.85% | 4 | 2.96% | 9 | 3.40% |
| Availability of quality water base | 75 | 57.69 | 83 | 61.48 | 158 | 59.62 |
| Easy access to primary highway | 7 | 5.38 | 15 | 11.12 | 22 | 8.31 |
| Remote from urban environ- ment | 2 | 1.54 | 4 | 2.96 | 6 | 2.26 |
| Proximity to a public park or other tourist attrac- tions | 3 | 2.31 | 4 | 2.96 | 7 | 2.64 |
| Purely personal preference | 31 | 23.85 | 22 | 16.30 | 53 | 20.00 |
| Others | 7 ^b | 5.38 | 3 ^C | 2.22 | 10 | 3.77 |
| Total usable responses | 130 | 100.00 | 135 | 100.00 | 265 | 100.00 |
| Total non-responses | 23 | | 34 | | 57 | |

Table 15.--Campground Location Determining Factors as Viewed by Michigan Private Campground Operators.^a

| Campground Locational Factors | As Viewed by Developed Own Land into CG | the Operators Who Purch. or Rented Land for CG Deve. | All Operators | |
|-------------------------------------|---|--|------------------|--|
| Total questionnaires returned | 153 | 169 | 322 | |

Source: Based on data collected in 1972 by mail survey conducted as part of this study.

^aOnly those locational factors ranked first in importance were counted and are presented in this table.

^bCampground owners bought the site with campground facilities already on it.

^CThese include a variety of considerations such as:

- (1) to make use of the land;
- (2) to use the property more productively;
- (3) no alternative use is more profitable than campground operation.

campground operators have over-emphasized the resource base on the one hand, and overlooked the importance of potential market location (i.e., population centers) on the other hand. With some understanding of the fact that population and neighborhood effects are often difficult to be realized, it is contended that campground operator's opinions are helpful but not suitable for testing the above hypothesis.

Based on the results of statistical analysis and inferential discussions, we may now derive the following conclusions:

- 1. Both water resources and population variables play a key role in determining the campground occupancy rate; and the former seems to have a much greater influence than the latter. But the higher occupancy rate is associated with campgrounds having both quality water resources and good access to population centers.
- 2. The influence of public campgrounds on private campground occupancy rate is significant. Private campgrounds often share advantages of natural wonders with the public neighbors, but they are in fact, competing for customers.
- 3. The campground developer's location selection is equivalent to the selection of an array of spatial characteristics. But within such an array, certain

characteristics are more important than others. It is these important characteristics that make campground location different, not the entire array. Campground developers would probably achieve higher profit levels by concentrating on key characteristics identified in this study.

- Immediate surroundings have a much greater influence on the campground occupancy rate than county characteristics.
- 5. The existing pattern of campground distribution seems to be consistent with variables significantly associated with the campground occupancy rate. Shifts in the spatial distribution do not appear to be helpful in improving campground business performance.

CHAPTER VI

SUMMARY AND CONCLUSIONS

This final chapter consists of a summary of the entire study and highlights of major findings. In addition, limitations of the study are indicated and implications for both campground management decisions and future research possibilities are discussed.

Summary of the Problem

The location of private campground enterprises is not a matter of indifference to prospective investors. When attempting to invest in a campground business, a campground developer will face both long-run location decision and short-run management decisions, with the former decision restricting the range of latter opportunities.

This study was primarily designed to provide an understanding of the spatial distribution pattern of the private campground industry in Michigan, and to inquire into campground location decision factors. The study was first carried out to investigate what kind of areal characteristics could be used to explain the existing

distribution pattern. Then an attempt was made to seek an answer to the question as to which of the selected location factors are most important and to what extent they can explain campground location choice behavior.

This study approached the problem of private campground location decision from the standpoint of the campground developer as a producer, and viewed the campground developer as the enterpreneur supplying and selling campground services. Conceptually the study analyzed the campground location decision factors within a microeconomic framework of production function and profit motivation.

The study area includes the entire state of Michigan, which was divided into three major regions for observing regional differences.

Summary of the Methods

The basic observation unit under study is the private campground operation unit which was defined in this study as a parcel or tract of land that is under control of a private person or persons and upon which campground facilities were established for commercial camping services. Data required for this study were obtained from both a mail questionnaire survey of campground operators and secondary sources such as campground directories, private campground registration records maintained by the Michigan Department of Public Health, and various government statistical reports. These data were first summarized in tables and displayed in illustrations that offered visual examinations and statistical interpretations.

The second major use of the data was for testing hypotheses generated from observed spatial associations, from a priori reasoning from theory, or from a combination of the two. Hypotheses were then developed into variables and relationships suitable for statistical testing. Two types of statistical techniques were used in this study. First, the "near-neighbor analysis" commonly used in geographical research was employed to test the campground distribution pattern for randomness. Second, multiple linear regression analysis was used to test selected locational factors or areal characteristics for their relationships with campground performance and spatial distribution patterns. In addition, computer mapping techniques were used to facilitate data display and the development of hypotheses.

Summary of the Findings

Information gained from statistical interpretation and analysis provides numerous findings relevant to answering previously stated questions. These findings can be summarized in three major categories relating to (1) campground distribution, (2) spatial associations, and (3) campground location decision factors.

(1) Findings Relating to Campground Distributions

There were 975 campgrounds consisting of 62,761 campsites in Michigan in 1973. Among them, 552 campgrounds with 32,853 campsites were owned and operated by individuals in the private sector. About half of these private campgrounds were located in Region 3 where state population concentration was nearly 90 percent in 1970, and only slightly over 8 percent were in Region 1, the Upper Peninsula, and the remainder in Region 2.

Of Michigan's total of 530 private campgrounds having ten or more campsites, 390, or 73.6 percent were operated on a seasonal basis in 1973. Of these seasonal campgrounds, 212, or 54.4 percent were located in Region 3, and this was 80 percent of Region 3's total private campgrounds.

Region 3 private campgrounds were found to have larger mean campground size, a higher percentage of improved campsites, and greater expansion since establishment, as compared to the other two regions. Campgrounds located in Region 1 were about one-third smaller than those located in Region 2 or Region 3.

Throughout the state, private campgrounds were located, on the average, about 3.7 miles from a primary highway (such as a state, interstate, or U.S. highway), 1.9 miles from a natural lake, 6.7 miles from the nearest private campground, and 12.8 miles from the nearest publicly

owned campground. By regional comparison, private campgrounds in Region 1 were located much closer to a natural lake (1.4 miles) and a primary highway (2.7 miles) than the state average and any other region. Region 3 had the shortest average distance (5.6 miles) between two closest private campgrounds but the largest average distance (16 miles) between a private campground and its nearest public campground, as compared to the other two regions.

Approximately three-fourths of the private campgrounds were located within 200 miles of the Detroit Metropolitan Area where 44 percent of the state's total population was concentrated in 1970. Private campgrounds were seldom developed in urbanized areas, but there were intensive private campground developments surrounding major population centers. One example of such a development pattern was found in the Oakland and Livingston counties which are located about 28 to 56 miles distant from Detroit Metropolitan Area, respectively.

(2) Findings Relating to Spatial Associations

Spatial distribution of the private campground industry in Michigan was found to be more clustered than random. This is a statistical indication of existing spatial associations. Thirteen variables, nine relating to general attractiveness of the county for outdoor recreation development and four relating to county
socio-economic characteristics, were isolated using multiple regression analysis and their relationships with the distribution of private campground development were determined. Four variables, highway density, average dollar value of farmland, number of lakes including 200 or more acres, and number of tourist attractions, were found to be significantly related to development of campsites by the private sector in the county.

Results of the regression analysis followed a logical pattern. Positive correlations were found between number of campsites provided by the private sector and variables relating to highway convenience, water resources, tourist attractions, and availability of public recreation areas, which are generally favorable to outdoor recreation. Since the return to the private campground business has been modest, those variables such as X_{10} , which tend to increase the costs of investment and operating the campground, showed a negative relationship with the development of campsites in a county by the private sector.

(3) Findings Relating to Campground Location Decision Factors

Determination of private campground location is assumed to be based upon three standard levels of spatial characteristics--region, area, and site--which act as inputs to, parameters of, and constraints on the cost and production functions. With this conceptual basis, we can

hypothesize that campground location decisions can be substantially explained by a list of spatial characteristics. Occupancy rate, which has often been used to indicate private campground performance, was selected to measure the outcome of a campground decision. Thirty-four variables considered to be significantly related to the campground occupancy rate were chosen. A multiple linear regression model was specified and applied to 1972 campground survey data to estimate relationships between occupancy rate as dependent variable and spatial characteristics as independent variables.

It was found that eight variables were significantly related to the campground occupancy rate. Variables significant at the .10 level include: (1) proximity to a natural lake (X_5) , (2) availability of water-skiing (X_{13}) , (3) occupancy rate of nearest public campground (X_{31}) , (4) number of campsites of nearest public campground (X_{30}) , (5) occupancy rate of the nearest private campground (X_{33}) , and (6) population density of the township in which the campground is located (X_{21}) . Among these variables only occupancy of nearest public campground was found to be negatively related to campground occupancy The variable "number of years in business" was sigrate. nificant at .10 before X_{30} entered into the equation, and the significance of X_{34} , regional location of the campground, shifted from .04 to .14 level when X_{33} entered

into the equation. Variable X_1 and X_{34} were significant at the .15 level. All other variables did not appear to be statistically significant, and they added only infinitesimally to the explanatory power of the overall model.

As indicated in Table 14, the campground model of six significant variables was statistically significant at the .01 probability level, and explained approximately 30 percent of the variation in campground occupancy rate. The model with eight variables was still significant at .01 level but it explained only about 33 percent of the variation in the campground occupancy rate.

General Conclusions

Results of this study reveal that Michigan's private campground industry is spatially characterized by a clustered distribution pattern. This locational pattern is primarily related to the highway system, and the location of recreational water resources and notable tourist attractions. The highway system is likely to form a linear distribution pattern, whereas water and tourist attractions tend to shape a point location pattern.

The campground location decision can be viewed as a selection of an array of spatial characteristics. But within such an array, certain characteristics are found to be more important than others. It is these important characteristics that make campground location different, not the entire array. When making locational choice,

campground developers may selectively concentrate on these key factors identified in this study.

On a fairly general level, private campgrounds in Michigan are water-oriented. Presence of easy access to high quality recreational water is a key factor to the development and success (in terms of occupancy rate) of private campground enterprises. Despite some advantages which can be obtained by locating campgrounds near a major highway, the need for access to high quality recreational water would favor development of private campgrounds in lake resource areas.

Easy access to population centers was found to be another significant factor positively related to the campground occupancy rate. This seems to confirm such a behavioral observation that camping for most families is a short-term experience which usually takes place in areas close to metropolitan areas. The urbanized area can never be a suitable location for campground development because of high land costs, and a lack of suitable environment for outdoor living. But urban fringe areas can be desirable sites for establishing private campgrounds--provided, of course, that land costs of these areas are modest, and that they have a quality resource base to enhance the camping experience.

The influence of public campgrounds on private campground occupancy rate is significant. Private

campgrounds often share the advantages of unique natural characteristics with their public neighbors, but they are in fact, competing for customers.

Finally, it is contended that campground location cannot be a matter of indifference to prospective investors, developers, and operators. Campground developers will face both long-run location decisions and short-run management decisions, with the former decisions restricting the range of latter opportunities. A poor campground location choice may not result in immediate and complete collapse of the enterprise; however, all campground enterprises may be affected in their profitability and in their consequent capacity for growth by the location choice.

Uses and Limitations of This Study

Multiple regression analysis in this study identified four major campground location factors as being important: (1) individual campground characteristics; (2) area (local and immediate) environment; (3) regional characteristics; and (4) interdependence. Analytical results derived from this study can be used to improve locational decisions of both private campground developers and public recreational planners.

Determination of campground location factors can provide private campground developers with a basis for identifying attributes that are likely to be favorable or unfavorable to campground development in any area under

consideration. Private campground operators currently engaging in the business can also use the locational information to re-evaluate their campground locational advantages and determine their future investment plans and management strategies. For example, operators of those campgrounds suffering from low occupancy rate may reevaluate their campground location on the basis of the significant location decision factors. If they find that such low occupancy rate is due to, say, lack of quality water resource base to support their water-oriented activities, they may develop other popular recreational facilities such as tennis courts and swimming pools to attract more customers.

For public recreation planning, the results of this study can be used at two levels: (1) by the local recreational planner to develop a preliminary evaluation of the prospects for encouraging private campground development; and (2) by the regional analyst to predict the spatial distribution of campground growth. For example, the local recreational planner can use information developed in this study to help identify a set of attributes indicative of whether or not an area is suitable for private campground development. If a recreational planner has locational information for various recreation activities, he may devise a list of attributes for each activity to facilitate planning decisions.

There are a number of limitations of this study that deserve special attention. First, like most studies using statistical techniques, analysis of campground location patterns and location decision factors can give only statistical explanation based upon correlation between variables. In this sense, it should be realized that relationships derived from such an analysis are not necessarily of the cause-effect type, and need not be useful for control purposes. As just mentioned, analytical results can be wisely used only to develop guidelines for preliminary evaluation of campground locations and for further experimentation that possibly would yield more insights into the campground location decision process.

Second, explanatory variables associated with past campground location decisions may not assume the same patterns in future years. Predicting errors thus can be introduced into future campground location decisions if they are based upon outdated empirical relationships.¹ In the present analysis, most data were collected before the gasoline shortage became a serious problem, and hence analysis based on such data may be underestimating the effect of relative location between private campground and potential market areas.

¹There are two types of problem here: (a) the specification of the model may become outdated--structural change or (b) coefficients associated with the specified variables may change over time--outdated data.

Third, the present analysis is handicapped by the absence of financial data concerning campground operation. Such financial data are important because they would provide a more precise and meaningful explanation of profit-maximizing campground location decision. Lack of such financial data has required the analysis of campground location decision factors on the basis of the campground occupancy rate. Therefore, it was necessary to draw inferences about the profitable campground location from relationships based upon the campground occupancy rate. Making such inferences necessarily involves the assumption that a high campground occupancy rate is consistent with a profitable campground location. But the campground occupancy rate can be a meaningful indicator of a profitable campground location only when all campgrounds under investigation are operated at an efficient scale. Since we do not know whether or not the campgrounds included in this study were operated at the most efficient scale of operation, consistency of high campground occupancy rate with a high level of profits is a questionable assumption. There could be a considerable gap between profitability and the occupancy rate.

Implications for Future Research

In realizing the limitations of this study and the needs for more precise investigation of locational impacts,

the investigator believes that the following research topics deserve special attention:

 Research concerning definition and measurement of campground performance.

What are the most effective and sensitive measures or indicators of campground business success, both in an absolute and relative sense? How can such measures be derived? What kinds of data are involved and how can these data be collected? A well-designed research study should be implemented to answer these questions. Methodologically, a comparative study may be designed to assess strengths and limitations of several potential measures, particularly under various assumed decision rules.

2. Research concerning determination of the tradeoff between management and locational effects.

In studying private campground economics, there are arguments between those who emphasize management and those who pay more attention to locational choice. In fact, both management and location are important to a private campground business and are interrelated. The question that should be involved here is not a dispute between the two in terms of relative importance, but a consideration of the trade-off point between them. To what extent can management strategies be used to overcome locational disadvantages? How much additional profit can locational advantages bring for the campground owner or operator? These appear to be the most crucial questions deserving special research attention.

3. Research concerning techniques for integrating locational effect into management programs.

How to fully utilize locational information in the design of campground management programs is the most important question to be answered in this kind of research. Findings from such research could help campground operators fully utilize locational advantages to promote business or design strategies to overcome locational disadvantages. It is important to discover from such a study how locational information can be used as a basis for improving campground management decisions.

Success of any research program requires sufficient data of good quality. The present study was unfortunately handicapped by circumstances that make it difficult to obtain consistent and accurate data, particularly on campground income and costs. In future studies concerning private campground economics, effective ways and means for collecting primary data must be thoroughly developed before actual field work proceeds. Moreover, it would be very helpful if high quality secondary data could be made available on a consistent basis. Existing campground directories may provide a good source for secondary data. But they have problems of incompleteness and inconsistency. For better results, an annual private campground directory

should be compiled on the basis of license records which must consist of: (1) date of establishment, (2) locational specifications, (3) facility types, and (4) total area and size of each campground currently in operation. It is hoped that research topics outlined above will be carried out in the future with consistent and high quality data.

It seems clear at this time that the implications for future study lie in the direction of further refinement of the analytical model and improvement of data collection and organization methods. It would be useful to try to extend the present analysis to additional aspects of relationships, particularly those relating to management strategies and activity programming. In analysis more attention should be directed to the formulation of specific models for different campground types, and less to the kind of general analysis achieved in this study.

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APPENDIX I

INTRODUCTORY LETTER AND QUESTIONNAIRES

APPENDIX I

INTRODUCTORY LETTER AND QUESTIONNAIRES

Introductory Letter for Initial Mailing

Michigan State University East Lansing Michigan 48823

Department of Resource Development Natural Resources Building

September 21, 1973

Dear campground operator:

We are conducting a location study of the private campground enterprises in Michigan. The primary objective of this study is to investigate the relationship between campground business performance and location of campgrounds in the state. The information derived from this study will enable us to develop guidelines that may have value to you in making future management decisions.

Your campground has been randomly selected for this location study. Please assist us by completing the enclosed questionnaire and return it to us with the stamped selfaddressed envelope. We can assure you that your answers will be held in the strictest confidence. They will only be used in a pool with all other replies to show the relationship in question.

Please give us your full support and accurate response to this inquiry. Your enthusiasm is the key to the success of this study. The results of this study will be forwarded to you as soon as it is completed.

Sincerely yours,

Rex J. T. Yu Graduate Research Assistant Department of Resource Development

Introductory Letter for the First Follow-Up Mailing

Michigan State University East Lansing Michigan 48823

Department of Resource Development Natural Resources Building

October 12, 1973

Dear Campground Operator:

This is a letter to remind you of our Campground Location Survey.

You recently received a questionnaire from the Department of Resource Development, Michigan State University, for the study of private campground locations. The information derived from the study will be used to develop an extension bulletin which will assist private campground operators in making management decisions. We believe the results of this study will be of value to you. Your report is needed to make this study as accurate as possible.

If you have already completed and returned the questionnaire to us, we sincerely appreciate your assistance and support. If not, please complete the questionnaire and return it to us promptly.

Thank you.

Sincerely yours,

Rex J. T. Yu Graduate Research Assistant Resource Development Department

Introductory Letter for the Second Follow-Up Mail Survey

Michigan State University East Lansing Michigan 48823

Department of Resource Development Natural Resources Building

November 9, 1973

Dear Campground or Trailer Park Operator:

About three weeks ago we sent you a questionnaire regarding a locational study of both private campgrounds and trailer parks in Michigan. The information derived from this survey study will enable us to develop a research bulletin which may have value to you in making your future management decisions.

To insure that the results of this study are accurate and relevant to your management decisions, we need your information inputs. Your accurate response is the key to the success of this study. Please give us your full support and assistance.

In case you mislaid the original questionnaire that we sent you, we have enclosed an additional copy. Please complete this copy and return it to us with the enclosed envelope as soon as possible.

Thank you.

Sincerely yours,

Rex J. T. Yu Graduate Research Assistant Resource Development Department

RJTY:1b Enclosure

| | Private Campground Location Study |
|-----|--|
| | Department of Resource Development Michigan State University * * * * * * * * * * * * * * * * * * * |
| | Date: |
| ITE | M: GENERAL CHARACTERISTICS |
| 1. | When did your campground first open?,, |
| 2. | Did your campground stay open year around in 1972? |
| | Yes, please skip to question 5 |
| | No, please continue with question 3 |
| 3. | When did your campground open for the season in 1972 ? |
| | day month |
| 4. | When did your campground close for the season in 1972 ? |
| | day month |
| 5. | How many campsites were included in your campground at the beginning of the season in <u>1972</u> ? |
| | modern sites,primitive sites,total sites |
| 6. | Did your campground provide separate sites for tent and trailer campers in <u>1972</u> ? |
| | Yes No If yes, please indicate the number of sites of each type in your campground: |
| | tent sites,trailer sites,total sites. |
| 7. | Was your basic fee charged in <u>1972</u> varied according to campsite location? |
| | Yes No |
| | If yes, please give only the average rate for a site If no, please give the basic rate for a site |
| | Per day Per week Per season Modern site: \$\$ \$\$ Primitive site: \$\$ \$\$ |

8. What was the average occupancy rate at your campground in each of the following months of <u>1972</u>? (Note: Please give your best estimates.)

| Month | Average Occupancy Rate for the month, in % |
|-----------|---|
| May | ¥ |
| June | <u> </u> |
| July | 8 |
| August | |
| September | |

ITEM II: LOCATIONAL CHARACTERISTICS

- 9. Is your campground located in a heavily wooded area? Yes No____
- 10. Is your campground located adjacent to a natural lake? Yes , skip to question 13

No ____, continue with question 11

11. What is the distance from your campground to the nearest natural lake?

_____miles

12. Which of the following best describe the location of your campground?

Located adjacent to an artificial lake or pond

Located adjacent to a river

Located adjacent to a small stream

Not located adjacent to any body of water

- 13. Which of the following water-oriented activities were available on your campground in <u>1972</u>? (Please check whatever you have)
 - (1) motor boating, (2) swimming, (3) fishing,
 - (4) canoeing, (5) water skiing, (6) row

boating, (7) paddle boats.

14. Was snow-skiing activity available in <u>1972</u> on your campground or within one mile of distance from your campground?

Yes No

15. Was snowmobiling activity available in <u>1972</u> on your campground or within one mile of distance from your campground?

Yes No____

16. Was there any golf course located within 15 minutes of driving distance from your campground in 1972?

Yes___ No____

ITEM III: SPATIAL CHARACTERISTICS

17. What is the distance from your campground to the nearest tourist attraction?

_____miles

Name of the tourist attraction:

18. What is the distance from your campground to the nearest publicly operated campground?

miles

Name of the public campground:

Type of service it provides: (please check one)

modern, primitive-rustic

| 19. | What is the distance from your campground to the nearest privately owned campground? |
|-----|---|
| | miles |
| | Name of the private campground: |
| | Type of service it provides:modern,primitive |
| 20. | What is the distance from your campground to the nearest state or inter-state highway exit? |
| | miles |
| | Name of the highway: |
| | Where to exit: |
| 21. | What is the distance from your campground to the nearest city or town? |
| | miles |
| | Name of the city or town: |

ITEM IV: FINANCIAL ASPECTS

22. Approximately how much did you have invested in your campground facilities by the end of 1972? (Please base your estimates on the 1972 price level and account for all buildings, structures, and installations you invested for your campground business operation, except land property.)

\$_____

23. Approximately how much did you spend on advertising your campground business in 1972?

\$

- 24. What was the approximate total expenditure for operating your campground business in <u>1972</u>? (Note: If you didn't record your expenditure in the following categories, please answer item 3 only.)
 - (1) Total expenditure for operating rental campsites:

\$_____

- (2) Total expenditure for operating other related income activities on the campgrounds:
 - \$_____
- (3) Total expenditure for all business operations on your campground (that is, (1) + (2):
 - \$_____
- 25. What was the approximate total slaes income from your campground business operation in <u>1972</u>? (Note: If you didn't record your income in the following categories, please answer item 3 only.)
 - (1) Total sales income from campsite rentals:
 - \$_____
 - (2) Total sales income from other related income activities on your campground:

| Ş . | | | |
|------------|--|--|------|
| · • | | | |

(3) Total sales income from all business operations on your campground (that is, (1) + (2):

\$_____

26. Which of the following statements best describes the owner's goals for operating the campground?

To give myself and/or my family something interesting to do. We enjoy operating the campground.

_____To receive additional income from the campground business to supplement my family income. The campground business is my secondary source of income.

To receive enough income from the campground business to support my family for the entire year. The campground business is my primary source of income.

Others (write in)

27. Was the land which you developed into a campground originally owned by you and/or your family?

Yes No or Other

(Please explain:

If yes, please continue with guestion 28

If no and other, please skip to question 29

- 28. What are the reasons that you decided to develop your land into a campground? (Please identify three main reasons and indicate their priority by filling the number (such as 1 for the highest priority, 2 for the second priority, and 3 for the third priority) in the corresponding space.)
 - ____Because the land is located close to a population center.
 - Because the land is located close to a quality water body such as lake or river for recreational use.

____)

- Because it has an easy access to state or interstate highway.
- Because the land is located far away from an urban environment.
- ____Because the land is located close to a publicly owned park or other tourist attraction.
- Purely personal preference

___Other (write in) ______

29. What are the reasons that you chose to develop your campground at the present location? (Please identify three main reasons and indicate their priority by filling the number (such as 1 for the highest priority, 2 for the second priority, and 3 for the third priority) in the corresponding space.)

Proximity to a large population center

____Availability of a quality water body such as lake or river at the location for recreation use ___Easy access to state or inter-state highway ____Remote from urban environment ____Proximity to a publicly owned park or other tourist attraction ____Relatively low property tax ____Relatively low labor costs (wages, productivity) ____Purely personal preference ____Others (write in) ______

Thank you for your time and effort in completing this important phase of our research. If you have any further questions on this research project, please contact me:

> Rex J. T. Yu Research Assistant Department of Resource Development Michigan State University East Lansing, MI 48823 Tel: (517)-353-7982

Introductory Letter for Mail Survey of Public Campgrounds

Michigan State University East Lansing Michigan 48823

Department of Resource Development Natural Resources Building

September 7, 1973

Dear Sir:

We are conducting a campground location study in which the relationship between publicly and privately operated campgrounds will be investigated. The information derived from this study will help both private and public sectors plan for additional campgrounds and for improvement of their camping services in the future.

Enclosed herewith is a stamped self-addressed envelope and a questionnaire for each of the campgrounds or trailer parks you operate, please assist us by completing the questionnaires and return them to us. The results of this study will be forwarded to you as soon as it is completed.

Your cooperation and accurate responses to this inquiry will be greatly appreciated.

Sincerely yours,

Rex J. T. Yu Graduate Research Assistant

RJTY:1b Enclosure

| | Private-Public Campground Location Study |
|------|--|
| | Department of Resource Development Michigan State University |
| Name | of campground or trailer park: |
| Loca | tion: Date: |
| | * * * * * * * * * |
| 1. | When did this campground first open?,,,, |
| 2. | Does this campground stay open year around? |
| | YesNo |
| | If yes, skip to question 5 |
| | If no, continue to question 3 |
| 3. | When does this campground open for the season? |
| | date month |
| 4. | When does this campground close for the season? |
| | date month |
| 5. | How many campsites were included in this campground at the beginning of the season in 1972? |
| | modern sites,primitive sites,total sites |
| 6. | How many campsites does this campground have now? |
| | modern sites,primitive sites,total sites |
| 7. | Does this campground provide separate sites for tent and trailer campers? |
| | YesNo |
| | If yes, please indicate the number of sites of each type in this campground: |
| | tent sites,trailer sites,total sites |

| 8. | What was the dai ground in 1972? | ly charge per campsite at this camp- |
|-----|--|--|
| | Modern site: \$ | Primitive site: \$ |
| | Tent site: \$ | Trailer site: \$ |
| 9. | Did you limit th this campground | e length of stay for the camper at in 1972? |
| | YesNo | |
| | If yes, please i | ndicate the limit:days |
| 10. | Did you require to camp at this | that each camper obtained a permit campground in 1972? |
| | Yes No | |
| | If yes, please is in each of the feature | ndicate the number of permits issued ollowing months of 1972? |
| | Month | Number of Permits Issued |
| | Мау | |
| | June | |
| | July | |
| | August | |
| | September | |

11. What was the average occupancy rate at this campground in each of the following months of 1972?

| Month | Average Occupancy Rate for the month, in % |
|-----------|---|
| Мау | 8 |
| June | |
| July | |
| August | £ |
| September | ¥ |

12. What is the distance from this campground to its nearest privately operated campground?

_____miles

Name of the private campground:

Location of the private campground:

APPENDIX II

DISTRIBUTION OF PRIVATE AND PUBLIC CAMPGROUND FACILITIES BY COUNTY, WITH REGIONAL AND STATE TOTALS
APPENDIX II

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DISTRIBUTION OF PRIVATE AND PUBLIC CAMPGROUND FACILITIES BY COUNTY, WITH REGIONAL AND STATE TOTALS

| COUNTY WITH HIGTURIAL AND LIATE TOTAL | | | | | | | | | | |
|---|--|---|--|---|---|---|--|--|--|--|
| NO | COUNTY | PR CA''PG NO CG | VATE ROUNDS NO 65 | PANY: NO CG | | ANNAROU PONICS NO CO | NDS T CG NT CS | CAMPU NO CO | NO CE | NO CO PER SO HILE |
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DISTRIBUTION OF PUPLIC AND PHIVALE CAMPORDUND FACELITIES BY

APPENDIX III

DESCRIPTIONS OF THE INDEPENDENT VARIABLES CONSIDERED FOR THE COUNTY MODEL

APPENDIX III

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DESCRIPTIONS OF THE INDEPENDENT VARIABLES

CONSIDERED FOR THE COUNTY MODEL

| Variable Number | Variable Description* | Unit of Measurement | Hypothesized Relation |
|--------------------|---|------------------------|--------------------------|
| Water Reso | ource Base | | |
| VAR003 | No. of inland water body | number | positive |
| VAR004 | Acre of inland water body | acre | positive |
| VAR005 | No. of inland water body over 200 acre | number | positive |
| VAR006 | Miles of stream | mile | positive |
| VAR007 | Miles of great lake shoreline | mile | positive |
| Alternativ | ve Land Uses | | |
| VAR008 | Percent of state and federal owned land | percent (1972) | positive |
| VAR009 | Percent of land in forest | percent (1966) | positive |
| VAR010 | Percent of land in farm | percent (1969) | negative |

| Other Recreational Facilities and AreasVAR011Acre of publicacreposirecreation land(1970)posiVAR002No. of publicnumberposicampsites(1973)posiVAR023No. of touristnumberposiattractionnat'l.(1973)significanceVAR024No. of touristnumberposiattractionstate(1973)significanceAccessibilityVAR016Distance to Detroitmilenegar | tion |
|--|------|
| VAR011Acre of public recreation landacre (1970)posi (1973)VAR002No. of public campsitesnumber (1973)posi (1973)VAR023No. of tourist attractionnat'l. significancenumber (1973)posi (1973)VAR024No. of tourist attractionstate significancenumber (1973)posiAccessibility VAR016Distance to Detroitmilenegation | |
| VAR002 No. of public number posi campsites (1973) posi VAR023 No. of tourist number posi attractionnat'1. (1973) posi VAR024 No. of tourist number posi attractionstate (1973) posi significance (1973) posi Accessibility VAR016 Distance to Detroit mile negar | tive |
| VAR023 No. of tourist number posi attractionnat'l. (1973) significance VAR024 No. of tourist number posi attractionstate (1973) significance Accessibility VAR016 Distance to Detroit mile negar | tive |
| VAR024 No. of tourist number posi attractionstate (1973) significance Accessibility VAR016 Distance to Detroit mile nega | tive |
| Accessibility VAR016 Distance to Detroit mile nega | tive |
| VAR016 Distance to Detroit mile nega | |
| | tive |
| VAR017 State & federal HWY mile posi (1972) | tive |
| VAR018 County HWY mile posi- (1972) | tive |
| VAR019 HWY density mile per sq. position (state + county) mile of area (1972) | tive |
| Land Costs | |
| VAR021 Average dollar dollars negative value per acre of (1969) farm land | tive |
| VAR022 Average property dollars negative tax per acre of (1969-1972) real property | tive |
| VAR030 Rate of growth in ratio nega- assessed value (1969-1972) | tive |

| Variable Number | Variable Description* | Unit of Measurement | Hypothesized Relation | |
|--------------------|--|----------------------------------|--------------------------|--|
| County E | conomic Conditions | | | |
| VAR012 | No. of political subdivisions | number (1970) | negative | |
| VAR013 | Average unemploy- ment rate | percent (1969-72) | positive | |
| VAR014 | Population density | person per sq. mile (1970) | negative | |
| VAR015 | Percent of urban population | percent (1970) | negative | |
| VAR020 | Median family income | dollars (1970) | negative | |
| VAR027 | Ratio of industry- farm employment | ratio (1969-72) | negative | |
| VAR028 | Percent of labor working outside the residence county | percent (1970) | positive | |
| Regional | Location | | | |
| VAR029 | Regional location | UP=-1, SLP=1 NLP=0 | positive | |

APPENDIX IV

DATA SOURCES FOR VARIABLES USED

IN THE COUNTY MODEL

APPENDIX IV

DATA SOURCES FOR VARIABLES USED

IN THE COUNTY MODEL

| Variable Notation | Variable Description | Sources of Data |
|----------------------|---|---|
| Dependent | variable: | |
| Y | No. of private campsites in the county | Data compiled from: (1) Campground License Records, Michigan Department of Public Health, 1973; (2) Campground Directory, Michigan Association of Private Campground Owners, 1973; (3) Campground and Trailer Park Guide, Rand McNally & Co., 1973, pp. 201-212. |
| Independe | nt Variables: | |
| ×1 | No. of inland water bodies over 200 acres | Data taken from County and Regional Facts, Vol. 1 to 13, section V, Table 26, Cooperative Extension Service, Michigan State University, East Lansing, MI, 1973. |
| ×2 | Mileage of streams | Data taken from the same source as variable X _l |
| x ₃ | Mileage of great lake shoreline | Data taken from the same source as variable X _l |

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| Variable Notation | Variable Description | Sources of Data |
|----------------------|---|--|
| ×4 | No. of public campsites in the county | <pre>Data compiled from: (1) Campground License Records, Michigan Department of Public Health, 1973; (2) Michigan Outdoor Guide, 1973, Michigan Auto- mobile Club; (3) Campground and Trailer Park Guide, 1973, Rand McNally & Co., Chicago, 111.</pre> |
| * ₅ | Acreage of public recreation land | Data taken from County and Regional Facts, Vol. 1 to 13, Section V, Table 25, Coop. Ext. Service, Michigan State University, East Lansing, MI, 1973. |
| × ₆ | No. of tourist attractions with national signifi- cance | Data compiled from State- wide Facility File, Michigan Department of State Highways, and inven- tory of tourist attractions maintained by Michigan Tourist Council. The significance of tourist attractions was classified by Mr. Charles E. Budd, Tourist Promotion Manager, Michigan Tourist Council. |
| ×7 | Distance from geo- graphic center of the county to Detroit | Distance measured in the actual mileage from geo- graphic center of each county to the population weighed geographic mean center of Detroit Metro- politan Area. |

| Variable Notation | Variable Description | Sources of Data |
|----------------------|---|--|
| x8 | Density of high- ways | Data taken from Twenty- second Annual Progress Report, MDSHT Report No. 162, Local Government Division, Michigan Depart- ment of State Highways, 1973, Table 2-1, pp. 140- 141. |
| ×9 | Average dollar value per acre of farm land | Data taken from County and City Data Book, Bureau of the Census, U.S. Depart- ment of Commerce, 1972, Table 2, item 179, p. 244. |
| × ₁₀ | Average property tax per acre of land and building (1969-72) | Data computed by dividing 4-year average annual total property tax levied in each county by the total area of land surface in the same county. The property tax data were made available by courtesy of Michigan State Tax Commission, Department of Treasury. |
| × ₁₁ | Numbers of poli- tical subdivisions | Data compiled from 1970 Census of Population, advance report, PC(V1)-24, Table 3, pp. 16-22. |
| x ₁₂ | Population density | Data taken from County and City Data Book, Bureau of the Census, U.S. Department of Commerce, 1972, Table 2, item |

The statistical Dest

| Variable Notation | Variable Description | Sources of Data |
|----------------------|--|--|
| x ₁₃ | Ratio of industry to farm employment | Data taken from Michigan Statistical Abstract, 1974, Table V-5, School of Business Administration, Michigan State University, East Lansing, MI. The data was originally re- leased by Michigan Employ- ment Security Commission, Lansing, MI. |
| ×14 | Average rate of unemployment (1969-72) | Data computed from the same source as variable ^X 13 [.] |

APPENDIX V

RESULTS OF REGRESSION ANALYSIS

(COUNTY MODEL)

APPENDIX V

RESULTS OF REGRESSION ANALYSIS (COUNTY MODEL)

| NULTIPLE R P Silvape Sto Deviati | ,6118. ,3743 CN 284,3678 | 0 ANALYS 1 REWRES 2 REDIOU | IS OF VARIANJE Sign Al | DF 50- 0 4. 3676 76: 6145 | F SQUARES 466.851J5 { 745.10276 | YELN SCULRE 19115.71274 12845.15477 | F 11.) | SIGNIFIJANS # 16964 .00 0 |
|--|--------------------------------|----------------------------------|------------------------------|---------------------------------|---------------------------------------|---|------------|--|
| ********* | YAR; | NOLES IN THE EQU | ATION | | | VARIABLES NOT | IN THE EQU | AT[Ca |
| A741757E | 8 | STO EHADA A | r SIGNIFICANCE | BOTA ELASTICITY | VAPIABLE | PARTIAL | TOLEANNCE | F Significance |
| ¥19019 | 4×€,44279 | 51,360450 | 34.990452 | 16677595 | VARCU2 | .89211 | .81327 | 184172510 |
| VAP 315 | 257195934 | 5,7947497 | 18,925548 18,925548 | 417-72 | VARGES | 00397 | .74121 | 71053212 45-85 |
| WAR:71 | -9.561774# | 2.8967720 | 10,595531 | +15617865 | VARCO7 | -10345 | .72264 | 181761115 |
| W19023 | 371308604 | 19,978053 | 3.4714)79 | 12436013 | VARGID | .11230 | .44095 | \$95795545 |
| CONSTANTS | -450.88982 | 131.30252 | 11.793201 | | VAR211 | .14291 | .36424 | 1.9417412 |
| | | | .361 | | VAR013 | .14528 | ,ż4\$50 | .215 L.al(2145 |
| | | | | | VARD14 | -+62675 | .22495 | 41206930038-02 |
| | | | | | ¥47616 | -12254 | . 23531 | 1024 1027421 1795 |
| | | | | | VAR017 | .12256 | . 63434 | 1-1342977 |

FALEYEL OR TOLERANCE-LEVEL INSOFFICIENT FOR FURTHER COMPUTATION.

SURRERY TABLE

| STE# | VARIABLE ENTERED REMOVED | F TQ Elter of He-ove | SIGNIFICANCE | HULTIPLE R | R SQUARE | R SCUARF CHANGE | STRPLE A | QVERALL É | \$IGN\$FIEANCE |
|------------------|---|--|----------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|---|--|
| : 2 3 4 | ATH352 ATH351 ATH3512 AT3312 AT3314 | 12.01946 15.67251 8.64335 3.8/141 | - 251 - 245 - 245 - 253 | ,37265 ,53259 ,58517 ,61180 | .:3962 .28365 .34243 .37430 | .13757 .14453 .05874 .63187 | .37365 .24302 .11139 .04396 | 12.81948 15.44232 13.3535 11.30838 | - C\$1 - Q35 - C - 8 3 0 |

Note: For description of variables, see Appendix III.

APPENDIX VI

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SELECTED CAMPGROUND STATISTICS

APPENDIX VI

SELECTED CAMPGROUND STATISTICS

This appendix provides a set of statistical summaries which serve to facilitate a better understanding of the general characteristics of the private campground industry in Michigan. These statistical summaries were based on data obtained from the mail questionnaire survey specifically conducted as part of the present study. For convenience of presentation and discussion, data are arranged in two major categories, enterprise characteristics and spatial relationships. Specific values in each category are displayed in tabular form accompanied by a brief description.

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| Goals | Number of Observations | e Distribution | Cumulative % |
|---|---------------------------|-------------------|-----------------|
| As primary source of income | 76 | 34.55 | 34.55 |
| As secondary source of income | 90 | 40.91 | 75.46 |
| Personal prefer- ence or others ^a | 54 | 24.54 | 100.00 |
| Total valid observations | 220 | 100.00 | |

1. Enterprise Characteristics

Appendix Table 1.--Goals of Michigan Private Campground Owner.

^aThis group includes all respondents indicating that they were not operating their campgrounds under income motivation. Rather, they claimed that they operated campgrounds for providing services for club members, for family activities for personal satisfaction by meeting people and friends, or for a retirement hobby.

| Years in Business | Number of Observations | % Distributi | on Cumulative % |
|-----------------------------|---------------------------|-----------------------|-----------------|
| 3.0 - less | 119 | 40.6 | 40.6 |
| 3.1 - 6.0 | 58 | 19.8 | 60.4 |
| 6.1 - 9.0 | 47 | 16.0 | 76.5 |
| 9.1 - 12.0 | 13 | 4.4 | 80.9 |
| 12.1 - 15.0 | 19 | 6.5 | 87.4 |
| 15.1 - up | 37 | 12.6 | 100.0 |
| Total Valid Observations | 293 | 100.0 | |
| Average Number of Years | 7.435 | Standard Deviation | 8.658 |

Appendix Table 2.--Number of Years in Business Operation.

| Daily Rate | Number of Observations | <pre>% Distribution</pre> | Cumulative % | |
|-----------------------------|---------------------------|---------------------------|--------------|--|
| 2.00 - less | 26 | 9.8 | 9.8 | |
| 2.01 - 2.50 | 4 5 | 16.9 | 26.7 | |
| 2.51 - 3.00 | 87 | 32.7 | 59.4 | |
| 3.01 - 3.50 | 61 | 22.9 | 82.3 | |
| 3.51 - up | 47 | 17.7 | 100.0 | |
| Total Valid Observations | 266 ^a | 100.0 | | |
| Average Daily Charge | \$3.111 | Standard Deviation | \$.756 | |

Appendix Table 3.--Basic Daily Charge of Campsite Rental.

^aExcluded 23 campgrounds which provided service only on a seasonal-lease basis.

| Campground Ownership | Number of Valid Observations | 3-month season (June-August) average (in %) | 5-month season (May-Sept.) average (in %) | |
|--|------------------------------------|---|---|--|
| State park ^b campground | 70 | 60.63 | 45.85 | |
| County, ^C township, municipal, and village campground | 46 | 56.83 | 44.72 | |
| Private ^d campground | 250 | 49.33 | 41.49 | |

Appendix Table 4.--Summary of Monthly Average Occupancy Rate^a for Public and Private Campgrounds, 1972.

^aThe occupancy rate is defined in percentage terms which may be computed by dividing the total number of campsite-days actually occupied by the total number of campsites days available for rental during the season.

^bThis occupancy rate was estimated from state park campground statistical records which were made available by courtesy of the Park Division, Michigan Department of Natural Resources.

^COccupancy rate was computed from responses obtained from the mail survey of public campgrounds in this category.

^dOccupancy rate was computed from responses obtained from the mail survey of private campgrounds.

| Occupancy Rate in percent | 3-mont (July- No. | h season August) % | 5-month season (May - Sept.) No. % | | |
|------------------------------|-------------------------|--------------------------|--|---------|--|
| 1.0 - 10.0 | 15 | 6.0 | 23 | 9.3 | |
| 10.1 - 20.0 | 23 | 9.2 | 33 | 13.4 | |
| 20.1 - 30.0 | 40 | 16.0 | 50 | 20.2 | |
| 30.1 - 40.0 | 40 | 16.0 | 37 | 15.0 | |
| 40.1 - 50.0 | 30 | 12.0 | 32 | 13.0 | |
| 50.1 - 60.0 | 22 | 8.8 | 26 | 10.5 | |
| 60.1 - 70.0 | 21 | 8.4 | 7 | 2.8 | |
| 70.1 - up | 59 | 23.6 | 39 | 15.8 | |
| Total Valid Observations | 250 | 100.0 | 247 | 100.0 | |
| Average Occupancy Rate | 49.3 | 27% | 41.4 | 85% | |
| | 27.7 | 16% | 25.9 | 24% | |

Appendix Table 5.--Summary of Monthly Average Occupancy Rates for Michigan Private Campgrounds.^a

^aFor sources and definition, see Appendix Table 4.

| 3-month | Number of | | Percentage | of Campgrou | und Having: | |
|----------------------|-------------|-------------------|------------|-------------|-------------|------------------|
| occupancy rate | Campgrounds | Motor- boating | Swimming | Fishing | Canoeing | Water- skiing |
| 1.0%- 10.0% | 15 | 20.0% | 20.0% | 53.3% | 33.3% | 13.3% |
| 10.1 - 20.0 | 23 | 56.5 | 73.9 | 91.3 | 65.2 | 43.5 |
| 20.1 - 30.0 | 40 | 27.5 | 62.5 | 70.0 | 52.5 | 15.0 |
| 30.1 - 40.0 | 40 | 57.5 | 72.5 | 85.0 | 65.0 | 37.5 |
| 40.1 - 50.0 | 30 | 40.0 | 73.3 | 76.7 | 36.7 | 26.7 |
| 50.1 - 60.0 | 22 | 59.1 | 90.9 | 90.9 | 77.3 | 40.9 |
| 60.1 - 70.0 | 21 | 33.3 | 76.2 | 81.0 | 61.9 | 28.6 |
| 70.1 - up | 59 | 72.9 | 84.7 | 86.4 | 64.4 | 62.7 |
| Total Campgrounds | 250 | 50.0 | 72.8 | 80.8 | 58.4 | 37.2 |

Appendix Table 6.--Relationships Between Occupancy and Water-Oriented Recreational Activities.^a

^aFor data sources, see Appendix Table 4.

| No. c | of Ites | 1964 & No. | before | 196! No. | 5-1969 | 197(No. | 0-1973 |
|--------------------------------|----------------------|---------------|-----------|-------------|--|-------------|--------|
| | | | | | ······································ | | |
| 10 - | 30 | 59 | 57.3 | 57 | 35.8 | 88 | 32.8 |
| 31 - | 60 | 22 | 21.4 | 45 | 28.3 | 76 | 28.4 |
| 61 - | 90 | 8 | 7.8 | 24 | 15.1 | 36 | 13.4 |
| 91 - | 120 | 5 | 4.9 | 18 | 11.3 | 46 | 17.2 |
| 121 - | 150 | 5 | 4.9 | 4 | 2.5 | 11 | 4.1 |
| 151 - | 180 | 3 | 2.9 | 5 | 3.1 | 3 | 1.1 |
| 181 - | 210 | 1 | 1.0 | о | 0.0 | 1 | 0.4 |
| 210 - | up | 0 | 0.0 | 6 | 3.8 | 7 | 2.6 |
| Total Observ | vations ^b | 103 | 100.0 | 159 | 100.0 | 268 | 100.0 |
| Averaç Number CS per | cof cG | 45.3 | - | 64.5 | ; | 66.3 | 3 |

Appendix Table 7.--Size Distribution of Private Campgrounds by Different Periods of Establishment.

^aThis table is compiled on the basis of the following data sources:

- (1) Private Campground License Records, Michigan Department of Public Health, 1973.
- (2) Campground and Trailer Park Guide, Rand McNally & Co., 1969 and 1973.

(3) Private Campground Survey designed as a part of the present study.

^bCampgrounds have less than 10 campsites are not included in the above table.

| No. of Campsites | Sea Camp No. | asonal Year-1 pgrounds Campgi % No. | | -round grounds % | Total Campgrounds No. % | |
|---------------------|--------------------|---|-----|------------------------|-------------------------------|--------|
| 10 - 30 | 163 | 41.79 | 38 | 27.14 | 201 | 37.92 |
| 31 - 60 | 107 | 27.44 | 38 | 27.14 | 145 | 27.36 |
| 61 - 90 | 48 | 12.31 | 20 | 14.29 | 68 | 12.83 |
| 91 - 120 | 47 | 12.05 | 22 | 15.71 | 69 | 13.02 |
| 121 - 150 | 11 | 2.82 | 9 | 6.43 | 20 | 3.77 |
| 151 - 180 | 8 | 2.05 | 3 | 2.14 | 11 | 2.08 |
| 181 - 210 | 2 | .51 | 0 | .00 | 2 | .38 |
| 211 - more | 4 | 1.03 | 10 | 7.14 | 14 | 2.64 |
| Total | 390 | 100.00 | 140 | 100.00 | 530 | 100.00 |
| Average | 54 | . 59 | 81 | .56 | 61 | .72 |

Appendix Table 8.--Size Distribution of Seasonal and Year-Round Campgrounds in Michigan (private).

^aCampgrounds with less than 10 campsites are not included in the above table. For data source, see Appendix Table 7.

| | · · · · · · · · · · · · · · · · · · · | | |
|-----------------------------------|---------------------------------------|---------------------------|--------------|
| Distance ^b in miles | Number of Observations | <pre>% Distribution</pre> | Cumulative % |
| 0.0 - 0.2 | 175 | 61.6 | 61.6 |
| 0.3 - 1.0 | 32 | 11.3 | 72.9 |
| 1.1 - 2.0 | 12 | 4.2 | 77.1 |
| 2.1 - 5.0 | 31 | 10.9 | 88.0 |
| 5.1 - 10.0 | 22 | 7.7 | 95.8 |
| 10.1 - 20.0 | 12 | 4.2 | 100.0 |
| Total Valid Observations | 284 | 100.0 | |
| Average Distance | | Standard Deviation | 4.158 miles |

2. Spatial Relationships

Appendix Table 9.--Summary of Distance Measures from Private Campground to a Natural Lake Location.^a

^aSources: Based on responses from the private campground survey designed as a part of present study.

^bDistances are measured in actual mileage as reported by the campground operator.

| Distance ^b in miles | Number of Observations | <pre>% Distribution</pre> | Cumulative % |
|-----------------------------------|---------------------------|---------------------------|--------------|
| 0.1 - 1.0 | 54 | 18.5 | 18.5 |
| 1.1 - 5.0 | 112 | 38.4 | 56.8 |
| 5.1 - 10.0 | 74 | 25.4 | 82.2 |
| 10.1 - 15.0 | 27 | 9.2 | 91.4 |
| 15.1 - 20.0 | 17 | 5.8 | 97.3 |
| 20.1 - 30.0 | 6 | 2.1 | 99.4 |
| 30.1 - 90.0 | 2 | .6 | 100.0 |
| Total Valid Observations | 292 | 100.0 | |
| Average Distance | 6.535 miles | Standard Deviation | 6.287 miles |

Appendix Table 10.--Distribution of Private Campgrounds by Distance to Nearest Competing Private Campground.^a

^aSource: Based on responses from the private campground survey designed as a part of the present study.

^bDistance are measured in actual mileage from the campground to its nearest neighbor as reported by the campground operator.

| Distance ^b in miles | Number of Observations | <pre>% Distribution</pre> | Cumulative % | | |
|-----------------------------------|---------------------------|---------------------------|--------------|--|--|
| 0.1 - 1.0 | 19 | 6.7 | 6.7 | | |
| 1.1 - 5.0 | 68 | 24.1 | 30.9 | | |
| 5.1 - 10.0 | 72 | 25.5 | 56.4 | | |
| 10.1 - 15.0 | 45 | 16.0 | 72.3 | | |
| 15.1 - 20.0 | 28 | 9.9 | 82.3 | | |
| 20.1 - 30.0 | 28 | 9.9 | 92.2 | | |
| 30.1 - 90.0 | 22 | 7.8 | 100.0 | | |
| Total Valid Observations | 282 | 100.0 | | | |
| Average Distance | 12.873 miles | Standard Deviation | 11.859 miles | | |
| | | | | | |

Appendix Table 11.--Distribution of Private Campgrounds by Distances to the Nearest Public Campground.^a

^aSource: Based on responses from the private campground survey designed as a part of the present study.

^bDistances are measured in actual mileage as reported by the campground operator.

| Persons per sq. mile | Number of Observations | <pre>% Distribution</pre> | Cumulative % |
|-----------------------------|---------------------------|---------------------------|--------------|
| 10.0 - less | 40 | 13.7 | 13.7 |
| 10.1 - 30.0 | 78 | 26.6 | 40.3 |
| 30.1 - 50.0 | 58 | 19.8 | 60.1 |
| 50.1 - 100.0 | 84 | 28.7 | 88.7 |
| 100.1 - 150.0 | 17 | 5.8 | 94.5 |
| 150.1 - 200.0 | 5 | 1.7 | 96.2 |
| 200.1 - 300.0 | 5 | 1.7 | 98.0 |
| 300.1 - up | 6 | 2.0 | 100.0 |
| Total Valid Observations | 293 | 100.0 | |

Appendix Table 12.--Distribution of Private Campgrounds by Township Population Density.^a

^aSource: Based on the responses from the private campground survey designed for the present study.

APPENDIX VII

FACTORS INFLUENCING PUBLIC

CAMPGROUND DISTRIBUTION

APPENDIX VII

FACTORS INFLUENCING PUBLIC CAMPGROUND DISTRIBUTION

STUDY OF PRIVATE CAMPSITES AND COUNTY CHARACTERISTICS 57/17/74 PAGE 10 FILE NOVANE (CREATION DATE = C7/1//74) DEPENDENT VARIABLES. VARCOZ PUCS FITD ENTER 2.790000. TOLERANCE SOLDOGS, FITD RENOVE 2.790000 VARIABLEISI ENTERED ON STEP NUMBER 7... VARGIO DIST-BETROII

| HULTIPLE A | .43474 | ANALYSIŞ DE VARIANCE | 35 | SUM OF SOUAHES | SELLOS VASH | F SIGNIF | CANDE. |
|---------------|-----------|----------------------|-----|----------------|--------------|----------|--------|
| R SCULRE | .46387 | AEGAESSION | 7. | 4754725.51646 | 643675.21578 | 9.20675 | 5 |
| STD DEVIATION | 271.91263 | REPIQUAL | 73. | 5397338,91417 | 73936,14951 | | - |

| VAPIABLE | 8 | STO EARDA D | F SIGHEFICANCE | BETA ELASTICITY | VAR!ABLE | PARTIAL | TÖLERINCE | F \$1411711411E |
|------------|-------------|--------------|--------------------------------|-----------------------|----------|---------|-----------|-------------------------|
| AT5002 | 157174064 | 6.3733042 | 9.1.41472 | 29(332) | VAR001 | .11341 | .26861 | 194141758 |
| ¥42007 | 2.7453236 | 248142968 | 1014 9-7.13276 | .15896 .3117957 | VARCII | .82127 | . #5774 | .315 3:834425532-82 |
| ¥48319 | 337,00105 | 102.34285 | .013 11.8605;= | 15134 5513/02 | A74072 | . 25092 | ,79953 | 1245 116712415 |
| /AP010 | -197341566 | 1,9973231 | 25.519711 | -17912111 | YARC17 | ++12919 | .28565 | .257 1+2227372 |
| YARDIA | -,75343762 | 7,1615897832 | 12.523429 | -1+(3/71 -135×3061 | ¥49621 | 83083 | .15317 | _273 &:8\$32367eE-12 |
| VIPCI6 | .29592453 | .12745792 | 5.9392533 | 2524319 | VAR023 | \$4214 | .34739 | 12885514 |
| VAP016 | -, 16528422 | 147542446 | 4.29533.2 | 3867044 | | | | •721 |
| (CONSTANT) | 24:983789 | 264,47122 | ,242 8,9240-4552-03 ,925 | ±.57473 | | | | |

FALEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION.

SUMMARY TABLE

| \$7EP | VAR:ABLE Entered removed | F TO Enter GP Ménové | SIGNIFICANCE | NULTIPLE A | R SQUARE | R SOUARE CHANGE | \$1HPLE R | OVERALL F | SIGN[F1CANCE |
|---------|--|---|--|--|--|--|---|---|--|
| 1234567 | VARC35 VAP337 VAP337 VAP34 VAP34 VAP34 VAP34 | 16.31736 3.71224 4.77556 11.27338 7.34122 3.85314 4.2*533 | -103 -138 -132 -143 -103 -129 -154 -142 | .41375 .41067 .51477 .54238 .63923 .60153 .64474 | ,17119 ,25674 ,25486 ,35691 ,40849 ,43762 ,46687 | ,17119 .03736 .04035 .39611 .39757 .42913 .63125 | .41375 .24352 •.02196 •.33°23 •.09473 .12625 .68831 | 14.31700 10.25572 8.27555 10.27555 10.37565 10.35659 9.59734 9.29826 | .103 .551 .493 .200 .100 .201 .201 |

Note: VAR001 represents total number of private campsites in each county, and see Appendix III for description of all other variables.

APPENDIX VIII

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MAP SHOWING PRIVATE AND PUBLIC CAMPGROUND DISTRIBUTION PATTERNS

APPENDIX VIII

MAP SHOWING PRIVATE AND PUBLIC CAMPGROUND DISTRIBUTION PATTERNS



These maps were developed by the "SYMAP" mapping routine with county geographic centers as data points.