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STUDY OF USER PATTERNS AND CHARACTERISTICS.

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MICHIGAN SUMMER TRAIL USERS: A PILOT STUDY
OF USER PATTERNS AND CHARACTERISTICS

By

Edilberto Zalvidea Cajucom

A THESIS

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ABSTRACT

MICHIGAN SUMMER TRAIL USERS: A PILOT STUDY OF USER PATTERNS AND CHARACTERISTICS

By

Edilberto Zalvidea Cajucom

This study was primarily concerned with obtaining preliminary indications of summer recreational trail use patterns and user socio-economic characteristics in Michigan. The information developed in this study may prove useful in the management, development, and administration of recreation areas. Also, the information may serve as a guide in deciding on the equitable allocation of land for various recreational pursuits. An objective of the study was also to test the use of self-administered questionnaires as a means of gathering data.

In data collection, eleven survey stations were selected in various parts of the state. These stations were all within the jurisdictional areas of the Michigan Department of Natural Resources and the United States Forest Service and were mostly concentrated along the Michigan Riding and Hiking Trail. At each of these unmanned stations a sign and a box containing

questionnaires were installed at the trailhead. The survey was conducted from June 15 to September 30, 1969. No motivational technique nor administrative encouragement was employed in eliciting response from trail users. The purpose was to test and evaluate the degree of responsiveness of trail users in filling out questionnaires on a purely voluntary basis.

Respondents of age eleven or above were asked to complete the questionnaire. Only one member of each family was requested to respond. Personal interviews of both respondents and nonrespondents were conducted to ascertain the reliability and validity of the data obtained. The information obtained was coded and processed using data processing equipment. Descriptive and statistical analyses were completed.

In general, hiking and horseback riding appear to be the predominant methods of travel used on trails. Motorcycling or motorbiking and bicycling were lightly represented. Trail users were composed of younger age groups in both hiking and riding pursuits. "One family and children" and "groups of friends" were the predominant group composition. Trail user heads of families were mostly professionals with seventeen or more years of education and had an annual income of \$10,000 or more.

In the statistical analyses of data, testing differences between proportions reveal significant

differences in selected variables in seven out of nine survey stations. It showed that sex, age, camping participation, education, professional occupation, and annual income were significantly different between users of two stations. Significant differences were also found in the case of other variables such as place of residence of users, availability of camping opportunities, and user's group composition.

In the chi-square analysis tests of significance, significant differences were found between variables such as method of travel, age, sex, reasons for choosing trail, camping frequency, group composition, trail use frequency, occupation, and education of users.

Response on self-administered questionnaires, except for two survey stations (Ludington and Pinckney), was not believed very substantial in this study. This could be attributable to some factors such as lack of motivational technique or publicity, excessive length of the questionnaire used, ineffective administration of the questionnaire, short duration of the study, difficulty of some questions asked or probably mere apathy on the part of trail users. On the average, only two out of ten trail users filled out questionnaires at the five locations observed. However, it is believed that the study gives some indications of trail use patterns and user characteristics in the state of Michigan.

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CHAPTER I

INTRODUCTION

Among the various aspects of outdoor recreation management and administration, the investigation of trail use and users has received little attention and consideration. Because little emphasis has been given to recreational trails by outdoor recreation researchers and policy-makers, information on trail use patterns and preferences and user socio-economic characteristics is scanty and in some instances entirely nonexistent.

Although fewer people participate in the recreational use of trails than in camping or picnicking, it is a significant aspect of recreation land management. Hiking, horseback riding, and other uses of trails are important recreational activities. As the report on the nationwide trail study entitled Trails for America states:

Walking, hiking, and bicycling are simple pleasures within the economic reach of virtually all citizens. Horseback riding, even though increasingly expensive for urban dwellers, is available to a large portion of Americans. Opportunities to enjoy these basic activities have become increasingly limited for the American people as the society has urbanized and as economic development has preempted areas which had earlier been devoted to outdoor recreation areas. Today, with more leisure time and with rising amounts

of disposable income available for recreation users, more and more Americans are seeking relaxation and physical and spiritual renewal in the enjoyment of the traditional simple pleasures.¹

In Michigan, trails play a significant role in the overall recreational pattern. The state has a trail system considered to be one of the finest in the country. It is reported that: "Michigan, with 650 miles of trail, maintains one of the most ambitious trail programs in the Midwest. A new shore-to-shore riding and hiking trail extends for 200 miles from the towns of Elberta and Empire on Lake Michigan, to Tawas City on Lake Huron."² It has the largest bicycle trail system in the country totaling 193 miles and a substantial length of horseback riding trails (186 miles) exceeded only by the states of Arkansas, California, Ohio, and Washington. The Michigan Riding-Hiking Trail across the upper part of lower Michigan, which is 271 miles in length, is considered one of the longest in the country.

In the series of meetings involving staff members of the Michigan Department of Natural Resources (represented by the Parks and Forestry Divisions), the United States Forest Service, and the Michigan State University Recreation Research and Planning Unit (Departments of

¹U.S., Department of Interior, Bureau of Outdoor Recreation, Trails for America: Report on the Nationwide Trail Study (Washington, D.C.: Government Printing Office, December, 1966), p. 13.

²Ibid., p. 113.

Resource Development and Park and Recreation Resources), it was agreed that the Unit should embark on a study of trail use patterns and user characteristics. The design of the study, types of information desired, the questionnaire, the location of study areas, and the questionnaire box construction and installation, were discussed and agreed upon by the staff of the agencies concerned. Although this study could not be exhaustive in view of time and financial constraints, it is believed to be of use for policy and management decision purposes in recreation area administration.

Objectives

The present research project was primarily intended to be a pilot study of trail user survey methodology. The main objectives were to:

1. Observe and obtain experience concerning the factors affecting trail user and use studies in Michigan.
2. Test the use of a self-administered questionnaire as a means of gathering data on trail use and users.
3. Test specific questions regarding use and users to determine their usefulness and practicality for future surveys.
4. Obtain some basic statistical data on trail use and user characteristics in order to be

able to determine the statistical characteristics and problems of such data. This information will be of great value in future survey sampling design.

5. Obtain preliminary indications of trail use patterns, trends in usage, and the socio-economic characteristics of trail users on some selected recreational trails in Michigan.
6. Conduct tests to determine if there are statistically significant differences between the socio-economic characteristics of users of different trails.

Significance of the Study

At present there are no available data on trail use patterns and users' characteristics for practically all types of park and forest recreation areas in Michigan. The information obtained in this study will be useful as a management guide for making sound decisions in the management and development of recreation areas. This study will be valuable in allocating resources for various recreational purposes. It will attempt to obtain information on the types of people using trails, their preferences, and the volume of trail use. Competition and conflicts in the use of trails will also be identified.

Such problems will only be resolved if data on users are obtained and carefully examined and evaluated. For example, the United States Forest Service is considering the possibility of providing separate trails for motorcycles. Data on trail use and users in this regard are necessary for decision-making purposes.

Recreation and tourism in this country have advanced tremendously in the last few years. In Michigan alone it is estimated to be more than a billion dollar industry representing the second largest income-producing activity.¹ It has been estimated that in Michigan state park areas alone over 409,000 families camped in 1969 and more than 75,000 had to be turned away because of lack of space and overcrowding. The figures do not include visitors in recreational areas under federal, regional, county jurisdiction, and other state resource-managing agencies. This is just an indication of the recreation explosion taking place in the state where competition in the use of lands for various recreational pursuits is becoming evident. Every piece of land acquired has to be justified and the demand for each recreational activity or potential users supported by actual use and user data. Hence, data on trail use patterns and users' characteristics are essential if recreation policy-makers and

¹Robert O. Dodge, "Michigan," Parks and Recreation, V (December, 1970), 44.

planners are to plan scientifically and provide satisfaction for this type of user.

Furthermore, data obtained in this study will be useful in both the current and long-range planning of major resource-managing agencies in the state especially in setting forth planning guidelines for land acquisition and development of additional outdoor recreation areas and facilities to meet the growing demands of recreationists.

Scope and Limitations of the Study

Although this study attempts to obtain information which is to some degree representative of overall recreational trail use and users in Michigan, it cannot be considered exhaustive and conclusive. Time and financial constraints prevented the selection of an adequately large sample which would be truly representative of trail users at many different locations and at different times. However, an attempt was made to select trails or trail systems under the administration or jurisdiction of the United States Forest Service and Michigan Department of Natural Resources which may be considered representative of some typical situations and, therefore, adequate for the purposes of the study. The limitations of the study are as follows:

1. On site self-administered questionnaires were used rather than personal interviews or mailed questionnaires, because the intention was to develop a technique that could be used for continuous data gathering. It would be unrealistic to expect considerable amounts of funds to be available for large scale interviews or mailings year after year.
2. Only a limited number of survey stations in the Lower Peninsula of Michigan could be selected because of budget limitations. Station distribution was concentrated in the northern portion and southeastern part of the Lower Peninsula eliminating entirely the southwestern and northeastern sections because of budgetary limitations.
3. Data collection was limited to the summer use of trails, specifically from June 15, 1969 to September 30, 1969.
4. Self-administered questionnaires were used to obtain information on behavioral and socio-economic characteristics of trail users since budget limitations precluded personal interviews.
5. No publicity, inducement or encouragement of any sort was used by the researchers or cooperating agency personnel to elicit information

or higher response rates from trail users. Filling out of questionnaires was purely a voluntary matter on the part of the respondents.

Survey of Similar Studies in Other States

Before embarking on the study, letters were sent to various universities throughout the country, specifically those with forestry, conservation, natural resources, or park and recreation resources departments, soliciting information on complementary studies undertaken concerning the recreational use of trails. The main purposes were to avoid possible duplication of studies and to detect similar studies which would be useful references concerning methods. Similar requests were made to various public recreation, forestry, conservation, and other resource-managing agencies. Most of those who replied were not able to provide useful information. Some schools or agencies said they would be embarking on similar studies soon. The great majority did not have studies on recreational trails and did not have plans of conducting such studies in the foreseeable future; most said they would be very interested in a report on the present project when it is finished.

Publications concerning trails received by the Recreation Research and Planning Unit from these agencies were mainly concentrated on trail concepts, inventory,

design, standards, policies, development, maintenance, and rules and regulations. For instance, the recently published A State Trail Study¹ by the Wisconsin Department of Natural Resources and Outdoor Recreation Trails in New York² by the New York Division of Parks and Outdoor Recreation Conservation are two of the most comprehensive state publications on recreational trails dealing largely with the management and administrative aspects; but these are not the major concerns of the present study. However, two research publications entitled Hiking on Camels Hump³ by the Vermont Agricultural Experiment Station, and A Trail Use Survey⁴ by the Canadian National Park Service are research studies similar in some respects to the study undertaken herein. The former deals only with the hiking use of trails along the Camels Hump area of Vermont; whereas the latter concentrates with hiking in two

¹Wisconsin Department of Natural Resources, A State Trail Study (Madison: Wisconsin Department of Natural Resources, 1969).

²New York State Council of Parks and Outdoor Recreation, Outdoor Recreation Trails in New York State (Albany, N.Y.: Conservation Department, 1969).

³F. O. Sargent, Hiking on Camels Hump (Burlington, Vt.: Vermont Agricultural Experiment Station, University of Vermont, July, 1969).

⁴J. W. Thorsell, A Trail Use Survey: Banff and Yoho National Parks, Recreational Research Report 33 (Canada: National Park Service, February, 1968).

Canadian national park areas. The present project differs somewhat from these since it deals with areas administered by a number of agencies and both riding and hiking are included as activities. Two other important studies on wilderness trails are worth mentioning. One is by Wenger¹ and the other by Wenger and Gregersen.² The first study deals with the factors influencing effectiveness in terms of increase in response for the information obtained through unmanned registration stations. The second report discusses the effect of non-response on representativeness of information obtained by the same method. Most of the variables used in both studies above were similar to those of the present study except that on site self-administered questionnaire rather than a mailed questionnaire and more variables on behavioral and socio-economic characteristics of trail users are used in the latter.

In general, research studies dealing with trail use patterns and user characteristics are still scanty. In Michigan there has been no known study of any kind of trail use and user characteristics.

¹W. D. Wenger, Jr., A Test of Unmanned Registration Stations on Wilderness Trails: Factors Influencing Effectiveness, U.S. Forest Service Research Paper PNW-16 (Portland, Oregon: Pacific-Northwest Forest and Range Experiment Station, November, 1964).

²W. D. Wenger, Jr. and H. M. Gregersen, The Effect of Non-response on Representativeness of Wilderness-Trail Registration Information, U.S. Forest Service Research Paper PNW-17 (Portland, Oregon: Pacific Northwest Forest and Range Experiment Station, November, 1964).

Selection of Study Areas

Ten stations in park and forest areas in both state and federal lands were selected by researchers in consultation with the personnel of the cooperating agencies. The following criteria were used in the selection process:

1. The study areas selected were confined to Michigan's Lower Peninsula where the population is concentrated.
2. A good number of survey stations were concentrated in the northern part of the Lower Peninsula where there is considerable use of trails. The well-established Michigan Hiking-Riding Trail is located in this region and several stations were at points along it.
3. The stations selected had to be grouped within reasonably proximate geographic areas in order to facilitate administration and supervision for economic reasons. This arrangement was also deemed necessary to minimize the incidence of vandalism.
4. Representation of various kinds of trails such as those which could be considered as primarily hiking trails, horse trails, bicycle trails, etc., was another goal. Also, it was an objective to obtain a good representation of various types of trail users.

Assumptions

It was assumed that:

1. The study areas selected within the administration of the Michigan Department of Natural Resources (Forestry and Parks divisions) and United States Forest Service were reasonably representative of the various trails on lands within the state of Michigan under jurisdiction of these agencies.
2. The study areas chosen were believed to be some of the most popular and widely used recreational trails within the state.
(Administrators and field staff do not have quantitative information on the number of trail users.)
3. The method of data collection in the form of a self-administered questionnaire would elicit adequate information or responses from trail users.
4. The data from the responses obtained would give preliminary indications of trail use patterns and socio-economic characteristics of Michigan trail users.
5. Upon analysis and interpretation of the data obtained, weaknesses and strengths of the study methods used could be objectively

evaluated and recommendations subsequently made for future studies.

6. Personal interview techniques of eliciting data obtains valid information and therefore can be used to test the reliability of the self-administered questionnaires.

Hypotheses

1. The first hypothesis of this study is that self-administered questionnaires will give reliable data concerning trail use patterns and the socio-economic characteristics of trail users.
2. The second hypothesis is that there is no statistically significant difference between selected socio-economic characteristics of trail users at certain pairs of survey stations.
3. The third hypothesis is that there is no statistically significant correlation or statistical significance between a selected pair of behavioral and/or socio-economic characteristics of trail users within the same survey station.

Sub-hypotheses

The selected socio-economic characteristics tested in relation to Hypothesis 2 are represented by the following sub-hypotheses:

1. There is no difference between the proportion of male trail users at the two stations.
2. There is no difference between the proportion of trail users who were more than thirty years of age at the two stations.
3. There is no difference between the proportion of trail users who were campers at the two stations.
4. There is no difference between the proportion of trail users who were from families whose head had received seventeen or more years of education at the two stations.
5. There is no difference between the proportion of trail users who were from families where the head of family was in a professional occupation at the two stations.
6. There is no difference between the proportion of trail users who were from families which had \$10,000 or more annual income at the two stations.

The sub-hypotheses for selected pairs of behavioral and/or socio-economic characteristics of trail users tested

in relation to Hypothesis 3 are presented in Table 2 (see Chapter III).

Definitions of Terms Used

The following are definitions adopted for this study.

Station.--This indicates the location of a questionnaire box containing self-administered questionnaires and an instructional and directional sign.

Trailhead.--It is the place on a trail where users begin or end hiking or riding.

Trail.--This term means a man-made or natural track through a forest and/or open space used by hikers or riders for recreational purposes. This is contrasted with a nature trail which is usually comparatively short and is equipped with interpretative devices.

Respondent.--A trail user who is eleven years old or older who attempts to complete a question and either returns it in the box or mails it in afterwards.

Non-respondent.--A person who does not complete a question nor place it in the box or mail it in even if he picks up a questionnaire.

Personal Observation.--This signifies observation of trail users in the field concerning their behavioral

characteristics and whether or not they completed a self-administered questionnaire.

Field Interview.--It is a face-to-face interrogation between an interviewer and the respondent for purposes of eliciting information from the latter pertinent to the research problem.

Self-administered Questionnaire.--It is a printed sheet of paper containing a series of questions which is deposited in a box at an unmanned trailhead station for trail users to fill out. After completion, it is either deposited in the same box or mailed in to the addressee.

Open-ended Questions.--These are questions that elicit a free response rather than a structured one such as is required in a "yes" or "no" or multiple choice question.

Trail Camp.--It is a campsite specifically designed or constructed for horseback riders. It is generally equipped with toilet facilities, fireplaces, and a water pump for overnight campers and provided with a picket line and watering place for horses separated from the camping location.

Organized Group.--A group of trail users who are there by reason of belonging to the same organization.

Examples are groups from organizations such as the Boy Scouts, Michigan Trail Riders' Association, or the Michigan Conservation Cycle Club.

CHAPTER II

DATA COLLECTION AND PREPARATION

Questionnaire Design

The primary objective in deciding on the design features of the questionnaire was to obtain the desired information from the largest number of respondents in the most accurate form possible. Questions asked were limited to those which would directly elicit information on trail use patterns and socio-economic characteristics of varied trail users. The portions of the questionnaires which necessitated opinionated responses, comments, and/or recommendations were open-ended rather than conventionally structured to give the respondents more freedom to speak out their minds. It is also felt that open-ended questions would elicit responses which are more realistic, reliable, and valid than structured.

The question sequence technique, color of the printed questionnaire, and other techniques of survey methodology which have elicited more responses in previous studies were considered in the design of the

questionnaire used herein.¹ For instance, a blue colored questionnaire was used in this study because this color produced slightly larger numbers of responses according to Crapo and Chubb.² The questionnaire itself was divided into three main groups of questions purposely arranged in the following sequence. The introductory part was made up of general questions. The middle portion was composed of socio-economic characteristics items with the last part largely consisting of open-ended questions concerning opinions and recommendations. The main reason for such an arrangement was based on the premise that a respondent tends to react more favorably to questions that necessitate short and direct answers than to those requiring lengthy evaluations such as opinions or recommendations. Since the socio-economic characteristics portion was an imposition on the privacy of the respondent, it was placed in the middle section on the assumption that such items would probably be completed once the respondent has started filling out the questionnaire.

Inasmuch as the rate of response has also been found to be dependent on factors such as sponsorship of

¹One study that may be specifically cited is the recent report of D. Crapo and M. Chubb, Recreation Area Day-Use Investigation Techniques: A Study of Survey Methodology, Technical Report No. 6 (East Lansing, Michigan: Recreation Research and Planning Unit, Department of Park and Recreation Resources, Michigan State University, January, 1969).

²Ibid., p. 97.

the survey, questionnaire length, questionnaire attractiveness, and the ease of completion and return, as reported in previous studies, these factors were considered in the design of the questionnaire (see Appendix B).¹ In general, the language used was fairly simple and straightforward so that even an eleven-year-old respondent (youngest deemed qualified to fill out questionnaire) would not have difficulty in completing it.

Pre-testing of Questionnaires

In order to determine if there were problems in question interpretation, the questionnaire was pre-tested before final reproduction. Some forty copies of a mimeographed version of the questionnaires were pre-tested at two locations (Highland State Recreation Area and Pinckney State Recreation Area).² The representative respondents consisted of both male and female hikers and riders ranging from twelve to fifty-three years of age. In the distribution of questionnaires, the researchers saw to it that a fairly good representation of age and sex of respondents were included to make such pre-tests valid and reliable.

¹Ibid., pp. 20-24.

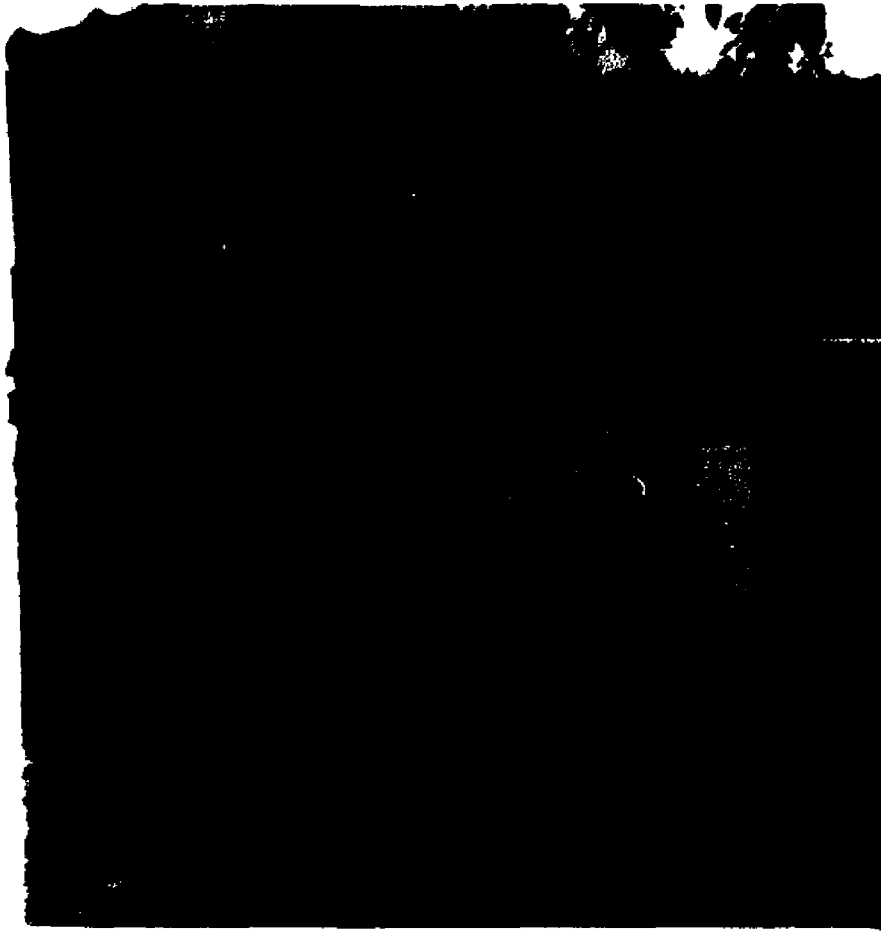
²For economic reasons, only these two areas were selected for pre-testing because they were the nearest from the home base and were close to each other.

After examining and evaluating the responses given, minor modifications in the wording or content of some questions were made where the responses indicated that difficulties had occurred. The revised questionnaire was then printed in the Recreation Research and Planning Unit's normal style. The main features of this style are: (1) the main questions are in large heavy type, (2) heavy lines separate the main questions, and (3) instruction boxes are shaded.

Questionnaire Box Design and Installation

The design of the box to contain the self-administered questionnaires was simple but functional. Both the blank and completed questionnaires were contained in one box in separate compartments (Figure 1). Blank questionnaires were accessible to respondents at the bottom and completed questionnaires were dropped in the slot provided at the top. The slot at the bottom of the box was designed so that blank questionnaires could be obtained only a few at a time to prevent wastage. Boxes were made of three-quarter-inch exterior type weatherproof plywood stained with the brown color normally used by the Michigan Department of Natural Resources and United States Forest Service for signs.

Each box was installed at the end of the trail being studied. A signboard was erected about thirty to fifty feet up the trail from the box informing the hikers



**Figure 1.--Front View of Questionnaire Box
Showing Separate Slots for Blank and Completed Questionnaires**

and/or riders of the study. The wording on the signs was "Riders and Hikers Stop! Help Plan Your Trails. Fill Out Information Card" (see Figure 2). This is similar to the wording used by Wenger in that it is in a firm tone without the use of "please."¹ Wenger found that this approach was more effective in eliciting information from trail users compared with more mildly toned signs although the question of the effect of the authoritarian approach on the reliability and representativeness of responses was not tested. Aside from the information on the box, and the instructions on the questionnaire as to who should complete questionnaires, no other devices nor media were employed to encourage participation in the survey. Completion of questionnaires was, therefore, purely voluntary on the part of the respondents.

In installing boxes and signs at each station, the original idea was to locate boxes near trail exits where they could be hidden from non-users of the trail who might pass by on an adjacent road or use an adjacent area. However, on the advice of agency field staff the boxes were installed in the open, right at the trailheads, because of the anticipated problems with vandalism. Most of the boxes were located far from the agency's office or

¹Wenger, A Test of Unmanned Registration Stations on Wilderness Trails: Factors Influencing Effectiveness, p. 25.



Figure 2.--Sign Installed at One Survey Station
Pointing to the Box Location

headquarters and therefore not within the regular inspection or patrol routine of the field staff, thus making them vulnerable to vandalism.

Boxes were mounted on posts and erected below eye level facing trail exits. For trail systems ending in trail camps, boxes were installed right in the middle of the camp near the fireplace where trail campers usually congregate. In some study areas where trail users were expected to come from both directions on the trail, two signs were installed on opposite sides pointing to the box location. Each box in these areas contained only a few blank questionnaires since few respondents were anticipated. However, in other study areas such as in state parks or recreation areas where a large volume of visitors were expected, ample blank questionnaires were deposited to insure continuity of supply. Pencils, erasers, and sharpeners were fastened to each box for the use and convenience of respondents.

Questionnaire Administration and Maintenance

After the boxes were installed at the agreed locations, the cooperating agencies, namely the Parks Division and Forestry Division of the Department of Natural Resources and the Huron-Manistee National Forest of the United States Forest Service, took charge of the administration and maintenance in the field during the months of June, July, August, and September. However, the field

staff still continued to administer and maintain the questionnaire boxes until October of 1969. Returns continued to be mailed in by the agencies, particularly by the state park and recreation areas. Some responses were mailed in by individual respondents even after the end of October.

In order to insure that the survey was administered in a uniform manner, specific instructions were sent to the agency field staff concerned. These instructions covered the filling of boxes with blank questionnaires and the mailing of completed questionnaires back to the Recreation Research and Planning Unit. Fieldmen were instructed not to encourage trail users to fill out the questionnaire nor to participate in question completion except for purposes of clarification. Pencils and the supply of questionnaires were to be checked at least once a week and completed questionnaires mailed back as soon as collected. To facilitate dispatch of completed questionnaires, stamped self-addressed, large brown envelopes were furnished by the Unit to all administering agencies. In anticipation of vandalism problems, a spare questionnaire box and set of signs were sent to each study location for replacement purposes.

Fieldmen were requested to report any incidence of vandalism so that immediate replacement could be effected in order to maintain continuity. Every effort

was made to anticipate possible field problems in advance and offset these difficulties by designing adequate questionnaires and procedures.

Observations and Personal Interviews

In order to ascertain the reliability and validity of the information obtained by the self-administered questionnaires, actual field observation and personal interviews were conducted in some selected areas. The locations involved were Ludington State Park, Highland State Recreation Area, Pinckney State Recreation Area, Mud Lake Trail Camp, and Scheck's Place Trail Camp. For budgetary reasons, only these five areas were selected. They were the stations which received the highest number of responses. Other stations, especially those located along the Michigan Riding and Hiking Trail, were assumed to have similar trail user characteristics and use patterns to one or more of the five selected. Hence, conducting interviews at these other areas was not essential.

Observations were made of trail users both entering and leaving the trail under study. For making objective observations on group or individual behavior, advantages and disadvantages of the method mentioned by Crapo and Chubb were considered.¹ Hidden observers stationed themselves at a trail exit adjacent to a

¹Crapo and Chubb, Investigation Techniques, pp. 12-14.

questionnaire box, where trail user's behavior and reactions could be observed. Both respondents and non-respondents' reactions were observed throughout the day starting early in the morning until late in the afternoon. Some of the findings of the observations made are presented at the end of this section.

Some interviews were also conducted of both those who completed questionnaires and those who simply ignored them. For those who completed the questionnaires, only some major questionnaire items were picked out and asked again to test the validity of the information previously given on the questionnaire. In order to match this interview information with the questionnaires actually submitted by the same respondents, the completed questionnaires, which had been previously numbered in sequence from 1 to 5 or 1 to 10 (depending on the frequency use of the trail), were taken out of the questionnaire box and comparisons of the data were made. Inconsistencies were noted where they occurred.

Since there were only two regular interviewers and observers, and since the interviews were conducted for both respondents and non-respondents, it was decided that emphasis should be put on the latter. The purpose here was to be able to obtain adequate information on non-respondents and compare it later with the respondents' behavioral and socio-economic characteristics of

the same study trail to see if differences existed between them. In conducting interviews of non-respondents, it was decided to use a systematic sample with a random start. In selecting a sample of respondents for each survey station, the researcher first determined which would be the first user to be interviewed. For example, if fifty people are expected to use the trail and five interviewees (or a one-tenth sampling fraction) are to be obtained, the first respondent was selected by moving a pencil over a random number table¹ without looking and letting the pencil down without consciously selecting a location. If the pencil happened to point at a two-digit number say 04, then the first sample would be the fourth qualified respondent to pass by the box. The second sample would be the eighth person, and the third the twelfth, etc., until the desired total number of interviews was obtained. If the expected population size of trail users was not likely to be realized due to less participation during the day of observation, then the table of random numbers was used to obtain a higher frequency of sampling.

In all cases, however, the frequently recommended sampling fraction of one-tenth of the population was set

¹A random number table consists of a number of elements which occur in random sequence and frequency.

as the lower limit of interview frequency used in order to be able to make valid statistical inference.¹

The following is a summary of the behavioral patterns and reactions of both respondents and non-respondents observed at the five locations selected:

1. Some trail users would pass by the box and fill out a questionnaire after using the trail as intended.
2. A few others would pull out a questionnaire upon entering the trail, read it briefly, and then put it back in the box.
3. Others would stop by the box, read the instructions on the outside and then proceed along the trail without taking out a questionnaire.
4. Some would stop by the box, read the instructions, pull out a questionnaire, pocket it, and proceed along the trail.
5. People leaving the trail would stop by the box, pull out a questionnaire, and fill it out.
6. Others leaving the trail would pass by the box without filling out a questionnaire.

¹Dean J. Champion, Basic Statistics for Social Research (Scranton, Pa.: Chandler Publishing Company, 1970), p. 14.

7. Others would pull out a questionnaire, scan it briefly and finally put it back inside.
8. Teenage girls were generally more serious than teenage boys in attempting to complete questionnaires.

Location and Description of Study Areas

Location

The following are the study areas under each respective administrative agency:

United States Forest Service, Huron-Manistee
National Forest

Caberfae Area

Gordon Creek Trail Camp

Lost Creek Sky Ranch

Michigan Department of Natural Resources,
Forestry Division

Four Mile Trail Camp

Goose Creek Trail Camp

Mud Lake Trail Camp

Scheck's Place Trail Camp

Michigan Department of Natural Resources, Parks
Division

Highland State Recreation Area

Ludington State Park

Pinckney State Recreation Area

Of the above ten locations, the Pinckney State Recreation Area and Highland State Recreation Area are most accessible to large numbers of users because of the large urban population centers nearby and the nature of the transportation systems involved. The cities of Ann Arbor, Jackson, Lansing-East Lansing, Flint, Pontiac, and Detroit alone have a combined population of approximately 2,092,000 (Figure 3).¹ In 1969, a total of 725,718 day-use visits and 10,386 camping permits were recorded at these two recreation areas.² These areas were used at full capacity as evidenced by the "Turn Away Data Report" (1969) showing 2,208 day-users and 1,068 campers who were turned away.³ Much of this use originated in the urban centers of southeastern Michigan.

Pinckney Recreation Area is located in the western portions of Livingston and Washtenaw counties. It is fifty miles from Detroit, using Interstate Highway 96 and only twenty-five miles from the city of Ann Arbor.

¹U.S., Department of Commerce, Bureau of the Census, Census of Population of Michigan (preliminary reports), 1970.

²Data obtained from the tabulated state park attendance and camp permits, Parks Division, Michigan Department of Natural Resources, Lansing, Michigan, 1969. Hereinafter referred to as Park Attendance.

³From "Turn Away Data Sheet," Parks Division, Michigan Department of Natural Resources, Lansing, Michigan, 1969.



Figure 3.--Map of Michigan Showing Study Areas, Major Cities, and Highways

Highland State Recreation Area is approximately fifteen miles west of Pontiac on State Highway M-59 and roughly forty miles northwest of Detroit. It is in Oakland County, the most populous county in Michigan with more than 900,000 people.¹

Another location under the supervision of the Michigan Department of Natural Resources which was selected for the study was Ludington State Park which had a record attendance of 430,974 day-use visits and 11,005 camping permits in 1969.² It is situated approximately eight miles north of Ludington and strategically located on a wooded sand dune area between Lake Michigan and Hamlin Lake. Although it is quite a distance from the major population centers of southeastern Michigan, it is one of the most popular state parks in the whole state.

Four locations were selected in Michigan state forests, namely: Mud Lake Trail Camp, Scheck's Place Trail Camp, Goose Creek Trail Camp, and Four Mile Trail Camp. These trail campsites are under the administration and management of the Forestry Division of the Michigan Department of Natural Resources. All are located along the main section of the Michigan Riding and Hiking Trail in the northern part of the Lower Peninsula (Figure 4).

¹Bureau of the Census, 1970 Census.

²Department of Natural Resources, Park Attendance.

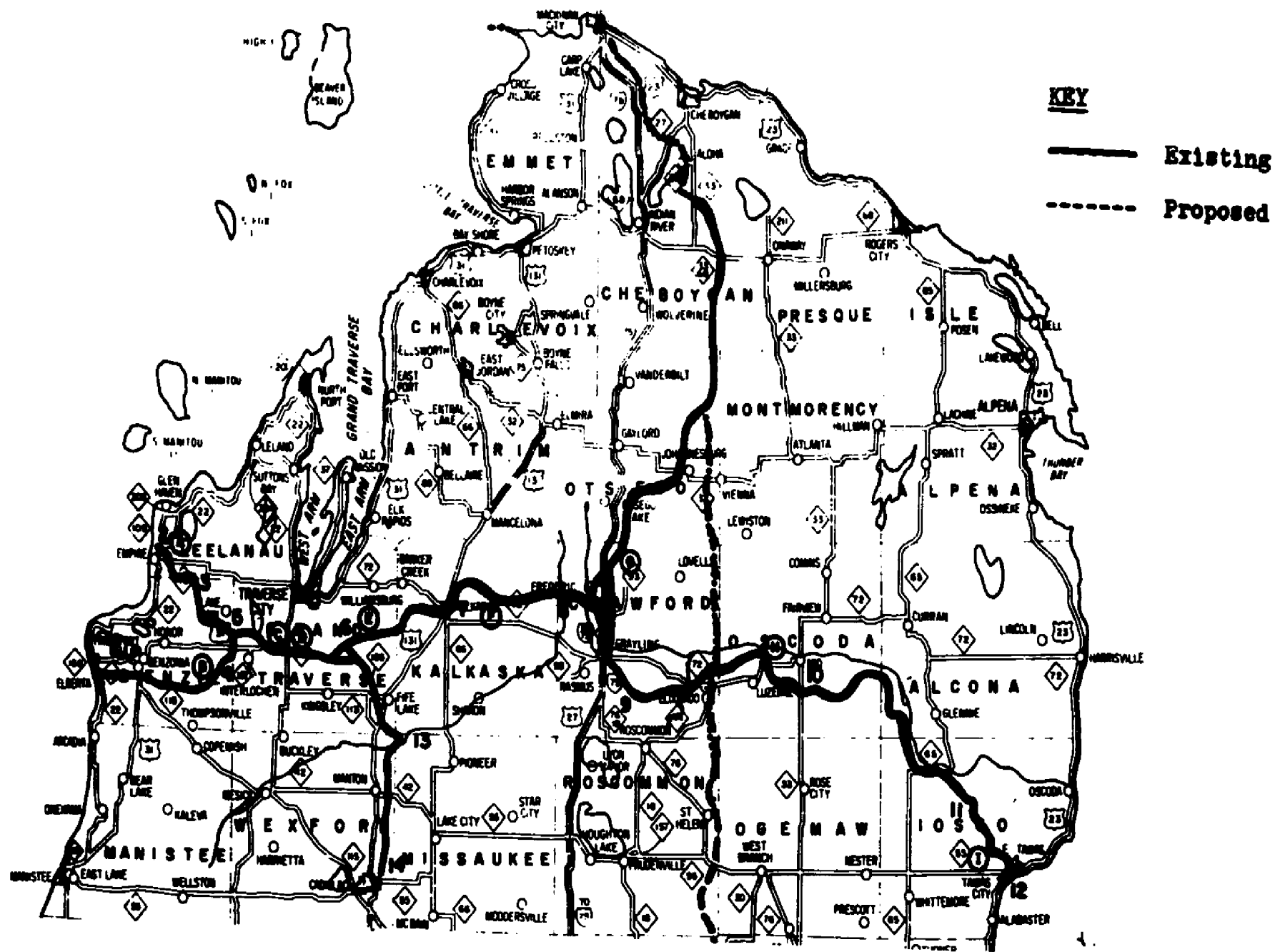


Figure 4.--Section of Michigan's Northern Lower Peninsula Showing the Michigan Riding and Hiking Trail

Both Mud Lake and Scheck's Place trail camps are in Grand Traverse County, the former on the western side and the latter in the eastern portion. Goose Creek and Four Mile trail camps are in Crawford County with Goose Creek in the northwestern section, whereas Four Mile Camp is east of Interstate Highway 75 on Four Mile Road.

Two other locations along the Michigan Riding and Hiking Trail were included. They are the Lost Creek Sky Ranch and Gordon Creek Trail Camp in the Huron-Manistee National Forest of the United States Forest Service, based at Cadillac, Michigan. The former site is located in Oscoda County and the latter in Iosco County. The majority of the trail users at both the state forest and national forest locations mentioned above are horseback riders although the trail system is designed for both riding and hiking. The tenth station designated as a study location was at Caberfae in Wexford County. It is also in the Huron-Manistee National Forest and is used mostly for minor motor-biking. It is not associated with the Michigan Riding and Hiking Trail.

Practically all the locations listed above which are on the Michigan Riding and Hiking Trail are accessible from several directions. If a horseback rider were to engage in a shore-to-shore ride from Empire Camp to Gordon Creek, it would take him at least sixty-eight hours or two days and twenty hours to complete his 272-mile journey

based on average speed of four miles per hour.¹ The shore-to-shore trail together with the various associated trail camps are relatively easily accessible from regional population centers especially potential users in Traverse City (population 17,687), Ludington (population 8,889), Manistee (population 7,762), Cadillac (population 9,832), and Alpena with a population of 13,661.² However, the majority of the riders usually came from the densely populated areas further south as Muskegon, Grand Rapids, Lansing, Kalamazoo, and Detroit where such extensive trail riding opportunities are not available.

The following is a brief description of the main features of these ten locations (stations).

Description of Stations in the National Forest

"Recreation" is one of the multiple uses of the national forest system in the country. It steadily gains nationwide recognition and increased participation from people of all walks of life. There are approximately one million acres comprising both the Huron-Manistee national forest system in the state of Michigan which boasts of

¹Michigan Trail Riders, Inc., Michigan's Hiking-Riding Trail (Traverse City, Mich.: Chamber of Commerce, 1969).

²Bureau of the Census, 1970 Census.

an estimated 1,675,200 visitor days with camping alone registering 442,400 visitor days spent.¹

Caberfae Area.--Caberfae is located within a 580-acre parcel of some 465,140 acres of Manistee National Forest lands in the vicinity of Cadillac, Michigan. It is one of Michigan's most popular and heavily used ski resorts during the winter months. During the summer, the trail system crisscrossing the national forest is usually used for hiking, motorbiking, and horseback riding. Other recreational opportunities offered in the area are picnicking and camping. The questionnaire box was installed at the end of the trail where it intersects a perpendicular unimproved access road leading to the main highway. Two signboards were installed to inform trail users coming from the access road or those starting from the private concessionnaire's establishment where minibikes are rented out by the hour.

Gordon Creek Trail Camp.--Located in the Huron National Forest this site is the last wooded trail camp for horseback riders coming from westerly direction. It is nine miles northwest of East Tawas on Forest Highway 4. It is fully developed for horses, as well as for riders and hikers. It is the most popular trail camp within Tawas district for three reasons: it is very close to

¹U.S. Forest Service, Man and His Environment: Huron-Manistee National Forests (Cadillac, Mich.: U.S. Department of Agriculture, 1969).

Tawas and East Tawas, it has a self-guided interpretative trail, and it is close to the Lumberman's Monument which is quite an attraction for both local and state residents. The questionnaire box was installed at trailhead where riders usually dismount coming from the Tawas area. It was hidden from non-rider campers or picnickers who might be using the campsite.

Lost Creek Sky Ranch.--This is actually a privately-operated concession within the Huron National Forest. The owner of the ranch has horses that are rented out to riders. He operates a lodging place and eating establishment specifically for trail users. The trail system which the concessioner helped develop is now part of the Michigan Riding and Hiking Trail. He has a complete outfitting service for horseback riders and extends guide service upon request. He advertises his establishment and the services he offers both locally and statewide. The questionnaire box was installed by him near his ranch at the trailhead to insure that only those who actually used the trail would fill out the questionnaire.

Description of Stations in the State Forest

Generally, the Michigan state forest system, like other public state forests in the country, is managed on a sustained yield and "multiple use" basis covering over 3,760,000 acres (largely concentrated on the Upper

Peninsula and northern portion of the Lower Peninsula). The Michigan state forest system is managed for timber, water, wildlife, forage, and outdoor recreation. The upsurge of outdoor recreation participation has spurred the establishment and development of more campground areas strategically located in proximity to population centers.

Some recreational opportunities are found on the state forests although the facilities provided may not be as sophisticated as those found in the state park system. For instance, practically all state park campgrounds and picnic areas are equipped with flush toilet system and running water in contrast with the pit toilet and well or pump as a source of water found on state forest campgrounds. Electrical outlets are provided in most state park areas which are not found on state forest recreational areas. However, due to congestion of campers and day-users in most state parks, they are likely to choose state forest campgrounds as an alternative. There has been a sharp increase of state forest campground users and day users in the last five years.

Goose Creek and Four Mile Trail Camps.--These two trail camps are located within the 152,111-acre Au Sable State Forest in Crawford County. They are, respectively, approximately four miles northeast of Grayling on North Down River Road and one and one-half miles south of Au Sable River. They are approximately twenty miles apart.

Each is equipped with the same basic facilities specifically designed for horseback riders using the Michigan Riding and Hiking Trail. These facilities include camping areas, picnic tables, hitching posts for horses, a parking lot, a well, and toilet. Generally, these trail camps are located adjacent or near shallow rivers or streams where riding horses can be watered at specifically designated areas. Some trail camps are purposely designed for overnight campers and long distance horseback riders. Facilities are limited and not as extensive as those found in a typical state forest campground where campers stay for extended periods. The distance between these trail camps varies from a minimum of three miles to a maximum of fifty-five miles.

A questionnaire box and a sign were installed at each of the above stations right in the open field adjacent to the water pump and bulletin board. The box was visible even at a considerable distance for horseback riders coming from opposite directions of the trail.

Mud Lake and Scheck's Place Trail Camps.--Within the 103,570-acre Fife Lake State Forest in Grand Traverse and Wexford counties are Mud Lake and Scheck's Place trail camps. Mud Lake is one mile north of Interlocken on M-137 and one and one-half miles west on US-131. Scheck's Place is approximately two miles north of Mayfield on Garfield and three miles east on Hobbs Road. Facilities found at

these two locations are similar to those at Goose Creek and Four Mile trail camps. At all four of these trail camps there are also separate regular camping facilities such as picnic tables, hitching posts for horses, a well, toilet, etc. However, Mud Lake is more attractive to campers and riders than Scheck's Place because of the presence of the lake in the former which offers other recreational opportunities such as fishing and canoeing. These camps are only twenty-five miles or approximately six hours riding time from each other.

Since Mud Lake is a wooded area, two signs and a questionnaire box were installed there. The box was installed adjacent to the camp fire and the water pump. The signs were erected approximately thirty to fifty feet from the box on opposite direction of the trail informing trail users of the study. In contrast, Scheck's Place being an open area, the box was placed in the open along the trail leading to the watering place for horses. Only one sign was installed about five feet in front of the box which was clearly visible for all trail users even at a considerable distance.

Description of Stations in State Parks

Unlike the state and national forest areas involved, where recreation is only one of the five main uses under the guiding policy of multiple use, the

Michigan state parks and recreation areas are primarily for preservation and recreation. Some of the state park systems functions, which are typical of many other state park systems, are the following:

1. Preserving and making available for public enjoyment areas and features of natural beauty having statewide significance.
2. Preserving and making available for public enjoyment areas and features having historic association of statewide interest.
3. Setting aside and making available to the public areas for outdoor recreation which are properly located and distributed to serve the state as a whole.
4. Providing appropriate facilities and conveniences in the various units according to the public needs, and operating, maintaining, and protecting the entire system for maximum public benefit.¹

Ludington State Park.--This is one of the most popular state parks in Michigan. Its excellent shoreline areas on Lake Michigan and Hamlin Lake and the 3,711 acres of sand dunes largely covered with coniferous and hardwood

¹Michigan Department of Conservation, State Parks of Michigan: A Report of the Past, a Look to the Future (Lansing: Michigan Department of Conservation, 1957), p. 31.

forest are the main physical attributes that attract thousands of users to this area especially during the summer months. Three large campgrounds with a total of 414 sites, and ample picnic areas and swimming beaches on both lakes are the principal recreational facilities. Another attractive feature is an outstanding twenty-five-mile trail system which is suitable for both short and comparatively long distance hiking. This well-marked trail system serves many interesting and scenic points in the park passing through wooded dune areas over much of its length.

Since some of its trails connect at some points and park visitors enter the trail in various trailheads, only the most used trail system was chosen and the questionnaire box was installed at its exit.

Highland State Recreation Area.--Approximately forty miles northwest of Detroit is the 5,406 Highland State Recreation Area. This park consists of fields, marshes, lakes, streams, and woodland of various species. It is particularly suitable for groups studying conservation education and a center is operated for this purpose by the DNR. Trails are available for hiking and nature study. A bridle trail system also traverses the wooded area for horseback-riding enthusiasts. Among the major recreational activities pursued by people are camping, picnicking, swimming, fishing, horseback riding, and

hiking. Autumn color tours, esthetic enjoyment at other times of the year, limited hunting, and dog training are also undertaken. The area's proximity to large centers of population is of great value especially to day-users. The questionnaire box was installed near the private concessionaire's house where the horseback riders usually come out after using the trail system within the state recreation area. Although the study area was under operation through a concessioner, the recreation agency took care of the administration of the questionnaires.

Pinckney State Recreation Area.--This area is located fifty miles from Detroit via I-96. It consists of 9,343 acres characterized by many irregular hills, lakes of varying sizes, and numerous clear streams. The major activities participated in by users are sightseeing, skiing, fishing, boating, and canoeing besides the usual camping and picnicking. A hiking trail system is one of its outstanding features. Both short and long trails are available. They are constructed purposely to pass through various types of vegetation and varied topographical features to give a panoramic view of the surrounding countryside.

Inasmuch as the trailhead in this area was frequently used as both entrance and exit by various types of park visitors, the questionnaire box and sign were installed facing up the trail so that users leaving the

trail would be more likely to participate in the study than those beginning to use the trail.

Coding and Processing of Completed Questionnaires

There were actually ten sites or study areas included in the survey. However, two station numbers were assigned to Highland State Recreational Area: one representing hiking (station 5) and the other horseback riding (station 6).

The stations were arranged in alphabetical order and assigned consecutive numbers as shown in Table 1. Each completed questionnaire received from the field was marked with the appropriate number for quick identification and retrieval purposes. Only fully completed questionnaires and a few which were at least one-half to three-fourths completed including the key questions were coded and processed. Those containing inappropriate responses were eliminated even if some of the information given appeared to be sensible. Questionnaires filled out by respondents less than eleven years old were also rejected. There were actually 694 usable completed questionnaires included in the study which could be considered valid and reliable.

Before the coding of the usable questionnaires could be started, a code book had to be prepared. In the case of the open-ended questions, the coding was

TABLE 1

LOCATION AND STATION NUMBER OF STUDY AREAS SHOWING USABLE AND
NON-USABLE RESPONSES OBTAINED

Box Station Number	Location of Study Areas	Total Responses Turned In	Number of Usable Responses	Number of Non-Usable Response	Percent (%) Usable
1	Caberfae	19	13	6	68
2	Four Mile	12	9	3	75
3	Goose Creek	42	34	8	81
4	Gordon Creek	22	14	8	64
5	Highland (hiking)*	62	27	35	44
6	Highland (h-riding)	84	46	38	55
7	Lost Creek	29	27	2	97
8	Ludington*	519	338	181	65
9	Mud Lake*	65	55	10	85
10	Pinckney*	170	102	68	60
11	Scheck's Place*	34	29	5	86
Total		1068	694	374	

*Personal interviews were conducted at this study area. The purpose was to cross-check reliability of some responses obtained through self-administered questionnaires and also to obtain some indications on nonrespondents' behavioral and socio-economic characteristics.

based on the actual responses obtained. Inasmuch as some of the answers given in the open-ended questions were identical, they were consolidated to a few categories. Those few responses which could not be included in any of the categories outlined for coding purposes were classified under "other" designation. Those that were completely out of categorical context were classified as "inappropriate." With the aid of the code book, the researcher and undergraduate research aides transferred the information from the questionnaires to mark-sense optical scan sheets. These sheets were prepared with numbered spaces for each item on the questionnaire.¹ Check coding was conducted on every tenth coded sheet to insure the accuracy of all codings and to check for double coded lines which would automatically be rejected by the mark sense reading machine. After check coding, the coded sheets were run through an automatic mark sense reading machine which punched the necessary data processing cards. These cards were then submitted to the Michigan State University Computer Laboratory for the preparation of contingency tables.

All the information obtained from the respondents and the coding used for different categories are shown with corresponding frequencies and percentages in Appendix A.

¹See Appendix C for samples of optical scan sheets used in coding in this study.

Potential users' place of residence, feasibility of administration and supervision of the stations were also largely taken into consideration in their selection and establishment.

As was mentioned earlier, observations and interviews were conducted for both respondents and nonrespondents to ascertain the validity and reliability of the data obtained. Such interviews were conducted on September 7 and 8, and August 10, 21, 22, 23, 24, and 25. Some of the observations made were included in the conclusion portion. Interviews of respondents showed consistencies of information given when compared with their completed answers. Hence, data obtained may be assumed to be valid and reliable. Random interviews of nonrespondents were also subsequently made and found to exhibit the same patterns of responses as those given by the respondents. Again, it can be assumed that data obtained from the respondents were reasonably representative to the total samples received from the survey stations established. However, in some areas where the use of the trail was limited to one type such as hiking in the case of Ludington and Pinckney, method of travel was not used as a variable to compare with the other characteristics of trail users to preclude biased comparison or interpretation inasmuch as the other survey stations were exposed to various types of uses. However, in other aspects of the data,

trail users may be compared and contrasted using identical variables.

In the absence of any other data on trail use patterns and user characteristics in Michigan, it is believed that the data obtained will have useful applications in indicating the types of trail use and users. Findings in this study cannot be considered necessarily representative for the whole state in view of the limited number of survey stations established and the number of responses obtained. Six hundred and ninety-four usable questionnaires were acquired in this study. Data from all stations were included in the overall analysis. However, the number of responses at certain stations was insufficient to permit statistical tests for all variables between or within individual stations.

CHAPTER III

GENERAL PROFILE OF TRAIL USERS

In this chapter, the data analysis and interpretation will be based solely on frequency counts and percentages produced in the initial computer tabulations. Statistical analysis concerning the relationships between specific variables will be covered in the next chapter.

Method of Travel

At the eleven stations where the study was conducted, trail users were asked to indicate their method of travel. Based on the total responses received, it appears that traveling on foot still predominates. A total of 475 respondents or 70.4 per cent of the total were hikers while 148 users (21.9 per cent) were horseback riders (Appendix A, Category I). Motorcycling or mini-biking was third in importance with 30 (4.4 per cent) respondents. Bicycling was the least used method of travel with only 7 (1.0 per cent) of the respondents involved.

Age and Sex

Respondents were asked their age and sex. The responses show that trail users are predominantly from the younger age groups. Respondents in the 11- to 15-year-old groups were most numerous with 142 (21.8 per cent) followed closely by the 16-20 age group with 134 (20.6 per cent) responses and the 31-40-year-old respondents with 110 (16.9 per cent). The 41-50 age group with 93 (14.3 per cent) responding was also well represented. The age groups with the least representation were the 51-60-year-old group with 38 (5.8 per cent) responding and the above 60-year-old group with 16 (2.5 per cent) participants (Appendix A, Category II). The distribution of users by age and sex is shown in Figure 5. Of the total number of respondents, 408 (64.5 per cent) were males. This breakdown of trail users' ages is similar to the result obtained in a study in Vermont.¹ It also shows that few people over 50 years of age use trails for hiking.

Camping Participation

To ascertain the proportion of those camping in connection with the use of the trail this question was asked, "Did you camp last night?" A total of 382 (56.2 per cent) said they camped while the others did not (Appendix A, Category III). When asked whether they

¹Sargent, Hiking on Camels Hump, p. 4.

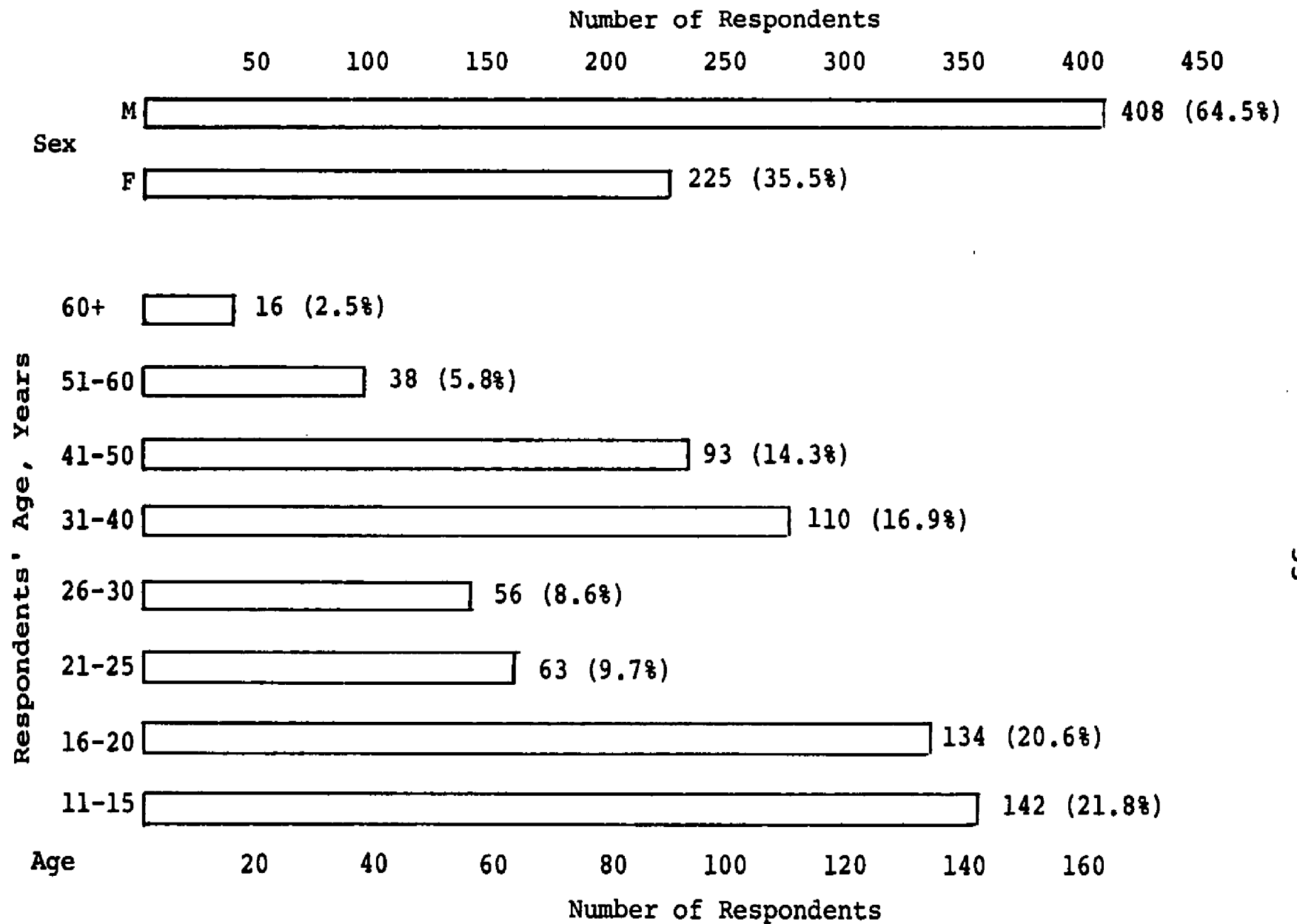


Figure 5.--Distribution of Respondents by Sex and Age

would camp in the succeeding night, 376 (55.5 per cent) said they would. Some camped only overnight while others camped for as long as a week or more. Most hikers stayed in the same campsite during their recreational experience. Riders generally moved from one campsite to another. Camping at a succession of different sites along the trail was usual for those using the Michigan Riding and Hiking Trail. Camping along trails is generally not possible in Michigan state parks in that campers are required to use developed campgrounds and the location of these does not facilitate such usage.

Choice of Trail

Trail users have a variety of reasons for selecting a particular trail. When asked why they chose the trail, the majority said it was "interesting and scenic" with 129 respondents (20.6 per cent) giving this as the principal reason. "Love for hiking and/or riding" was the second most important reason given with 63 (10.1 per cent) responding in this category. Other reasons given were "like it better than others," "for fun or curiosity," "by accident," "have been on it before," "close to home," "friend's recommendation," "no choice," "satisfactory length," etc. A few gave "well-marked," "nature observation," and "read about it in brochures" as their reasons for selecting the trail (Appendix A, Category VII, Figure 6). The question, "How did you learn

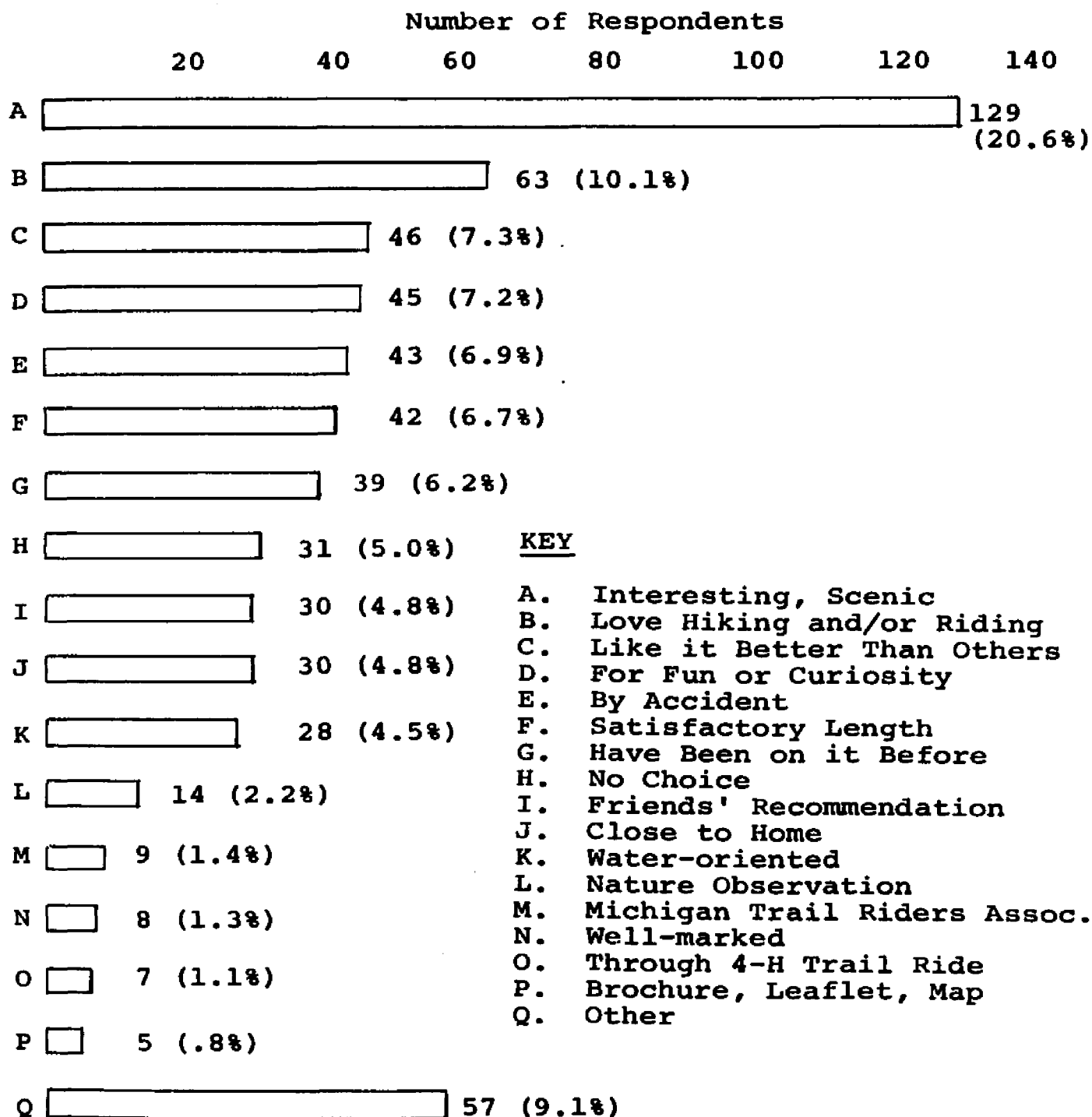


Figure 6.--Reasons Given for Choosing Specific Trail

about this trail?" was also asked. The majority or 129 (20.1 per cent) stated that "mention on a map, brochure, or trail guide" had been the stimulus. The next most important methods were learning about the trail "through friends" (100 or 15.6 per cent), "having been on it before" (78 or 12.1 per cent), "coming on it by accident" (77 or 12.0 per cent), or "seeing signs" (62 or 9.6 per cent). A few of the trail users learned about the trail through clubs or associations such as the Michigan Trail Riders Association,¹ a conservation club, the Automobile Club of Michigan, or even through their church. Private advertisement, word of mouth (other than friends) and parents also played a role in publicizing the location and interesting features of some trails (Appendix A, Category VIII; Figure 7).

Recreational Activities Along the Trail

Many of the people using trails do not just hike or ride. Most of them engage in a variety of other recreational activities along the trail. When asked, "What recreational activities (if any) did you undertake along this trail?", various activities were given. Of these

¹It is a non-profit association organized for the "purpose of promoting the use and development of horseback trails throughout Michigan and encouraging outdoor education in Michigan's natural resources." As of August, 1969, it had a membership of approximately 400 families.

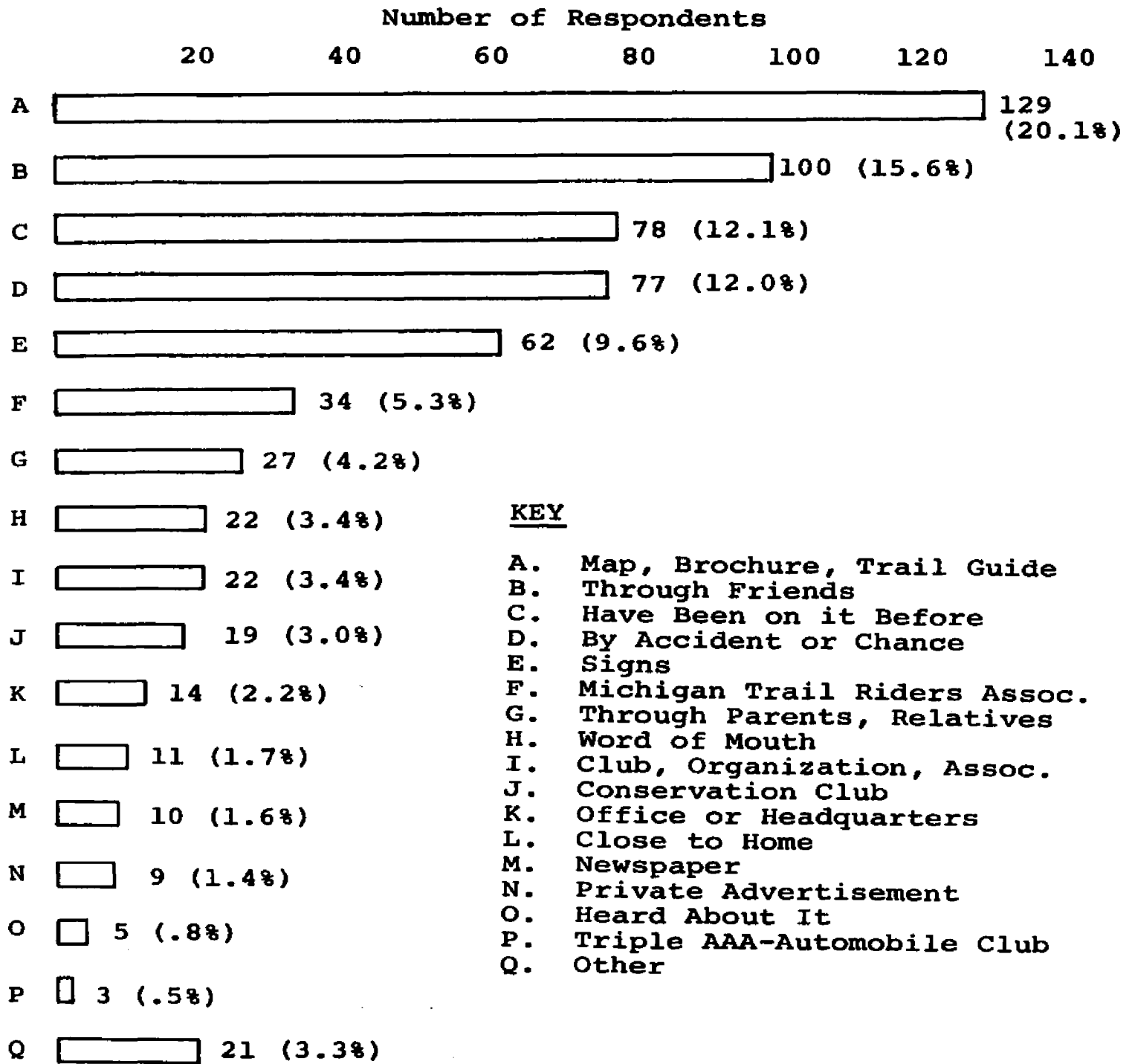


Figure 7.--Media by Which Users Learned of Trail

(not considering hiking and horseback riding),¹ the following are the patterns of participation (arranged from greatest to lowest): birdwatching (25.2 per cent), swimming (15.8 per cent), photography (9.2 per cent), sightseeing (8.5 per cent), and camping/picnicking (7.9 per cent). Some other minor activities engaged in along trail accounted for 33.4 per cent of those responding.

Group Composition

When the respondents were asked as to their group composition, various categories were mentioned. A total of 163 (26.1 per cent) trail-using parties were composed of "one family including children." The second most frequently reported type of group was "a group of friends" with 136 responses (21.8 per cent) followed by "one couple" with 109 (17.4 per cent), and "organized group" with 72 (11.5 per cent). Only a few users (7.6 per cent) prefer to hike or ride alone and "two families" (6.9 per cent) seldom hike together. Other types of groups such as "father-son," "mother-son," "mother-daughter," "group of boy friends," "group of girl friends," etc. accounted for 8.8 per cent of trail use (Appendix A, Category X; Figure 8).

¹Hiking and/or riding were not considered as activities in computing the corresponding percentage indicated.

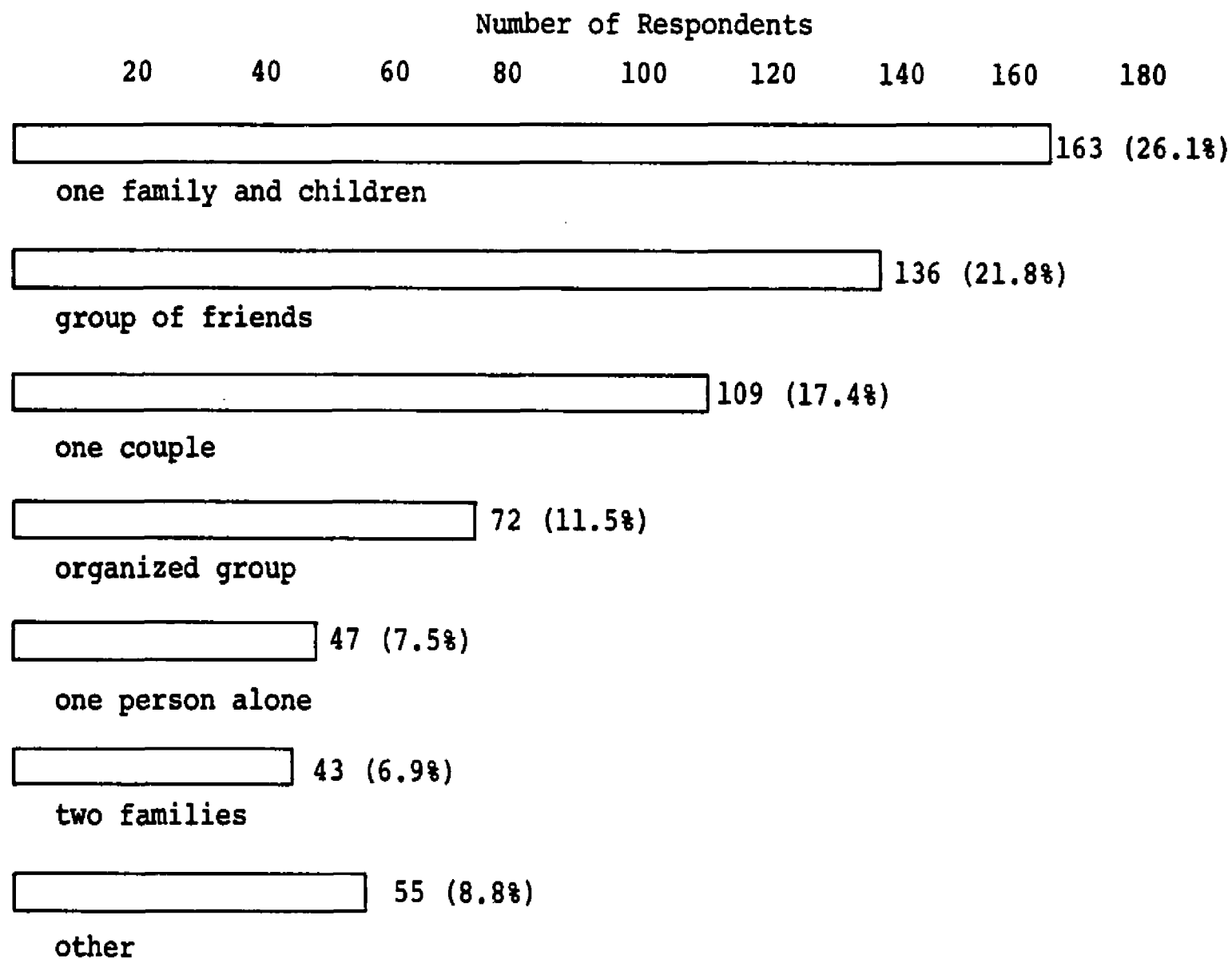


Figure 8.--Type of Group Using Trail

Time of Use

Question 9 provided information concerning the time during the summer months when trail use takes place. It reveals that the month of August was the time when the majority of hikers and horseback riders were using the trails with some 315 (50.2 per cent) responses received for the month. September was the second busiest month with 130 (20.7 per cent) starting a trip at that time. July was chosen by only 96 (15.3 per cent) trail users. Trail use was practically negligible for the months of May and June with only 8 (1.3 per cent) users starting their trips then. These early vacationers may be represented by retired people or working people without children in school (see Figure 9).

Question 9 also indicated that there was no significant pattern in the distribution of the beginning of trail trips within a given month. However, the time of day when recreationists usually begin their trip, ranges from 8:00 A.M. to 6:00 P.M. with the greatest number 149 (27.1 per cent) beginning between 10:00 A.M. and 12:00 noon. Less traveling is done early in the morning and late in the evening (Appendix A, Category XI). The survey also reveals that trail hikers are on the trail between one and four hours depending on the length of the trail being used and the endurance of the hikers. Most of the hikers spend at least the whole day for the experience, whereas many of the horseback riders spent a number of days on the trail.

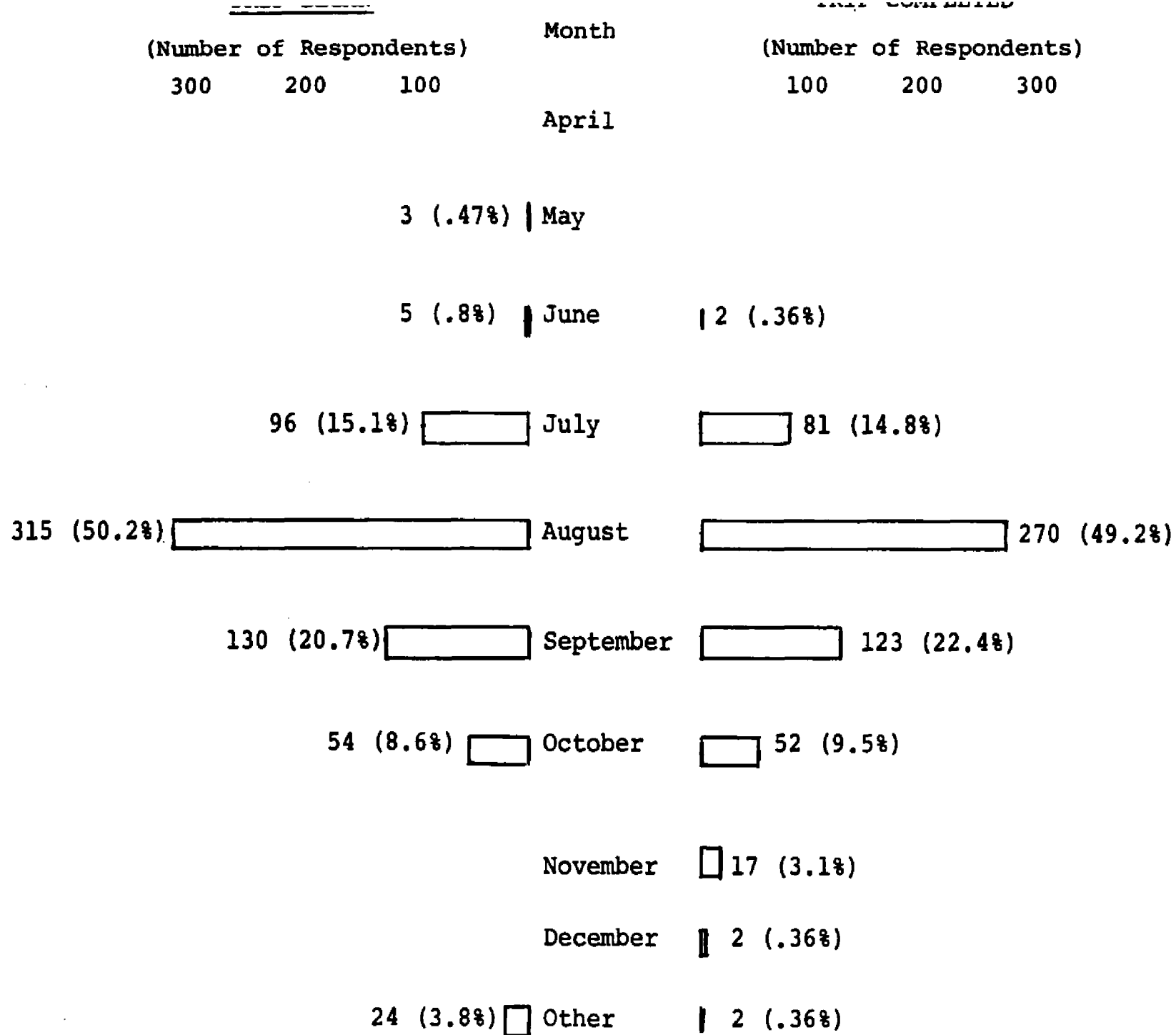
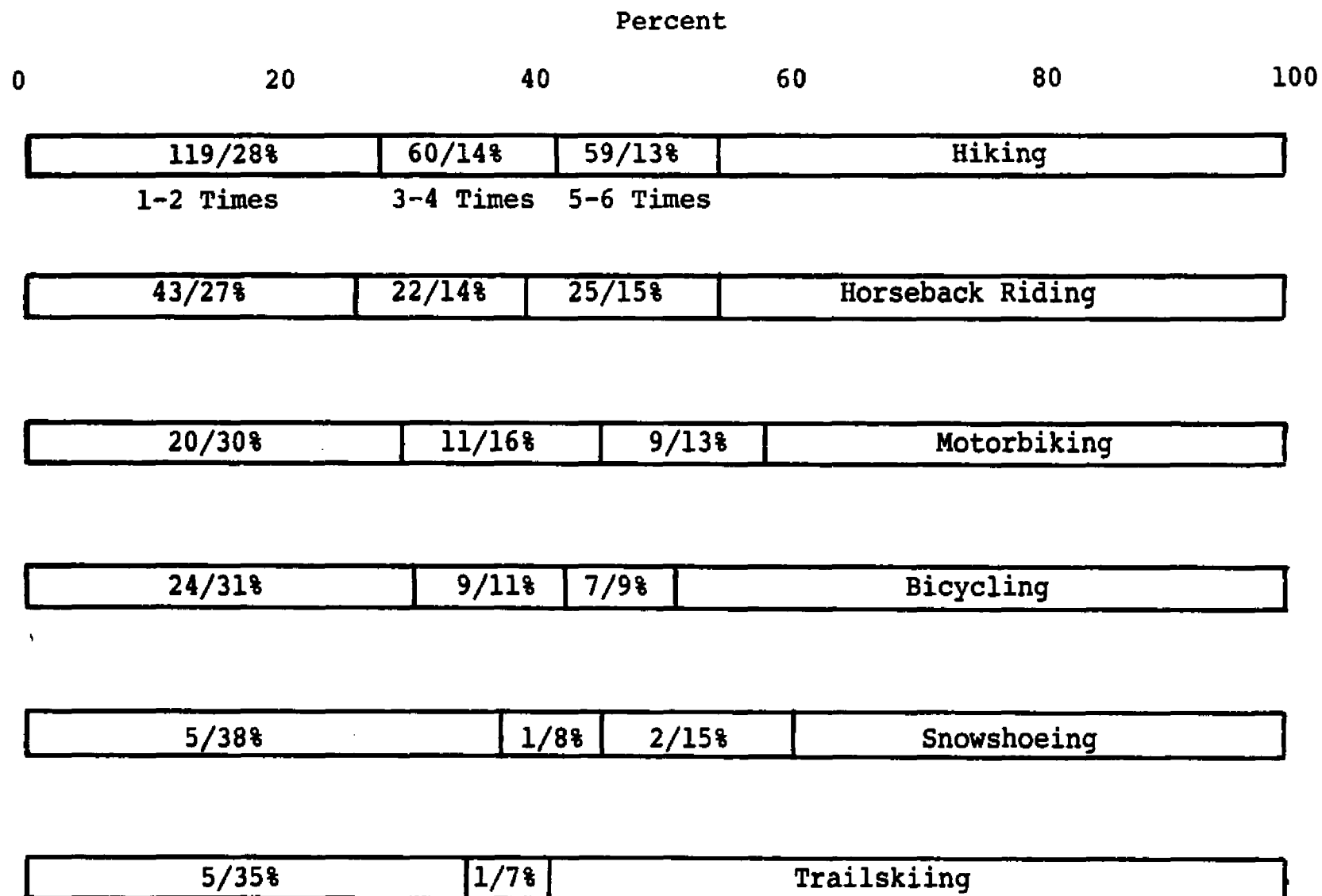


Figure 9.--Histogram Showing Beginning and Completion of Trip

Method of Trail Travel in
Past Twelve Months

In order to determine the various methods of trail travel used by the respondents during the past twelve months, trail users were asked to indicate the approximate number of times they had used seven methods over that period. A total of 43 (26.5 per cent) said they engaged in horseback riding at least one or two times, 47 (29.0 per cent) had participated three to six times and 21.0 per cent had participated seven to twenty-eight times. However, a further 18.5 per cent indicated that they had traveled by horseback on a trail during the previous twelve months but did not indicate the number of times (Appendix A, Category XIII).

Motorbike riding and bicycling were also significant activities on trails. Some 20 (29.9 per cent) indicated that they used motorbiking one to two times in the past twelve months with 11 (16.4 per cent) using same three to four times. However, 18 (36.5 per cent) stated that they used trails five to ten times a year for the same purpose. Bicycling was used by 24 (31.2 per cent) having used it three to ten times. The rest used the same method more than ten times with 18 (23.4 per cent) not indicating the number of times. Snowmobiling was mentioned by 21 (51.2 per cent) respondents using it one to two times. Trail skiing and snowshoeing were reported by a total of 27 respondents (see Figure 10).



Note: First three sections of bar represent 1-2 times, 3-4 times, and 5-6 times, method of travel frequency, respectively. Numbers within each bar represent number of participants and corresponding percentage of participation.

Figure 10.--Method of Travel for the Past Twelve Months

Associated Activities in Past
Twelve Months

In addition to methods of travel, trail users were also asked about the types of activities they have engaged in for the past twelve months which were associated with their trail use. Besides hiking and horseback riding, 48 (41.4 per cent) trail users reported that they engaged in fishing at least one or two times, whereas 29 (25 per cent) did some form of fishing at least three to six times. Although 19 (16.4 per cent) stated that they participated in fishing, they did not mention the number of times they did it. Nature study, camping, and sightseeing were the next most important activities engaged in by recreationists in connection with their use of trails. Some 74 respondents (26.5 per cent) engaged in nature study at least one or two times while 78 (27.9) at least three to six times. Another 67 (24 per cent) participated in the same activity but failed to mention the frequency. Camping was mentioned by 77 (35.2 per cent) respondents who engaged in it one to two times and 61 (27.8 per cent) ranging from three to six times a year. A total of 49 (22.4 per cent) participants did camp but did not say how many times. In connection with sightseeing as an activity associated with the use of trail, 77 (35.2 per cent) participated at least once or twice and 54 (19.9 per cent) at least three to six times. Some 84

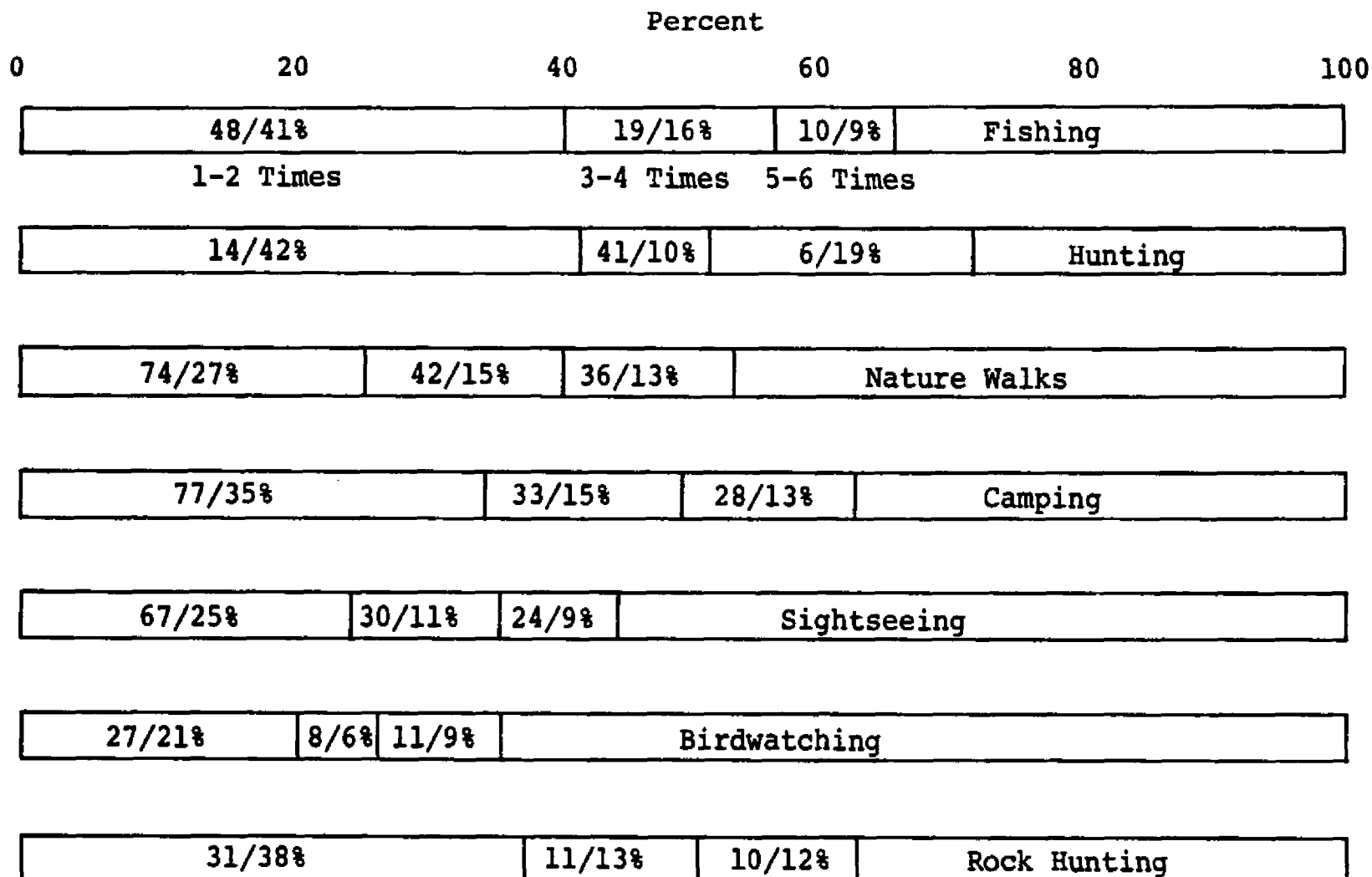
also engaged in sightseeing but the frequency was not indicated.

Birdwatching was also mentioned by 27 (21.1 per cent) users. They participated in this activity at least one or two times. The majority representing 36.7 per cent did participate but failed to indicate how many times. In most of the questionnaires examined, the combined activities of nature study, sightseeing, birdwatching, and camping were usually engaged in by the trail users.

The study also revealed that hunting and rock hunting were the activities engaged in least by trail users (see Figure 11).

Number of Times Trail Used in
Past Twelve Months

To determine trail use frequency within a twelve-month period by the same individual, the question, "How many times have you used this trail in the past twelve months?" was asked. The responses show that 321 (55.6 per cent) of the recreationists used it at least one or two other times. A total of 94 (16.3 per cent) used it at least three or four times, and 67 (11.6 per cent) said they had been on it five to six times. The rest used the same trail more than six times with 9 (1.6 per cent) having used it more than thirty-four times. Upon examination of the information obtained, it appears that the great



Note: First three sections of bar represent 1-2 times, 3-4 times, and 5-6 times, method of travel frequency, respectively. Numbers within each bar represent number of participants and corresponding percentage of participation.

Figure 11.--Associated Activities Undertaken for the Past Twelve Months

majority used the same trail only once or twice within a period of one year.

Socio-Economic Characteristics
of the Family¹

According to the responses obtained, the majority of the heads of the families of the trail users were in the 41- to 50-year-old bracket with 222 (35.4 per cent) reporting. This was followed by those within the 36 to 40 years of age group accounting for 114 (18.2 per cent). It was also interesting to note that 17 (2.7 per cent) reported a head of the family below 20 years of age. There were 24 (3.0 per cent) heads of families over 60 years old. The 51-60 age group was represented by 90 (14.3 per cent) respondents while the 21- to 35-year-old heads of families had 160 (25.5 per cent) in it.

Most trail user family heads were professionals with 221 respondents (34.5 per cent) indicating they were in that occupational category. This was closely followed by skilled workers with 139 responses (22.7 per cent). The other occupations given included clerical and sales (49 or 8.0 per cent), self-employed (48 or 7.9 per cent), semi-skilled (40 or 6.5 per cent), service worker (30 or 4.9 per cent), unemployed and student (30 or 4.9 per cent).

¹In this portion of the questionnaire it may or may not be possible that the respondents are the heads of families. No attempt was made to isolate the respondents who were not the heads of families.

Farm operator, housewife, retired, and other classifications accounted for the rest of the responses (see Figure 12).

As far as educational attainment was concerned, the great majority of family heads had seventeen or more years of schooling with 187 (30.1 per cent) responses in this category. There were 147 (23.9 per cent) heads of families who had twelve years of education. Over 200 (32.5 per cent) had received more than twelve years but less than seventeen years of formal schooling. A negligible number of family heads had only eleven years of education (see Figure 13).

The responses further revealed that 198 (36.5 per cent) families had an income of from \$10,000 to \$14,000 per annum. Some 111 (20.4 per cent) indicated their family income was in the \$15,000 to \$24,000 bracket. For those families earning \$25,000 or over, 37 responses (8.6 per cent) were recorded while 19 (8.6 per cent) stated that the family was earning less than \$3,000 per year. The remainder reporting family earnings of more than \$3,000 but less than \$10,000 numbered 178 (22.8 per cent) (see Appendix A, Categories XIX, XXII, and XXIII). Looking closely at the educational, occupational, and income patterns of the families reported in this survey, it appears that high income, professional families generate much of the use of recreational trails (see Figure 14).

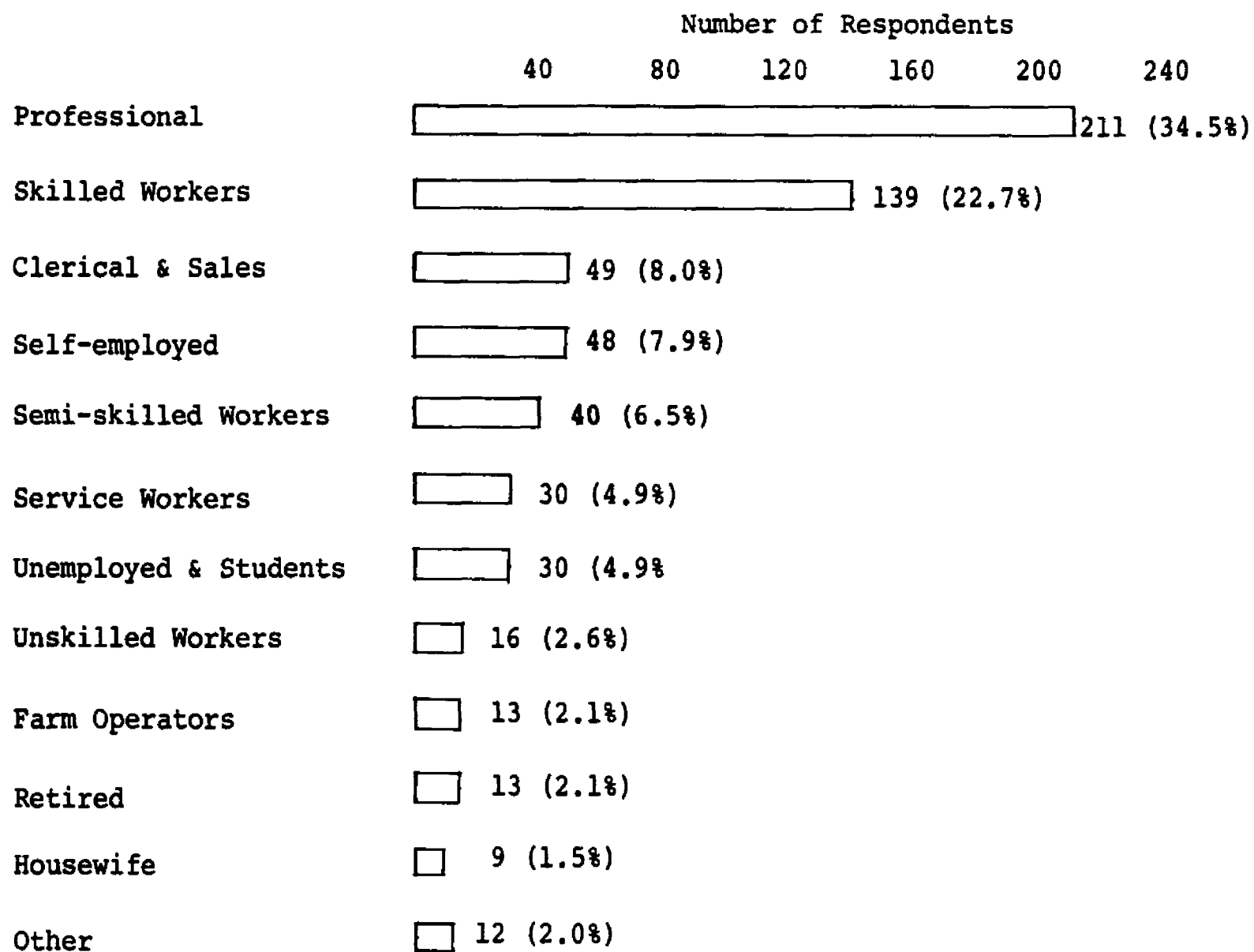


Figure 12.--Occupation of Head of Family

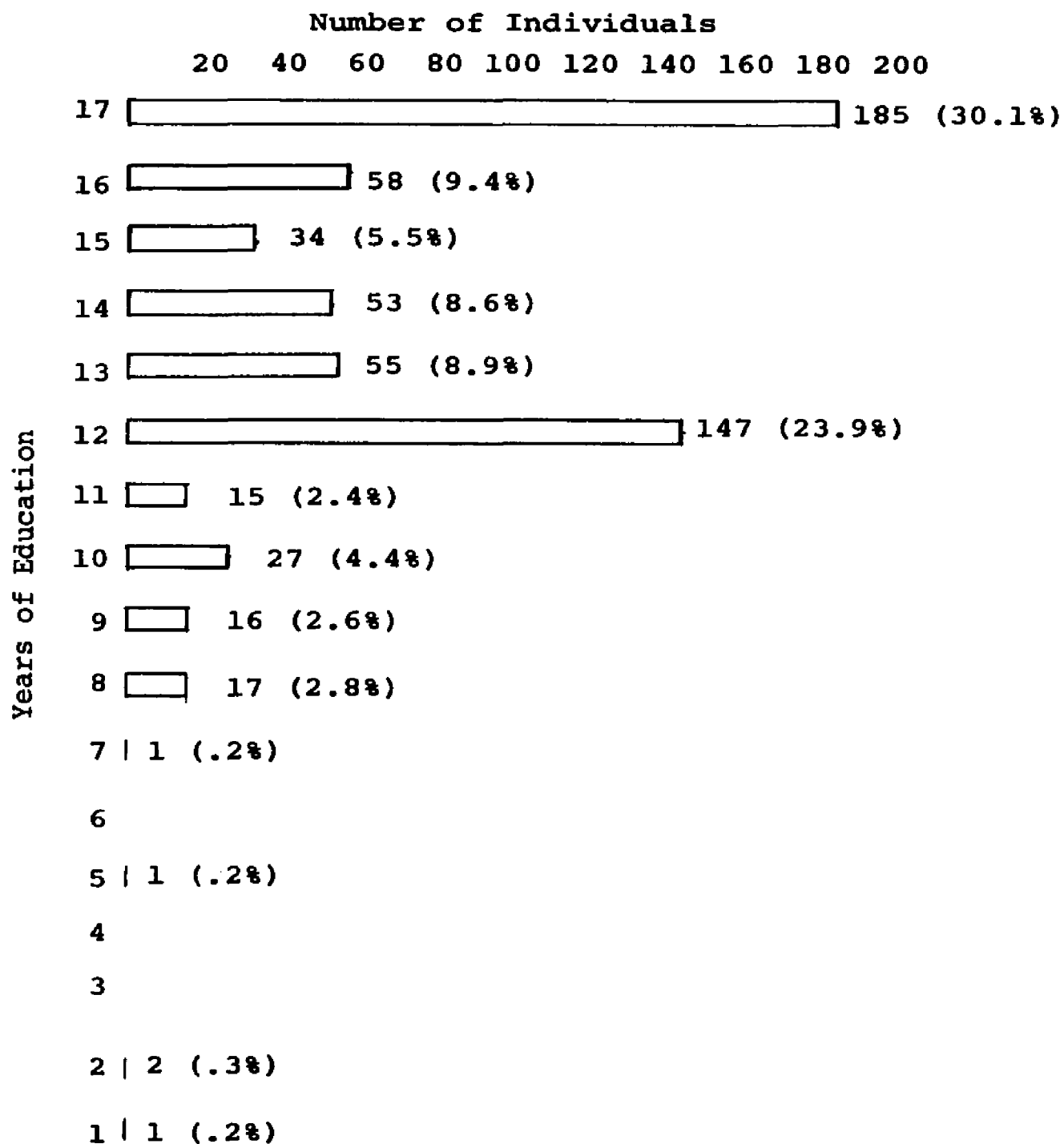


Figure 13.--Histogram Showing Educational Level of Head of Family

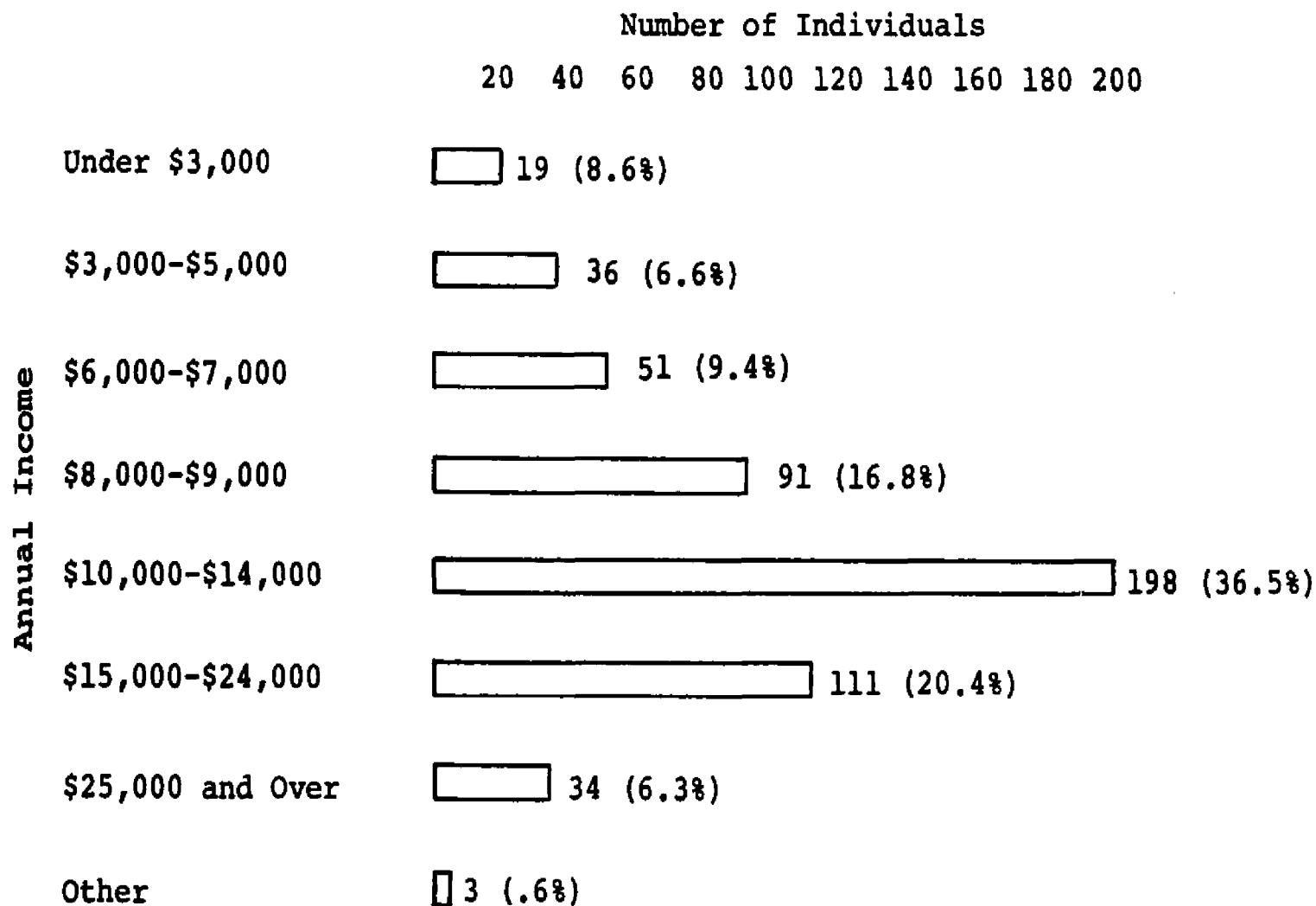


Figure 14.--Family Total Annual Income

When respondents were asked to indicate their permanent residence various responses were obtained. Information revealed that 501 (84.5 per cent) were Michigan residents. Some 25 (4.2 per cent) registered Indiana as their residence while 34 (5.7 per cent) were from Illinois and 14 (2.4 per cent) from Minnesota. The other 15 (2.5 per cent) came from the other parts of the country. Within the state of Michigan, the majority of trail user's permanent residence was distributed as follows (arranged according to greatest total number of county residents): Wayne (13.6 per cent), Oakland (11.0 per cent), Kent (10.1 per cent), Washtenaw (6.9 per cent), Ottawa (5.3 per cent), Muskegon (4.9 per cent), and Gratiot (4.3 per cent). As shown above, although some counties were fairly represented as residence of trail users, other counties were not represented at all (Appendix A, Category XVI).

Trail User's Comments and Recommendations

Besides hiking or horseback riding as the major uses of trails, users were asked questions such as, "What did you enjoy most on this trail or connecting trails?" in order to obtain more information concerning other activities that they might have enjoyed. "Scenery, beauty, and nature study" were given by 249 respondents (44.9 per cent) as the things they enjoyed most. "Observation of trees, birds, fish and plants" was the second major

enjoyment experienced along the trail as reported by 74 (13.4 per cent). "Privacy, tranquility, and solitude," "hiking, walking, riding, and exercise," and "presence of river and lake" were the other things enjoyed with 7.3 per cent, 10.6 per cent, and 7.2 per cent participants registering, respectively.

When users were asked what recommendations they would like to make concerning trail improvements for their enjoyment, responses revealed both realistic as well as unrealistic suggestions. For instance, 129 (29.2 per cent) recommended more and better marked trails. In contrast, 41 (9.3 per cent) users preferred trails in a relatively natural state without further improvements. Others requested more camp sites and restrooms (11.3 per cent); the provision of benches and trash cans (13.4 per cent); and more drinking fountains or water (7.5 per cent). A few users (6.5 per cent) suggested that motorcycles and other motorized vehicles be banned on the trails.

In response to the question, "What 'services' do you feel should be provided along or at the ends of this trail?", a number of interesting suggestions were obtained, although some listed recommendations similar to their responses to the previous question. Suggestions for "more maps, leaflets, labels, and signs" were indicated by 45 trail users (14.2 per cent) and 90 (28.3 per cent) requested for "more drinking fountains or water pumps." "Food machines and concession stands" were mentioned by

36 (11.3 per cent) as their preference. Requests for "some rest areas and campgrounds," "more picnic tables, benches, and better restrooms" were also prominent.

At the end of the questionnaire, trail users were asked to give general remarks or comments. About 60 per cent of trail users said that they enjoyed their use of the trail and complimented the agency on an excellent trail system. However, a few (8.9 per cent) were still requesting more campsites and better trails. Others (10.7 per cent) alleged that some of the questions were long, hard, and too personal, especially the socio-economic ones. A few also complained about the trail being too muddy or sandy, while others emphatically suggested authorities should not allow pets in the campgrounds (Appendix A, Categories XXIV to XXVII).

CHAPTER IV

STATISTICAL ANALYSES AND RESULTS

Because of the limited number of responses obtained at practically all of the stations, not many nonparametric statistical tools could be used to conduct tests of significance between and among the variables.¹ Personnel of the Department of Statistics and Probability and the Computer Center at Michigan State University were consulted for statistical advice in this regard. Since no single statistical method would adequately test for significance among all the variables involved, it was recommended that two techniques be used. Testing the differences between proportions was recommended to test the significance of selected variables between stations. On the other hand, chi-square (χ^2) analysis was suggested to test the significance between variables within the same station. The first test was conducted using a desk calculator while the latter was run on the university CDC 3600 computers.

¹Only at Ludington State Park where sufficient responses obtained for an indepth statistical analysis since each cell had a frequency of at least 5, without reduction in number of categories.

Testing the Differences Between Proportions or Percentages for Uncorrelated Data

Explanation of Techniques

The main purpose of this test was to decide whether or not the difference between two sample proportions or percentages of data for a variable at two stations was significant or could be attributed to chance. It is important that this test be carried out before interpreting differences in attitudes or socio-economic characteristics of various trail users.

To illustrate this kind of test, the basic formula below is given:¹

$$S_{D_P} = \sqrt{\frac{P_1 q_1}{N_1} + \frac{P_2 q_2}{N_2}}$$

where

S_{D_P} = Standard error of the difference between two proportions.

P_1 = Proportion of Group 1.

P_2 = Proportion of Group 2.

N_1 = Number of Group 1.

N_2 = Number of Group 2.

$q_1 = 1 - P_1$

$q_2 = 1 - P_2$

¹Champion, Basic Statistics for Social Research, pp. 130-39; N. M. Downie and R. W. Heath, Basic Statistical Methods (2nd ed.; New York: Harper & Row, Publishers, 1965), pp. 146-51.

Using this formula, the standard error of the difference between two proportions can be computed and then the test of significance can be made by using the "Z" test, based on the formula:

$$Z = \frac{P_1 - P_2}{S_{D_P}}$$

The obtained "Z" value is then checked against the tabular value of Z for areas under a normal curve to determine if the null hypothesis (H_0) is rejected or not. If it is rejected at a given level of significance (say 5 per cent) then the difference between two population proportions being tested can be concluded to be significant and not likely to have occurred by chance.

The formula below for standard error should be used when the values of "N" are at least 30 and when the proportions are extreme; that is "P" is less than .10 or greater than .90. In this case, standard error of the difference of proportions in the two groups is based on the proportion in the two groups combined.

$$S_{D_P} = \sqrt{\frac{Pq}{N_1} + \frac{Pq}{N_2}}$$

or

$$S_{D_P} = \sqrt{Pq \left[\frac{1}{N_1} + \frac{1}{N_2} \right]}$$

where,

$$P = \frac{P_1 N_1 + P_2 N_2}{N_1 + N_2}$$

$$q = 1 - P$$

The rest of the symbols are the same as those used in the previous formula. After computing S_{D_P} , a test of significance is determined by using the "t" test. The formula for this test is:

$$t = \frac{P_1 - P_2}{S_{D_P}}$$

After solving for the value of "t", the test of significance can be made by checking this value obtained against the value for "t" given in a set of statistical tables.¹

Downie and Heath mentioned that the "t" test
 " . . . can be used with large samples as well as with small ones. With large samples, the difference in the

¹The procedure is similar to that for the "Z" test above except that a value for the "degrees of freedom" is considered. To obtain the degrees of freedom in the "t" test, the sum of the number of degrees of freedom in each of the samples is taken. For example, if $N_1 = 25$ and $N_2 = 30$, then the degrees of freedom (df) = $(N_1 - 1) + (N_2 - 1)$ or $df = (25 - 1) + (30 - 1)$ which is equal to 53.

results will be trivial; with smaller samples, more reliable results are obtained. . . ."¹ Hence, in all of the tests relating to the differences between proportions of variables for the various stations, the "Z" test or "t" test has been used as appropriate.

Stations and Variables Tested

The following pairs of stations were selected for testing in this section of the statistical analysis:

1. Ludington State Park and Pinckney State Recreation area.
2. Highland State Recreation Area and Lost Creek Sky Ranch.
3. Goose Creek Trail Camp and Mud Lake Trail Camp.
4. Highland State Recreation Area and Ludington State Park.
5. Lost Creek Sky Ranch and Pinckney State Recreation Area.
6. Goose Creek Trail Camp and Lost Creek Sky Ranch.
7. Highland State Recreation Area and Mud Lake Trail Camp.
8. Goose Creek Trail Camp and Pinckney State Recreation Area.
9. Ludington State Park and Mud Lake Trail Camp.

¹Downie and Heath, Statistical Methods, p. 149.

Data for the above paired stations hypotheses were tested for significant differences in the following trail users characteristics: sex composition, camping participation, education level, occupation, and income. (For detailed statement of hypothesis in each of the paired stations, refer to Chapter I and for sample of calculations see Appendix E).

The purpose of comparison number 1 was to detect any significant differences in characteristics between the trail users at a western Michigan vacation-oriented park (Ludington) and a southern Michigan recreation area more strongly oriented toward weekend use and closer to population centers (Pinckney). The second comparison was made in order to show any differences in characteristics between trail users who rent their horses from concessionaires for short time use (at least one hour--Highland) and those who either own a horse or rent one for long time use (at least half day--Lost Creek Sky Ranch). Comparison number 3 was made to test the assumption that trails located adjacent to one another and having the same primary use will have similar trail users.

Comparison number 4 was intended to test the hypothesis that horseback riders renting horses at Highland State Recreation Area would generally have different socio-economic characteristics than hikers at Ludington. In comparison number 5, predominantly long-distance

horseback riders at Lost Creek are compared with hikers at Pinckney. Horseback riders of Goose Creek Trail Camp who own their horses are compared in number 6 with Lost Creek riders who predominantly rent horses. Two groups of horseback riders are again compared in number 7 but the two riding trail systems (Highland and Mud Lake) are geographically far apart and of variable length. Both comparisons 8 and 9 are primarily concerned with comparison of hikers' and riders' socio-economic characteristics with one pair of stations far apart (Goose Creek and Pinckney) and the other pair (Ludington and Mud Lake) comparatively close to each other geographically.

Summary and Interpretation of Results

The results of the tests of differences between proportions are summarized in Table 2. A detailed example of the data used for the tests in comparison number 1 (Ludington and Pinckney) is contained in Appendix E. A summary of the actual "Z" and "t" values for all nine comparisons is given in Table 2.

Comparison 1: Ludington and Pinckney

The significance in the difference of proportion of male or female trail users between the Ludington and Pinckney stations may be attributed to the difference in family camping opportunities and more attractive features found in the former than in the latter. The male/female

TABLE 2

RESULTS OF TESTS OF SIGNIFICANCE FOR DIFFERENCES
BETWEEN PROPORTIONS FOR SELECTED SURVEY STATIONS

Null Hypothesis Number ^b	1 Ludington(8) ^c and Pinckney(10)			2 Highland(6) and Lost Creek(7)			3 Goose Creek(3) and Mudlake(9)			4 Highland(6) and Ludington(8)	
	Computed t ^a Value	Tabular t ^a Value	Significance	Computed t ^a Value	Tabular t ^a Value	Deg. of Freedom	Computed t ^a Value	Tabular t ^a Value	Deg. of Freedom	Computed t ^a Value	Tabular t ^a Value
H0: 1(Ex)	-2.74 ^d	$\pm 1.960^e$	S ^f	-0.68	± 2.005	56	+1.58	± 1.994	77	-2.16	± 1.960
H0: 2(Age)	+1.48	± 1.960	NS	-2.19	± 1.997	68	+0.98	± 1.993	80	-8.60	± 1.960
H0: 3(Camping)	+7.50	± 1.960	S	-5.86	± 1.997	69	+0.84	± 1.991	86	-0.95	± 1.960
H0: 4(Education)	-2.32	± 1.960	S	-1.40	± 2.004	57	-1.32	± 1.994	78	-3.54	± 1.960
H0: 5(Occupation)	+0.17	± 1.960	NS	+0.08	± 2.000	60	-2.65	± 1.995	75	-1.84	± 1.960
H0: 6(Income)	-0.68	± 1.960	NS	+1.28	± 2.015	46	-2.79	± 1.998	65	-0.96	± 1.960

^a Tested at 5% level of significance.^b Refer to Appendix E for detailed statement of hypothesis and variables tested.^c Number in parenthesis refers to survey station as reported in Appendix A.^d Sample solution and computation entered in this and succeeding columns are shown in Appendix F^e Tabular values for "z" or "t" tests may be referred to any statistical tables for the corresponding degrees of freedom.^f NS means Not Significant and S equals Significant.

5 Lost Creek (7) and Pinckney (10)					6 Goose Creek (3) and Lost Creek (7)					7 Highland (6) and Mud Lake (9)					8 Goose Creek (3) and Pinckney (10)					9 Ludington (8) and Mud Lake (9)				
Computed "t" Value	Tabular "t" Value	Deg. of Freedom	Significance		Computed "t" Value	Tabular "t" Value	Deg. of Freedom	Significance		Computed "t" Value	Tabular "t" Value	Deg. of Freedom	Significance		Computed "t" Value	Tabular "t" Value	Deg. of Freedom	Significance		Computed "z" Value	Tabular "z" Value	Significance		
-2.21	+1.960	122	S		+1.85	+2.014	47	NS		-1.46	+1.991	86	NS		+0.21	+1.960	125	NS		+0.38	+1.960	NS		
-1.06	+1.960	125	NS		+1.78	+2.009	52	NS		-3.57	+1.988	96	S		+1.16	+1.960	127	NS		+0.96	+1.960	NS		
+5.18	+1.960	129	S		-1.77	+2.002	59	NS		-4.28	+1.988	96	S		+3.64	+1.960	116	S		+1.83	+1.960	NS		
-1.69	+1.983	111	NS		-1.15	+2.000	53	NS		-1.87	+1.992	82	NS		+2.68	+1.980	118	S		+0.89	+1.960	NS		
-1.22	+1.983	111	NS		-1.83	+2.010	51	NS		-0.76	+1.992	84	NS		-3.26	+1.981	116	S		+0.96	+1.960	NS		
-0.98	+1.985	104	NS		-1.06	+2.013	48	NS		-0.27	+1.999	63	NS		-2.43	+1.984	108	S		-1.62	+1.960	NS		

proportions obtained at Pinckney and Ludington are .75/.25 and .61/.39, respectively.¹ It appears that the male proportion of trail users at Pinckney exceeded those of Ludington. Besides, trail users of Pinckney may be considered also as day-users (non-campers) inasmuch as most of them did not camp as shown by the .30/.70 proportion of camping/not camping responses obtained compared with those of Ludington where the majority were campers on account of the .69/.31 proportion given. Since camping is more of a family recreational activity, it is likely that the proportion of male campers to female campers would be approximately equal.

Ludington day-users (40 per cent) gave "one family and children" as their type of group in contrast with Pinckney's 18 per cent. Most of Pinckney's trail users were groups of friends (22 per cent). Hence, it is believed that trail users in Ludington were likely to differ from those of Pinckney in some of the above respects. However, the main significance existing between the two study areas in terms of educational attainment of trail users appears to be that there were more users in Pinckney who have had seventeen or more years of education than those at Ludington. This significant difference in proportion may be attributable to the urban-oriented and

¹See Appendix A for detailed tabulations of these and other proportions discussed here.

greater percentage of retired trail users at Pinckney than in Ludington.

Comparison 2: Highland
and Lost Creek

Between Highland State Recreation Area and Lost Creek Sky Ranch, only tests on difference between age and camping participation proved significant. The main reason may be due to the high frequency of young trail users who prefer short time horseback riding in Highland than at Lost Creek Sky Ranch where the group was more heterogeneous. Besides, it is reasonable to believe that those who engage in long distance horseback riding are more likely to camp than those who participate on a hourly basis as in the case of Highland. For instance, frequency counts show that there were approximately 85 per cent users at Lost Creek Sky Ranch who camped compared with only 14 per cent at Highland. Based on observations made at Highland, it appears that most users were teenage boys and girls representing 43 per cent (11-15 years of age) who were usually composed of groups of friends. Whereas at Lost Creek Sky Ranch about 77 per cent of the trail users were 11 to 30 years old and mostly composed of organized groups who predominantly engaged in long distance horseback riding.

Comparison 3: Goose Creek
and Mud Lake

The trail users at Goose Creek Trail Camp and Mud Lake Trail Camp exhibit quite different patterns of

characteristics compared with those previously discussed. They are significantly different in the number of professional trail users and their earning capacity of \$10,000 or more per year. It appears that approximately 33 per cent of Mud Lake users were professionals compared to only 7 per cent at Goose Creek. Similarly, 75 per cent of the former earned \$10,000 or more annually compared with 59 per cent of the latter. Inasmuch as these groups of users were not significant in their camping participation and level of educational attainment, their significance in professional status and earning capacity may be attributed to the place of residence of users. That is, urban or suburban residents, generally, are financially better off than rural-oriented residents. The greatest percentage of Mud Lake trail users appears to be from Grand Traverse County (33 per cent) and Wayne County (18 per cent), while the Goose Creek users are mostly from the less populated counties such as Dickinson, Mackinac, Montcalm, etc.

Comparison 4: Highland
and Ludington

Highland and Ludington users were significantly different in the proportion of male participants, years of age, and educational attainment. Most of the users at Highland (privately-operated short time horseback riding) were teenage boys and girls compared with Ludington

(mostly hiking) where male participants predominated. Disproportionate age distribution existing between the two areas (with predominant adult participants at Ludington) makes the user professional status comparison significant.

Comparison 5: Lost Creek
and Pinckney

Lost Creek and Pinckney area users were actually a comparison between horseback riders and hikers, respectively. Significant differences in the proportion of male participants and camping participation exists between the two stations. It appears that there was a 52-48 per cent male/female participation ratio for horseback riding at Lost Creek compared to a 75-25 per cent male/female ratio for hiking at Pinckney. As to be expected, long distance horseback riders camp more than hikers in the ratio of 85 per cent to 30 per cent. Hence, there were significant differences between hikers and horseback riders in behavioral characteristics although somewhat insignificant in the socio-economic characteristics such as level of educational attainment and earning capacity.

Comparison 6: Goose Creek
and Lost Creek

Tests of variables between these two survey stations did not indicate significant differences. They indicated that trail users in both areas have approximately the same sex, age, camping participation, education

level, occupation, and income characteristics. The similarities in the characteristics mentioned may be attributed to membership in the same kind of trail user groups since both could be considered predominantly long distance horseback riders. Besides, these two areas were geographically adjacent to each other and it would be logical to expect that users of adjacent areas are more likely to exhibit similar characteristics as was found in other comparisons such as between Ludington and Mud Lake.

Comparison 7: Highland
and Mud Lake

The Highland and Mud Lake analysis was actually a comparison between two kinds of horseback riders: one who rents his horse from the concessioner (Highland) generally on an hourly basis and one who owns the horse or rents one usually for long distance riding. Out of the six variables tested only age distribution and camping participation appear to be significant. It is apparent (as in the preceding comparisons) that more young participants are involved in short time horseback riding activity at Highland than are able to participate in trips involving days or weeks of riding.

Comparison 8: Goose Creek
and Pinckney

The main purpose of comparing Goose Creek and Pinckney trail users was to find out whether differences

in behavioral and socio-economic characteristics exist between horseback riders and hikers to two distantly located areas. The hypothesis here was logically that there should be differences since users of one area do not necessarily have the same characteristics as those of the other. The tests of variables in this case supported the fact that there indeed existed significant differences in camping participation, educational attainment, professional status, and earning capacity. As revealed previously, the long distance riders had a greater propensity to camp than the hikers. There appear to be more participants who were college graduates (44 per cent at Pinckney) than riders (13 per cent at Goose Creek). This was also supported by the higher frequency of professionals (39 per cent) as hikers compared with riders (7 per cent). The same trend was also observed with the annual income of \$10,000 or more with hikers (67 per cent) compared with riders (59 per cent).

Comparison 9: Ludington
and Mud Lake

In the comparison between trail users of Ludington (hikers) and Mud Lake (riders), it appears that there was no significant difference for any of the six variables tested. The result was somewhat the opposite of the one obtained between Goose Creek and Pinckney users above where all the variables tested were significant except for male and age proportions. However, it may be noted

that in the previous comparison (between Goose Creek and Pinckney) the study areas involved were at considerable distance from each other whereas in this last comparison the stations were close to each other. It can be deduced from these distance and locational differences that users of recreation areas close to each other geographically are more likely to have similar socio-economic characteristics than users of two separate areas distant from each other. This deduction may be applicable even if the areas concerned have identical or different recreational activities. In this case, participants may be hikers or riders or both. Hence, the socio-economic characteristics of such users would not considerably vary from each other.

Chi-Square (χ^2) Tests of Significance¹

Stations Selected and Methods Used

Chi-square tests of significance were used in this study for data from the following stations:

1. Goose Creek Trail Camp
2. Highland State Recreation Area
3. Ludington State Park
4. Mud Lake Trail Camp
5. Pinckney State Recreation Area

¹The appropriateness and advantages of using χ^2 test in this study are discussed in Appendix G.

The reason for the above selection was primarily based on the high "cell"¹ frequency obtained at these stations. Each cell should have at least an expected frequency of 5 to make the use of χ^2 analysis valid and reliable.² Hence, the higher the expected frequency obtainable in various categories in each question, the greater the reliability of the χ^2 value estimate. On the other hand, lower expected frequencies tend to overestimate the χ^2 value. Reduction of categories means a corresponding increase in expected frequencies which will eventually result to a reduction in the chi-square value. This reduction tends to result in "acceptance" of the hypothesis being tested. Since the χ^2 value is a function of the number of categories, caution was observed in "collapsing" the number of categories in order to obtain a more reliable value of χ^2 . However, some responses were grouped into a reduced number of categories especially where the expected frequency was less than 5.³

All the χ^2 design and analysis was done by the Applications Programming Unit as outlined by the researcher and processed through the university CDC 3600 computer

¹Cell frequency is defined here as the number of responses in a given category.

²Champion, Basic Statistics, p. 134.

³The author decided on a regrouping of categories which would not obscure valuable information.

using the Analysis Contingency Tables program. The χ^2 values obtained were compared individually with the critical values from statistical tables for the corresponding degrees of freedom. This comparison established the statistical significance or lack of significance for each of the variables tested. Both the sample and mathematical table values for all the tests at each of the five stations with their corresponding degrees of freedom are summarized in Table 3.¹

Nine major variables were selected and tested in this study. They are as follows:

- A. Method of travel
- B. Age
- C. Sex
- D. Reason for choosing trail
- E. Camping frequency
- F. Group type
- G. Trail use frequency

¹Chi-square tests of two variables is said to be significant if the computed value is greater than the statistical table value for a given level of significance (5 per cent is used here) and the corresponding degree of freedom. For instance, referring to Table 3 for "Travel Method & Age" characteristics (row 1) the chi-square values under Goose Creek Trail Camp is 25.900 for the sample and is 36.415 for the statistical tables. Since the sample value is less, the variables tested (travel method and age in this case) are said to be not significant. This means that the method or methods of travel used by trail users such as by foot, bicycle, horseback or other means are not significantly related to their age distribution.

TABLE 3

CHI-SQUARE (χ^2) TESTS OF SIGNIFICANCE OF RELEVANT BEHAVIORAL AND/OR SOCIO-ECONOMIC CHARACTERISTICS OF VARIOUS TRAIL USERS^a

Hypothesis Number Characteristics (Variables)	ODDIE CREEK TRAIL CAMP (3)					HIGHLAND STATE RECREATION AREA (6)					LIVINGSTON STATE PARK (8)					MIDDLEBURY TRAIL CAMP (9)					PINEKEY STATE RECREATION AREA (10)				
	CHI. X ² V	TAB. X ² V	df	S or NS		CHI. X ² V	TAB. X ² V	df	S or NS		CHI. X ² V	TAB. X ² V	df	S or NS		CHI. X ² V	TAB. X ² V	df	S or NS		CHI. X ² V	TAB. X ² V	df	S or NS	
A. Travel Meth. & Age	25.900	36.415	24	NS		3.743	18.307	10	NS		36.359	41.337	28	NS		41.087	32.671	21	S		11.778	18.307	10	NS	
" " " Sex	5.061	9.488	4	NS		2.802	5.991	2	NS		1.112	9.488	4	NS		13.674	7.815	3	S		.977	5.991	2	NS	
" " " W. Chosen	3.221	7.815	3	NS		5.294	9.488	4	NS		21.355	15.507	8	S		9.000	16.919	9	NS		21.359	15.507	8	S	
" " " Group	26.275	28.869	18	NS		7.483	18.307	10	NS		63.113	36.415	24	S		26.892	28.869	18	NS		6.920	12.592	6	NS	
" " " Camping	5.909	7.815	3	NS		.000	.000	0	0		1.417	5.991	2	NS		2.281	7.815	3	NS		.000	.000	0	0	
" " " Sightseeing	5.867	7.815	3	NS		1.143	3.861	1	NS		1.770	7.815	3	NS		3.782	7.815	3	NS		1.513	3.861	1	NS	
" " " Trail Use f	6.019	15.507	8	NS		3.275	9.488	4	NS		3.426	12.592	6	NS		10.238	12.592	6	NS		.966	5.991	2	NS	
" " " Occupation	27.715	21.026	12	S		9.978	9.488	4	S		9.708	31.410	20	NS		13.869	24.996	15	NS		8.621	11.070	5	NS	
" " " Education	17.874	15.507	8	S		7.844	9.488	4	NS		5.991	15.507	8	NS		8.931	12.592	6	NS		5.238	5.991	2	NS	
" " " Income	8.995	16.919	9	NS		11.605	12.592	6	NS		6.485	21.026	12	NS		9.025	16.919	9	NS		.000	.000	0	0	
" " " Enjoyment	2.000	15.507	8	NS		7.306	5.991	2	S		20.053	15.507	8	S		8.462	12.592	6	NS		9.027	5.991	2	S	
" " " Recommendation	21.527	21.026	12	S		17.000	5.991	2	S		8.547	21.026	12	NS		17.234	16.919	9	S		2.172	7.815	3	NS	
B. Age & Group Type	50.278	50.821	36	NS		28.913	37.652	25	NS		108.702	58.108	42	S		76.319	58.108	42	S		71.899	43.773	30	S	
" " " Hiking f	2.236	5.991	2	NS		8.333	12.592	6	NS		25.061	32.671	21	NS		8.708	18.307	10	NS		12.717	24.996	15	NS	
" " " Nature Walks f	9.600	15.507	8	NS		3.937	9.488	4	NS		19.331	23.685	14	NS		13.632	21.026	12	NS		14.863	18.307	10	NS	
" " " Camping f	4.800	9.488	4	NS		.000	.000	0	0		11.163	14.067	7	NS		1.857	14.067	7	NS		3.373	11.070	5	NS	
" " " Sightseeing f	2.222	5.991	2	NS		2.880	3.861	1	NS		16.133	14.067	7	S		6.146	11.070	5	NS		5.804	11.070	5	NS	
" " " Trail Use f	5.285	21.026	12	NS		6.109	18.307	10	NS		17.112	23.685	14	NS		9.231	23.685	14	NS		13.057	18.307	10	NS	
" " " Enjoyment	6.300	21.026	12	NS		12.288	18.307	10	NS		19.640	23.685	14	NS		12.079	23.685	14	NS		10.528	18.307	10	NS	
" " " Recommendation	14.290	28.869	18	NS		11.835	18.307	10	NS		24.781	32.671	21	NS		44.441	32.671	21	S		14.438	24.996	15	NS	
C. Sex & Group Type	10.755	12.592	6	NS		5.235	11.070	5	NS		6.023	12.592	6	NS		14.212	12.592	6	S		8.260	12.592	6	NS	
" " " Hiking f	1.905	3.861	1	NS		6.679	7.815	3	NS		3.229	7.815	3	NS		1.757	5.991	2	NS		1.526	7.815	3	NS	
" " " Nature Walks f	2.625	5.991	2	NS		1.333	5.991	2	NS		2.438	5.991	2	NS		1.286	5.991	2	NS		.705	5.991	2	NS	
" " " Camping f	.917	3.861	1	NS		4.000	3.861	1	S		1.489	3.861	1	NS		.061	3.861	1	NS		.267	3.861	1	NS	
" " " Sightseeing f	.875	3.861	1	NS		.533	3.861	1	NS		.734	3.861	1	NS		1.527	3.861	1	NS		.583	3.861	1	NS	
" " " Trail Use f	1.252	5.991	2	NS		1.492	5.991	2	NS		4.165	5.991	2	NS		.283	5.991	2	NS		.667	5.991	2	NS	
" " " Enjoyment	4.364	5.991	2	NS		2.074	5.991	2	NS		1.973	5.991	2	NS		7.576	5.991	2	S		1.802	5.991	2	NS	
" " " Recommendation	1.294	7.815	3	NS		2.554	5.991	2	NS		1.812	7.815	3	NS		3.987	7.815	3	NS		4.330	7.815	3	NS	
D. W. Chosen & Group Type	8.800	18.307	10	NS		21.357	31.410	20	NS		19.156	36.415	24	NS		11.537	16.919	9	NS		24.024	36.415	24	NS	
" " " Hiking f	3.000	3.861	1	NS		5.500	12.592	6	NS		16.503	21.026	12	NS		.000	.000	0	0		8.448	21.026	12	NS	
" " " Nature Walks f	3.333	9.488	4	NS		3.000	9.488	4	NS		14.115	15.507	8	NS		.000	.000	0	0		10.552	15.507	8	NS	
" " " Camping f	4.000	3.861	1	S		.000	.000	0	0		8.202	9.488	4	NS		.750	5.991	2	NS		2.796	7.815	3	NS	
" " " Sightseeing f	.000	.000	0	0		.444	3.861	1	NS		1.030	9.488	4	NS		.000	.000	0	0		3.130	9.488	4	NS	
" " " Education	3.272	12.592	6	NS		6.930	9.488	4	NS		9.077	15.507	8	NS		3.135	7.815	3	NS		9.099	15.507	8	NS	
" " " Recommendation	8.000	9.488	4	NS		.000	.000	0	0		13.336	21.026	12	NS		4.667	12.592	6	NS		7.195	16.919	9	NS	

E.	Camping & Group Type	11.990	12.592	6	NS	9.405	11.070	5	NS	40.361	21.026	12	S	4.413	12.592	6	NS	20.459	12.592	6	S
	" " Trail Use f	.318	5.991	2	NS	2.250	5.991	2	NS	5.925	9.488	4	NS	.954	5.991	2	NS	.867	5.991	2	NS
	" " County Origin	18.375	23.685	14	NS	3.802	11.070	5	NS	59.725	48.471	34	S	12.775	19.675	11	NS	23.037	19.675	11	S
	" " Occupation	11.006	9.488	4	S	12.738	9.488	4	S	4.767	11.070	5	NS	4.886	11.070	5	NS	3.889	11.070	5	NS
	" " Education	8.535	5.991	2	S	7.284	5.991	2	S	2.444	9.488	4	NS	.113	5.991	2	NS	.719	5.991	2	NS
	" " Income	3.973	7.815	3	NS	1.304	7.815	3	NS	5.306	12.592	6	NS	5.443	7.815	3	NS	.893	7.815	3	NS
	" " Enjoyment	.839	5.991	2	NS	1.510	5.991	2	NS	.777	9.488	4	NS	5.894	5.991	2	NS	1.985	5.991	2	NS
	" " Recommendation	4.015	7.815	3	NS	4.460	5.991	2	NS	7.299	7.815	3	NS	1.022	7.815	3	NS	5.678	7.815	3	NS
F.	Group Type & Hiking f	3.022	9.488	4	NS	16.200	21.026	12	NS	22.594	28.869	18	NS	9.319	21.026	12	NS	20.997	28.869	18	NS
	" " Camping f	7.467	11.070	5	NS	.750	3.861	1	NS	5.007	12.592	6	NS	2.589	12.592	6	NS	3.230	12.592	6	NS
	" " Trail Use f	12.114	21.026	12	NS	5.879	18.307	10	NS	26.058	21.026	12	S	17.913	21.026	12	NS	16.326	21.026	12	NS
	" " Occupation	20.503	36.415	24	NS	17.737	31.410	20	NS	46.292	63.773	30	S	26.781	43.773	30	NS	44.378	43.773	30	S
	" " Education	10.888	21.026	12	NS	10.674	18.307	10	NS	7.127	21.026	12	NS	23.852	21.026	12	S	9.817	21.026	12	NS
	" " Income	20.198	28.869	18	NS	15.056	24.996	15	NS	27.321	28.869	18	NS	26.709	28.869	18	NS	11.841	28.869	18	NS
	" " Enjoyment	20.821	21.026	12	NS	11.035	18.307	10	NS	19.390	21.026	12	NS	19.729	21.026	12	NS	16.329	21.026	12	NS
	" " Recommendation	9.362	18.307	10	NS	6.287	15.507	8	NS	15.361	28.869	18	NS	28.413	28.869	18	NS	18.637	28.869	18	NS
G.	Trail f & County Origin	24.075	38.885	26	NS	7.562	15.507	8	NS	68.387	88.182	68	NS	38.521	31.410	20	S	16.352	28.869	18	NS
	" " Occupation	15.491	15.507	8	NS	3.363	15.507	8	NS	24.830	18.307	10	S	13.200	18.307	10	NS	11.799	18.307	10	NS
	" " Education	.365	9.488	4	NS	1.004	9.488	4	NS	6.295	9.488	4	NS	2.984	9.488	4	NS	3.913	9.488	4	NS
	" " Income	11.852	12.592	6	NS	5.163	12.592	6	NS	4.403	12.592	6	NS	4.357	12.592	6	NS	16.781	12.592	6	NS
	" " Enjoyment	6.560	9.488	4	NS	7.234	9.488	4	NS	8.053	9.488	4	NS	3.637	9.488	4	NS	2.695	9.488	4	NS
	" " Recommendation	4.125	12.592	6	NS	1.171	9.488	4	NS	11.577	12.592	6	NS	7.688	12.592	6	NS	4.173	12.592	6	NS
H.	Occupation & Enjoyment	4.554	12.592	6	NS	8.599	15.507	8	NS	10.125	18.307	10	NS	10.955	18.307	10	NS	13.411	18.307	10	NS
	Occupation & Recommendation	10.779	16.919	9	NS	12.160	15.507	8	NS	5.354	21.026	12	NS	14.425	21.026	12	NS	16.235	24.996	15	NS
I.	Education & Enjoyment	1.611	9.488	4	NS	4.007	9.488	4	NS	2.654	9.488	4	NS	6.813	9.488	4	NS	7.433	9.488	4	NS
	Education & Recommendation	14.000	7.815	3	S	6.653	9.488	4	NS	5.094	12.592	6	NS	5.210	12.592	6	NS	21.378	12.592	6	S

^aTested at 5% level of significance.

^cComputer chi-square value.

^fStatistically significant (S) and not significant (NS).

^bRefers to station number in Appendix A.

^dStatistical table chi-square value.

^eFrequency.

^cDegree of freedom.

H. Occupation

I. Education

The various categories within these nine major variables are listed in detail in Appendix A. These variables were tested against each other (where appropriate) for each study area and the results tabulated as shown in Table 3. They were selected not only because of the socio-economic characteristics of trail users that are of primary interest but also because they had more than the required minimum frequencies suitable for χ^2 analysis.

Goose Creek Trail Camp

When travel method (3A)¹ was individually tested against the other eight variables enumerated above, the occupation, education, and recommendations variables appear to be significantly related to it. The other variables such as age, sex, "reasons for choosing the trail," type of group, camping participation (camping or not camping), camping frequency, trail use frequency, sightseeing frequency, income, "enjoyment" in the use of trail, etc. were not significant when correlated with the method of travel used.

The significant relationship between the method of travel and occupation of trail users could be attributed

¹The information in parentheses in these discussions refer to the hypothesis number of variables or characteristics as shown in Table 3.

to the large proportion of users who were on horseback at this station since most horseback riders (69.6 per cent) were in the skilled and semi-skilled occupational group. Not even one was in a professional occupation and the rest of the occupational groupings were poorly represented. In educational attainment, most Goose Creek Trail Camp respondents (70 per cent) were in the 8- to 12-year-old group, while about 13 per cent had received seventeen or more years of schooling. Since most users at this station were horseback riders, it is not surprising that their recommendations were concentrated in two areas directly related to trail riding; better and more marked trails were suggested by 23.8 per cent, and more campsites, restrooms, etc. were recommended by 38.1 per cent.

The age variable (3B) when tested against selected characteristics such as type of group, hiking, frequency, nature study frequency, camping frequency, etc. showed no significance. These same sets of characteristics were tested against sex variable (3C) and still no significance was found. However, "reasons for choosing the trail" (3D) appeared to be significant when matched against camping frequency. The significance could be attributed to the predominant choice of Group I (interesting, scenic, etc.) and Group II (well-marked, satisfactory length) than in the three remaining groups.¹

¹For "collapsed" categories or new groupings see Appendix D.

Whether camping participation (3E) is related to some of the socio-economic characteristics, only occupation and education appear to support this hypothesis. There appear to be more who camped (75 per cent) than those who did not (25 per cent). Besides, the occupational distributions of users were concentrated on the combined clerical-sales, skilled and semi-skilled workers categories (88 per cent) and the rest distributed in the remaining three occupational groups and none in the professional level. The same pattern of percentage distribution of users appears to be true in the educational aspect where those who camped have had eight to twelve years of schooling (68 per cent) than those who had more education (32 per cent).

It was anticipated that trail users who usually come in various groups (3F) such as "one family and children," "two families," "one couple," "organized group," "alone," "group of friends," and various combinations of the above categories were dependent on each other in some way. For instance, one family and children can be assumed to camp or make use of the trail more frequently than one couple or families with no children. Also that an organized group is likely to camp longer and more frequently than one couple or individual person. That this same organized group is likely to be within the same occupational, educational, and income bracket. However, when

these various group types were interacted with the selected characteristics not even one showed significance. Similarly, the frequency of trail use (3G) appears to have no dependence at all on the place of residence, occupation, education, and income of trail users.

No significant difference was obtained when occupation variable (3H) was tested for possible degree of dependence on "enjoyment" reason given and education of users. Trail users education (3I) has also nothing to do with the enjoyment he gets out of trail use participation. However, it appears that his education has something to do with the recommendation he makes. Those who were the eight to twelve years educational bracket (92 per cent) tended to request more and better marked trails with more campsites and other facilities such as drinking fountains, restrooms, etc. The others, however, with higher educational attainment (but less than seventeen years of schooling) prefer to "leave the trail as is" and recommend the banning of motorized vehicles and motorcycles.

Highland State Recreation Area

At this station, the "travel method" used appears to be significantly related to occupation, enjoyment, and recommendations made by trail users but again, this is not surprising since the great majority of the users (97 per cent) were horseback riders. (This high proportion is because the station is located on a bridle trail used by

the clients of the concession-operated riding stable). The significance in the "enjoyment" reasons given and recommendation aspects may be also attributed to the greater percentage of horseback riding opportunity existing compared with the others.

No significant relationship between either age or sex was evident except in the case of sex and camping frequency where males (75 per cent) camped more frequently than females (25 per cent). No significant relationship was observed when "the reasons for choosing the trail" was tested against the variables as shown on Table 3.

Camping participation appeared to be related to both occupation and education; about 83 per cent of the users did not camp. The largest occupational groups among the campers were professionals, skilled workers, and semi-skilled or related workers, with 33 per cent, 23 per cent, and 27 per cent, respectively. The majority of those who did camp had eight to sixteen years of schooling (86 per cent) while most of the remainder had seventeen or more years (14 per cent).

In comparing types of group, trail use frequency, occupation, and education of the trail users with the selected variables as used in Goose Creek analysis, the χ^2 tests indicated the relationships were all insignificant.

Ludington State Park

"Method of travel" cannot be considered as a variable for this particular area and tested against selected trail users' characteristics as in other survey stations. The reason was because at Ludington "hiking" is the only trail use actually permitted. Of the 328 respondents, 316 (96.4 per cent) gave hiking as their method of travel and the rest mentioned bicycling (.6 per cent), horseback riding (1.8 per cent), motorcycling (.3 per cent), and other methods of travel (.9 per cent) indicating some may have violated park regulations.

The χ^2 tests of significance between age and group type and sightseeing frequency revealed significant relationships at Ludington. Though there is a fairly good representation of all age classes, there is a significant concentration of respondents in the "one family and children" category (39 per cent). Category 4 (organized group) is not represented at all. Sightseeing frequency was highest among the younger users (11-20-year-old group) which contained 43 per cent of all the trail users. Some 114 (78 per cent) of the respondents used the same trail three or more times a year while the rest only once or twice a year.

The variables sex and "reasons for choosing a trail" did not show any significant correlations with the other variables tested. However, camping participation was significantly related to both group type and place

of residence (county). Responses show that trail users who camped (71 per cent) greatly exceeded those who did not (29 per cent). The majority of these trail users (48 per cent) belonged to group type Category I (one family and children) and uniformly distributed in other categories. Camping participation was significantly related to place of residence since concentration of users was observed in Kent (17 per cent), Ottawa (11 per cent), Muskegon (10 per cent), Wayne (7 per cent), Mason (6 per cent), Oakland (6 per cent), and out-of-state (17 per cent). The rest of the Michigan counties had only less than 6 per cent users and none at all in others.

The group type variable when tested against trail use frequency and occupation of trail users, reveal some relationship. Besides the predominant group of users belonging to "one family and children" which has been found in the preceding discussion, there exists a big difference in proportion between those who used the same trail one to two times and those using it three or more times. The data show that 64 per cent of the overall trail users used the same trail one or two times compared with those using same more than twice. The pattern of use seems to be logical inasmuch as people only go to the same place at least once or twice a year except perhaps for those who live closeby where frequency of use is possible. As regards the existing significance between group type and occupation of users, the responses clearly

reveal that more users (44 per cent) are a professional category compared with the skilled workers (25 per cent) and other lower occupational groups such as semi-skilled and unskilled combined (15 per cent) and total unemployed, students, and retired (4 per cent). The number of times a trail is used within a year appears to have a direct bearing on the occupation of trail users. Aside from the greatest number of users who were professionals as reported above, many of these users of various occupational groups (65 per cent) used the trail at least one to two times, and the rest three or more times. No significance was found in the interactions between the occupation, enjoyment and recommendations variables nor between the education, enjoyment and recommendations variables.

Mud Lake Trail Camp

When method of travel was compared with the age and sex of trail user for possible dependence, a greater degree of significance was observed which did not show in other study areas previously discussed. The information obtained show that many users (62 per cent) resorted to horseback riding as their method of travel and the age distribution of users was concentrated in the 11- to 20-year-old bracket (46 per cent). The same trends emerge when sex is used as the other variable. Male participation (58 per cent) exceeded that by female trail users.

In the other χ^2 tests conducted, age versus group type and recommendations seem to have significant relationships. As before, users appear to be clustered within the 11- to 20-year-old bracket (44 per cent) while the group composition seems to fall within the "group of friends" category (43 per cent) with organized group (19 per cent) next in percentage. Recommendations made in Group III (more campsites, restrooms, benches, drinking fountain, etc.) made up 50 per cent of the total responses.

"Reasons for choosing the trail" and camping participation variables when interacted against the same characteristics used in other χ^2 tests, did not show any significance. However, group type compared with the education variable of users exhibited some significance. Aside from the tendency of users to be within the "group of friends" (39 per cent) category, these users mostly belonged to the group with thirteen to sixteen years of schooling (43 per cent). The tests indicated that the frequency of using the trail has some dependency on the users' place of residence. It appears that about 67 per cent of trail users had used the same trail about five to thirty-four times compared with the remaining 23 per cent using it one to two times and 10 per cent from three to four times. The majority of these users were concentrated only on a few counties such as Grand Traverse (47 per cent), Barry (10 per cent), Wayne (17 per cent), and the rest to

the other eight counties equally represented and none at all in the remaining counties. It did not show any significance in the rest of the variables tested.

Pinckney State Recreation Area

The situation in Pinckney regarding use of the trails is similar to that in Ludington where the trail system is principally established for hiking purposes. Of the 104 total respondents, 101 (97.1 per cent) reported hiking as their method of travel on trail. One individual (.9 per cent) reported bicycling and two (1.9 per cent) mentioned motorcycling or motorbiking as their means of travel method. Again, method of travel will not be used here as a variable since hiking in this particular survey station could be considered an exclusive use of the trail.

Test between age and type of group variables indicate some degree of relationships. The significance could be attributed to the greater proportions of "one family and children" (18 per cent), "one couple" (18 per cent), and "group of friends" (23 per cent) representation of trail users than the other group types. Camping participation and type of group of users were also correlated in the sense that those who did not camp (70 per cent) greatly exceeded those who did (30 per cent).

Users came from relatively few counties. Washtenaw County accounted for 37 per cent, Wayne 30 per cent, and out-of-state origins 8 per cent. Users' type of group

and occupation were also found to be significant which could be attributable to the large proportion of participants in the one family and children, one couple, and group of friends categories. The high percentage of professionals (44 per cent) participating was significant in this regard.

Education and recommendations appear to be significantly correlated as at Goose Creek Trail Camp. It appears that recommendation II (better and more marked trails) with 48 per cent responding, and recommendation III (more campsites, restrooms, etc.) with 25 per cent in favor, were responsible for this correlation. The other variables tested did not indicate significant relationships.

CHAPTER V

SUMMARY AND CONCLUSIONS

Survey Methods Used

Self-administered questionnaires are generally the quickest and the cheapest method of collecting trail user information compared to mailed questionnaires or interviews. Self-administered questionnaires, once filled out and deposited in the box provided, can readily be retrieved. Mailed questionnaires, on the other hand, involve considerable time and money in the preparation for mailing and retrieval purposes. Less personnel are also required in the former than in the latter.

In comparison with interviews, self-administered questionnaires require considerably less personnel and expense. Of course, there are both advantages and disadvantages in using each of the above mentioned methods in data collection. Detailed explanations on the strengths and weaknesses of these methods may be referred to the study by Crapo and Chubb.¹ In the present study, however,

¹Crapo and Chubb, Investigation Techniques, pp. 9-31.

self-administered questionnaires seemed to be adequate and commensurate with the number of personnel involved, and the number of survey stations established. Besides, respondents have had more freedom to speak their minds in self-administered questionnaires than in interviews.

Furthermore, self-administered questionnaires are advantageous over interviews in that they:

- . . . generally require less skill to administer
- . . . can insure uniformity from one measurement situation to another. . . . Respondents have confidence in their anonymity and this can have greater sense of freedom to express views they think may be contrary to those held by the majority . . . place less pressure on the subject for immediate response
- . . . can usually be adapted so that it doesn't interfere with the operation of a recreation area. . . .
- Personnel antagonism to investigators, which may lead to a refusal to give the desired information is avoided.¹

In some instances, questions which are too personal or strictly confidential can be more readily obtained through self-administered questionnaires than by interviews. As Moser states, "Some people may answer certain questions--perhaps those of a personal or embarrassing nature more willingly and accurately when not face to face with interviewer who is a complete stranger to them."² This situation was observed in the field, especially during the interview of nonrespondents. Interviewees

¹Ibid., pp. 22-23.

²C. A. Moser, Survey Methods in Social Investigation (London: Heinemann Educational Books, Ltd., 1958), p. 177.

were quite frank in answering opinionated questions or those which called for recommendations. However, in the socio-economic portions of the questionnaire such as income, education, and occupation, many respondents preferred not to make comments. This attitude on the part of the respondents greatly affects the validity and reliability of data obtained in interviews.

In general, response on the self-administered questionnaires, except for two stations (Ludington and Pinckney), was not substantial.¹ On the average, only two out of ten trail users (20 per cent) would fill out questionnaires at the five stations which were observed. The nonresponse was even higher in intensively used areas such as in Ludington where trail users would just pass by the box especially if some other users were there filling out questionnaires at that instant. This low percentage of response could be attributed to some of the following factors. In the first place no inducement, encouragement, or publicity of any kind was used to elicit response from trail users. The purpose here was to make the filling out of questionnaires purely voluntary on the part of the users. Then there were a number of mechanical problems which may have influenced response. The writing board

¹In terms of total respondents, these two areas alone registered more than 50 per cent. However, in percentage of responses, all the survey stations were more or less proportionately represented.

attached to the box was only large enough for one respondent at a time. Hence, when trail users came out of the trail in groups, only one person could complete the questionnaire at one time. This situation was especially true in crowded areas such as in Ludington and Pinckney. Lack or absence of benches where respondents could sit down while filling out the questionnaire is also believed to be one reason for low response.

The length of the questionnaire may also have been an important factor in the limited response. The questionnaire was probably too long. There were twenty-three items in all; this exceeds the length and complexity of questionnaires used in previous trail studies.¹ Many would-be-respondents were observed returning questionnaires to the box without completing them after momentarily glancing over the questions. Those who had started filling out the questionnaires often left several items unfinished. Questions 7, 11, and 19 to 23 were mostly left blank (see Appendix B). These questions were believed to have demanded too much time on the part of the respondents. At some stations, the questionnaire box was found to be empty at the time of observation and pencils either gone

¹Crapo and Chubb, however, revealed that length of the questionnaire was not a major factor in influencing response to self-administered questionnaires employed in state park day-user studies. See Crapo and Chubb, Investigation Techniques, p. 97.

or unsharpened. This unfavorable situation would undoubtedly tend to lessen possible response.

The color of the questionnaire box and signs used seemed not to attract the attention of some trail users especially those who were somewhat absorbed in their thoughts while traveling. When this survey equipment was installed under trees at some distance from the passersby, it was hardly noticeable. Although it is generally desirable that the color of the signs used should be as harmonious with the environment as possible, it appears advisable for research purposes to use brighter colors if they are to become more conspicuous. Extreme brevity in wording should also be used to make an impact on users, especially on horseback riders, who often can only glance at the sign. Larger lettering on a contrasting background should be tested.

One questionnaire box is normally sufficient on trails used for hiking only. At trailheads for trails used by horseback riders, other stations should be provided where shortcuts exist and at major mounting points specifically for those who might have missed the first box for some reason. When possible, boxes should be located in open areas to improve visibility with some shade for the comfort of respondents. The site should also be spacious for horseback riders because of the increased likelihood of stock milling around to their inconvenience and displeasure.

It was anticipated that vandalism might take a heavy toll of the questionnaires and questionnaire boxes. However, no major violations occurred except for minor infractions such as few pieces of torn questionnaires strewn near the station. This constructive attitude of the users toward the study was an indication of their cooperation and interest in the project.

In many of the responses received, there appear to be confusion in answering some of the questions. For instance, in Questions 5 and 6 some of the answers given were identical or at least very similar (see Appendix B for questions and Appendix A for answers given). This same confusion appeared in answering Questions 20 and 21. Thus, there was some information received which could have been more useful in data analysis if follow-up questions were asked. Consider for instance Question 2. If the question, "Are you the head of the family?" had been asked, then it would have been possible to isolate trail users who were not heads of the families from those that were. Again, the structure of Question 7 resulted in problems during coding and analysis of data.

When the study design was made and the collection of data was started, there was no data on trail use to work with. There was not even an indication of how many responses would be obtained or how well the questions would be answered. Therefore, it was not possible to

determine in advance the precise statistical techniques to be used in the analysis phase. The data collected were more of "convenience samples" where methods of analysis would have to be devised to make desirable inferences. In future research undertakings along these lines, it will be possible to specify data objectives more exactly. However, such objectives should be flexible and workable enough to fully benefit from insights concerning interpretation of data derived during the collection stage.

Trail Use Patterns and Users' Profile

As was previously mentioned, only limited survey stations were included in this study primarily due to time, personnel, and budget constraints. Only eleven stations or study areas were established in the Lower Peninsula and none at all in the Upper Peninsula. Most of these survey stations were concentrated in the northern portion of the Lower Peninsula along the well-established Michigan Riding and Hiking Trail. They were assumed to be reasonably representative compared with the other existing trails in the state of Michigan because of the representation of various kinds of trails such as those which could be considered as primarily hiking trails, horse trails, etc. The Lower Peninsula's population concentration, the origin of potential trail users, and the amount of trail use were also factors used in site selection. Furthermore, the survey stations' geographic

proximity to one another which would facilitate administration and supervision of questionnaire boxes and questionnaires, was also considered for economic reasons. In short, the maximum amount of information that could be obtained at the least expense with a reasonable degree of sample representativeness was a primary consideration. The responses obtained through self-administered questionnaires were believed fairly representative for purposes of this study to show some indications of trail use patterns and user socio-economic characteristics.

Although hiking appears to be the predominant method of travel on trails followed by horseback riding, motorcycling/motorbiking, and bicycling, this cannot be considered a typical trail use pattern for individual trails. The results show that 70.4 per cent of the total respondents were involved in hiking. This was largely due to Ludington State Park and Pinckney State Recreation Area users being predominantly hikers. This is understandable since hiking in these areas was more or less the exclusive use of the trail because of the regulations. However, in other survey stations along the Michigan Riding and Hiking Trail where varied use of the trail is allowed, a fairly good representation of horseback riding as well as hiking took place. Motorcycling/motorbiking and bicycling were lightly represented. Horseback riding seems to predominate in most of the areas along the shore-to-shore riding and hiking trail. In

concession-operated areas where horses were rented out to users on either a short or long time basis, it seems this kind of trail use is popular among younger people. In both areas studied more than 50 per cent of the users in each station were from the 11- to 20-year-old group. The more than 60-year-old participants in horseback riding were negligibly represented. This trend in use and user age participation are very similar to the findings in the "National Recreation Survey" conducted by the Outdoor Recreation Resources Review Commission (ORRRC) where it stated that "Younger ages, 12 to 17 years, participate in horseback riding at rates significantly higher than other ages . . . the rate declines with age, participation being quite insignificant for those over 65."¹

Hiking appears to be more predominant in most state parks and recreation areas than along the Michigan Riding and Hiking Trail. This could be probably due to short distance hiking preferences by trail users or probably because of use designation or regulation in such areas. However, two areas in this trail system (Four Mile Road and Gordon Creek) registered quite a number of hikers. The reason may be attributed to their accessibility to paved highway roads than other survey stations which were mostly remotely located connected by dirt roads.

¹ORRRC, National Recreation Survey, Study Report 19 (Washington, D.C.: Government Printing Office, 1962), p. 13.

Motorcycling or motorbiking appears to be less on the riding and hiking trail. This lower rate of participation could be attributed to the unsuitability of the terrain or due to incompatibility with other trail users. Based on interviews and comments obtained from some respondents, motorcycles or any motorized vehicles create unbearable noise that is annoying and disturbing to horses and riders as well as hikers. Hence, they suggested that they should be banned from the trail system. However, in Caberfae where the trail has been specifically designed and established for motorcyclists or motorbike riders, these users predominate.

Based on the total responses received, about 42 per cent of trail users in Michigan appear to be predominantly from the younger age groups. The male participants exceeded the female and that the majority (56 per cent) of the respondents camped in connection with their use of the trail.¹ It appears that scenic, interesting, and strategically located trails are the features preferred by trail users. Aside from hiking and horseback riding as the major uses of the trail, approximately 43 per cent of trail users engaged in swimming, photography, sightseeing, picnicking, etc. to some extent along the trail. "One family and children" and "groups of friends" seem to be

¹Those who camped in connection with the use of the trail largely apply to horseback riders than to state park users or campers who might have used the trail incidental to their camping.

the predominant group composition of trail users. Heads of families of trail users (35 per cent) were mostly professionals with seventeen or more years of education. Approximately 37 per cent of these users had an annual income of \$10,000 or more.

Many respondents usually use the same trail at least one to two times within a twelve-month period. It appears that August was the month when the majority of hikers and riders were in the field with September next in frequency of use. For the months of May and June, use of the trails was light. However, as late as October, a substantial number of hikers and riders were still in the field. Although hiking and horseback riding were the predominant activities participated in by trail users, these same hikers and riders indicated they had engaged also in motorbiking and bicycling on trails within a twelve-month period. In connection with the activities participated in along the trails, fishing, nature study, camping, and sightseeing appear to be the predominant activities.

Only twenty-one respondents engaged in snowmobiling while twenty-seven trail users participated in trailskiing and snowshoeing.

Some 249 (45 per cent) trail users indicated "scenery, beauty, and nature study" as the features of trail they enjoyed most. As to their recommendations,

129 (29 per cent) suggested more and better marked trails. In contrast, 41 (9 per cent) users preferred trails to remain in a comparatively natural state. Regarding services preferred, "more maps, leaflets, labels, and signs" were suggested. Requests for more "drinking fountains or water pumps" were prominently mentioned. The desire for "more picnic tables, benches, and better restrooms" was also clearly emphasized. Nevertheless, about 60 per cent of the trail users said they enjoyed their use of the trail in question and complimented the agency on an excellent trail system.

Most of the findings in this study were very similar to those obtained in other studies conducted by Sargent,¹ Thorsell,² and ORRRC³ specifically in the behavioral and socio-economic characteristics of trail users which is surprising in that these studies involved more remote natural areas. However, they differ in some respects. For instance, in this study, younger male and female participants seem to emerge the majority of trail users, whereas Thorsell reported adult males and females as the predominant participants. The main difference could be attributed to the user-oriented and intermediate type of

¹Sargent, Camels Hump.

²Thorsell, Trail Use Survey.

³ORRRC, National Recreation Survey, pp. 13-15 and pp. 34-36.

areas involved in this study. Besides, the variety of recreational opportunities offered to the users in these areas, they are relatively more easily accessible and less expensive to reach for the majority of users than remote national park areas. In contrast, the survey areas in Thorsell's study were two national parks which are considered "resource-based" in Clawson's classification of outdoor recreation areas.¹ These areas are generally far from centers of population and considerable expense, time, and travel are involved in getting there.

Statistical Analysis Significance

Testing differences between proportions reveal that significant differences existed in the variables tested for some of the respondents in seven out of nine stations (Table 2). It shows that sex, age, camping participation, education, professional occupation, and annual income were significantly different between users of two stations. Significant differences were also found in the case of some other variables such as place of residence of users, availability of camping opportunities, and differences in user's group composition. It was also interesting to note that statistical significance was found to exist in some variables between riders at two stations, between hikers at two stations, and between riders

¹Marion Clawson and Jack Knetsch, Economics of Outdoor Recreation (Baltimore: The Johns Hopkins Press, 1966), pp. 36-38.

and hikers at two stations. For instance, riders at Goose Creek and Mud Lake show significant difference in their occupations and income. Hikers in Ludington and Pinckney appear to be significantly different in camping participation, education, and sex distribution. Whereas riders at Goose Creek and hikers at Pinckney exhibit significant differences in their camping participation, education, occupation, and income (see Table 2).

In the chi-square (χ^2) analysis tests of significance, significant difference was found to exist between variables such as method of travel, age, sex, why trail was chosen, camping frequency, group type, trail use frequency, occupation, and education of users (Table 3). For instance, significant relationship was found to exist between user travel method and his occupation, education, and also the recommendations he makes. His method of travel had also some dependence on his group composition, camping participation, sex, age, and the enjoyment he gets out of trail use.

Statistical analysis also show significant difference between user's age and group composition, sightseeing frequency, and recommendation he makes. User's sex distribution had also some relationships with his camping frequency, group composition, and enjoyment he derives from the use of the trail. Reasons for choosing the trail had also some dependence on the camping frequency of the user.

Camping participation was found to be significantly related with occupation, education, group composition of trail use frequency. On the other hand, group composition of trail users had been associated with their occupation, education, and trail use frequency. Trail use frequency was also found to be related to the place of residency and occupation of the trail user.

It is interesting to note, however, that there was no significant difference at all between the user's occupation and the enjoyment he derives out of trail use and the recommendations he makes. However, his education was found to have some relationship with the recommendation he makes. The existing dependence found in these tests of statistical significance may be true in one or more stations but not necessarily true in the others as reported in Table 3.

CHAPTER VI

RECOMMENDATIONS

Trail Research Methodology

1. Inasmuch as most long distance trail systems, especially the Michigan Riding and Hiking Trail, cross jurisdictional boundaries such as state, federal, and private lands, cooperation and coordination in management and research undertakings of various agencies involved should be encouraged. Data on present use patterns and user characteristics in the existing recreational trails in Michigan should be obtained, analyzed, and evaluated before long-range management planning are formulated and implemented. Conflicts in uses and competition for the use of recreational lands can only be solved with knowledge of various existing uses. Hence, if socially desirable allocation of recreational lands is to be made which will satisfy various kinds of forest and park users, collection of data on trail use and user characteristics is desirable.

2. Further research on trail use patterns and user characteristics in Michigan should be conducted to obtain a more reliable data than secured from the present

study. Short self-administered questionnaires should be used to elicit higher response. Questionnaire's content should be carefully worded and only the most desirable and useful information should be asked. Personnel of the University Applications Programming Unit should be consulted during the initial stage of questionnaire design concerning the kinds and chronology of data anticipated to be collected to avoid programming complications later. This teamwork between the programmer and researcher saves valuable time and unnecessary expense.

3. Research on trail use and users should be conducted for a duration of at least two years although a longer period of time is desirable to be able to make good comparisons, especially on variances and trends taking place. The purpose here is to be able to obtain representative, reliable, and valid data. Trail users are known to be highly mobile and generally diffused over a wide area. Since field access to them is difficult, uncertain, and time-consuming, representative samples can only be obtained through collection of adequate samples at many different locations. A minimum of two years and a maximum of four years are recommended for this kind of study. Also there should be an adequate number of personnel to interview nonrespondents at sample stations in order to determine the representativeness of the collected data. Samples should also be collected from the Upper Peninsula trail users in order to make reliable

inferences concerning trail use pattern and user characteristics on a statewide basis.

4. In order to have a good count of all users of trails the whole year-round for purposes of population size determination, an intensive study at several trails should be conducted. Both single-use and multiple-use trails should be studied. Photoelectric beam counters should be installed at these trailheads. The beam should be installed at a height such that the light will strike a part of the user's body to prevent double counting. The only major counting error anticipated would be for users passing the counter side-by-side. However, since trails are normally narrow, such underestimation is unlikely to be a major problem. It can be controlled for experimental purposes by constricting the trailheads to assure single-file formation of trail users when leaving and entering the trail. To insure the reliability, validity, and representativeness of the data obtained using this technique, year-round collection of data for a number of years should be conducted to determine trail use patterns and the total number of trail users for all seasons. The population data obtained from these sample trails would be reliable and could be used in planning survey sampling on other trails. This technique has not yet been used in trail use data gathering. However, it appears promising and is, therefore, recommended to the researchers if

reliable data on trail use patterns and users' population sizes are to be obtained.

5. Simple or stratified random sampling should be used in the sample selection since it is one of the most reliable and unbiased methods of data collection. Samples that were used in past trail use or wilderness studies have often been merely "convenience samples" and in others "judgment samples."¹ Most of the reasons for structuring such sampling were purely economic, particularly the lack of personnel to gather the necessary data. If data on this aspect of resource management are to be made reliable, valid, representative, and useful for recreation resource-planners and decision-makers, large scale simple or stratified random sampling is recommended for future research undertakings.

6. Self-administered questionnaires can be used efficiently and effectively to obtain adequate, reliable, and valid data from various trail users concerning their trail use patterns and socio-economic characteristics. To achieve this end, it is recommended that various motivational techniques and administrative encouragements should be used to increase response rates. For instance, administering agencies should inform trail users of the importance of the study and encourage them to fill out

¹Wenger, Factors Influencing Effectiveness; L. C. Merriam, Jr. and R. B. Ammons, The Wilderness User in Three Montana Areas (Minnesota: University of Minnesota, 1964).

questionnaires. These agencies usually put out publications or leaflets distributed free to forest or park users. If such surveys are given publicity in these leaflets, a higher response rate may result. Questionnaire boxes should be located in spacious and convenient areas where trail users usually congregate. Benches should be provided for the comfort of the respondents while filling out questionnaires.

Facility and Management

The following recommendations are referred to the various agencies whose trails or trail systems were included in this study:

1. There is a growing need for improved trail systems within recreational areas to cater specifically to the needs of hikers and riders. This is especially true in urban or user-oriented areas such as state parks and state recreation areas which are intensively used during the summer months. For instance, in some recreation areas, portions of the trails consisted of rotting and unstable "corduroy" (wooden poles). Tall grasses and tree branches covered parts of some trails making them impassable to users, they deserve proper maintenance and elimination of obstacles that may be hazardous to trail users.

2. Inasmuch as "scenery, beauty, and nature study" were the major reasons for trail user's

participation, overlooks, especially in strategic locations, should be provided for the use and enjoyment of various hikers and horseback riders. This is especially recommended along the Michigan Riding and Hiking Trail system. Some of the facilities in trail camps need improvement, renovation or replacement if they are to be efficiently used and not abused by users. Some hitching posts were observed to be rotting, missing, or entirely nonexistent. Bank erosion was noticeable in some watering places for horses. This should arouse concern on the part of the administering agencies and result in steps being taken to prevent further soil erosion and gradual bank deterioration.

3. Benches, water pumps, and trash cans should be provided or installed at strategic locations along the trail for the use and convenience of trail users. These facilities should be provided especially on long trail systems and in places far from other recreational areas. Such recommendations were prominent in the responses received from trail users themselves.

4. Motorcycles, motorbikes, and other motorized vehicles should be banned from major and intensively used hiking and riding trails. It is believed that these methods of travel on trails are not compatible with other methods because of the noise and disturbance created and the consequent displeasure of other trail users. Many

hikers and horseback riders who were interviewed and a significant number of questionnaire respondents indicated that they objected to motorcyclists or motorbike riders using the same trail. It is probably desirable that separate trails should be designed and established specifically for these types of users.

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APPENDICES

APPENDIX A

RESPONSES ON SELF-ADMINISTERED

QUESTIONNAIRES

APPENDIX A

RESPONSES ON SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
I. Method of Travel																									
	Foot			4	44.44	4	12.12	5	35.71	27	100.00			1	3.73	316	96.34	9	16.98	101	97.11	8	28.57	475	70.37
	Bicycle	1	7.69			1	3.03					1	2.56			2	.60			1	.96	1	3.57	7	1.03
	Horseback			2	22.22	23	69.69	5	35.71			37	94.87	24	88.83	6	1.82	32	60.37			19	67.85	148	21.92
	Motorcycle/Motorbike	9	69.23	1	11.11	3	9.09	2	14.28			1	2.56	2	7.40	1	.30	9	16.98	2	1.92			30	4.44
	Other	3	23.07	2	22.22	2	6.06	2	14.28							3	.91	3	5.66					15	2.22
	Total	13	100.00	9	100.00	33	100.00	14	100.00	27	100.00	39	100.00	27	100.00	328	100.00	53	100.00	104	100.00	28	100.00	675	100%
II. Respondents Age and Sex																									
Age																									
	11-15			1	11.11	3	10.71			2	8.00	19	43.18	9	34.61	75	24.19	8	14.81	21	20.79	4	14.28	142	21.77
	16-20	3	23.07	2	22.22	6	21.42	1	7.14	3	12.00	14	31.81	7	26.92	54	17.41	16	29.62	22	21.78	6	21.42	134	20.55
	21-25			2	22.22	1	3.57	2	14.28	3	12.00	5	11.36	2	7.69	24	7.74	6	11.11	16	15.84	2	7.14	63	9.66
	26-30	1	7.69			5	17.85	1	7.14	5	20.00	4	9.09	2	7.69	23	7.41	5	9.25	8	7.92	2	7.14	56	8.58
	31-40	5	38.46	1	11.11	6	21.42	3	21.42	4	16.00	1	2.27	3	11.53	61	19.67	2	3.70	20	19.80	4	14.28	110	16.87
	41-50	3	23.07	1	11.11	3	10.71	2	14.28	8	32.00	1	2.27	3	11.53	46	14.83	5	9.25	14	13.86	7	25.00	93	14.26
	51-60	1	7.69	2	22.22	4	14.28	4	28.57							18	5.80	7	12.96			2	7.14	38	5.82
	60 +							1	7.14							9	2.90	5	9.25			1	3.57	16	2.45
	Total	13	100.00	9	100.00	28	100.00	14	100.00	25	100.00	44	100.00	26	100.00	310	100.00	54	100.00	101	100.00	28	100.00	652	100%
Sex																									
	Male	12	100.00	8	88.88	20	76.92	12	100.00	14	60.86	15	42.85	12	52.17	190	61.09	31	58.49	76	75.24	18	64.28	408	64.45
	Female			1	11.11	6	23.07			9	39.13	20	57.14	11	47.82	121	38.90	22	41.50	25	24.75	10	35.71	225	35.54
	Total	12	100.00	9	100.00	26	100.00	12	100.00	23	100.00	35	100.00	23	100.00	311	100.00	53	100.00	101	100.00	28	100.00	633	100%
III. Camped Last Night?																									
	Yes	5	38.46	5	55.55	22	64.70	10	76.92	4	14.81	6	13.63	23	85.18	227	69.20	30	55.55	31	29.80	19	65.51	382	56.15
	No	8	61.53	4	44.44	12	35.29	3	23.07	23	85.18	38	86.36	4	14.81	100	30.48	24	44.44	73	70.19	10	34.48	299	43.84
	Total	13	100.00	9	100.00	34	100.00	13	100.00	27	100.00	44	100.00	27	100.00	327	100.00	54	100.00	104	100.00	29	100.00	681	100%

1 Station numbers refer to trail locations at Caberfae, Four-mile Road, Goose Creek, Gordon Creek, Highland (hiking), Highland (horseback riding), Lost Creek Sky Ranch, Ludington State Park, Mudlake, Pinckney, and Scheck's Place, respectively.

2 This percentage and succeeding percentages for all stations may not necessarily amount to exactly 100% due to rounding off errors as recorded by the computers.

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL		S
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	N
IV.	<u>Campground Name</u>																									
	Carrieville	3	75.00														1	3.44						4	1.13	
	Four-mile Trail Camp			1	33.33								1	4.54										2	.56	
	Manistee River					5	26.31								1	0.48						1	5.55	7	1.99	
	Gordon Creek							5	55.55													1	5.55	6	1.70	
	Goose Creek					7	36.84															1	5.55	8	2.27	
	Au Sable Lodge			1	33.33	3	15.78								2	9.09								6	1.70	
	McKinley													18	81.81									18	5.12	
	Beechwood					1	5.26			1	33.33					129	62.31	7	24.13	1	3.22	2	11.11	141	40.17	
	Pines									2	66.66					29	14.00	1	3.44					32	9.11	
	Cedar Camp															12	5.79							12	3.41	
	Anderson															4	1.93							4	1.13	
	Mud Lake Trail Camp																	2	6.89					2	.56	
	Interlochen State Park																	3	10.34					3	.85	
	Grass Lake																	2	6.89					2	.56	
	Scheck's Place																	8	27.58			11	61.11	19	5.41	
	Grand Traverse Saddle Camp																	4	13.79					4	1.13	
	Crooked Lake															1	.48			20	64.51			21	5.98	
	Bruin Lake																		6	19.35				6	1.70	
	Ludington State Park															20	9.66							20	5.69	
	Other	1	25.00	1	33.33	3	15.78	4	44.44			6	100.00	1	4.54	11	5.31	1	3.44	4	12.90	2	11.11	34	9.68	
	Total	4	100.00	3	100.00	19	100.00	9	100.00	3	100.00	6	100.00	22	100.00	207	100.00	29	100.00	31	100.00	18	100.00	351	100%	17
																								393		
V.	<u>Camping Tonight?</u>																									
	Yes	4	30.76	7	77.77	23	67.64	9	69.22	5	18.51	5	11.36	17	65.38	225	68.80	40	76.92	28	27.18	13	44.82	376	55.53	18
	No	9	69.23	2	23.22	11	32.35	4	30.76	22	81.48	39	88.63	9	34.61	102	31.19	12	23.07	75	72.81	16	55.17	301	44.46	18
	Total	13	100.00	9	100.00	34	100.00	13	100.00	27	100.00	44	100.00	26	100.00	327	100.00	52	100.00	103	100.00	29	100.00	677	100%	18
VI.	<u>Campground Name</u>																									
	Stewart Creek	2	66.66					4	50.00	1	16.66					1	.48							8	2.27	
	Manistee River			1	20.00	4	18.18									1	.48							6	1.70	
	Goose Creek					3	13.66																3	.85		
	Lost Creek Sky Ranch													15	88.23								15	4.26		
	Beechwood					11	50.00									130	62.50			2	16.66		143	40.62	10	
	Pines															30	14.42						30	8.52		
	Cedar Camp															7	3.36						8	2.27		
	Anderson					1	4.54	1	12.50	2	33.33					4	1.92	5	13.15	1	3.57		14	3.97		
	Mud Lake Camp Ground									2	33.33					1	.48	13	34.20			1	8.33	17	4.82	
	Interlochen State Park															2	.96	2	5.26				4	1.13		
	Boardman's River																	3	7.89				3	.85		
	Scheck's Place																	8	21.05			7	58.33	15	4.26	
	Kalkaska																	6	15.78			2	16.66	8	2.27	
	Crooked Lake															1	.48			17	60.71		18	5.11		
	Bruin Lake																		6	21.42			6	1.70		
	Ludington State Park															22	10.57			1	3.57		23	7.09		
	Other	1	33.33	4	80.00	3	13.63	3	37.50	1	16.66	5	100.00	1	5.88	9	4.32	1	2.63	3	10.71			31	8.23	
	Total	3	100.00	5	100.00	22	100.00	8	100.00	6	100.00	5	100.00	17	100.00	208	100.00	38	100.00	28	100.00	12	100.00	352	100%	18

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
VII. Why Trail Chosen																									
	Close to my home			1	16.66	2	6.45	2	15.38	1	4.54	2	5.40	1	3.84	9	2.93	5	10.63	4	4.08	3	11.53	30	4.79
	Interesting, Scenic, Nice Location	5	41.66			5	16.12	2	15.38	3	13.63	12	32.43	2	7.69	76	24.67	5	10.63	15	15.30	4	15.38	29	20.60
	Friend's Recommendation					3	9.67			1	4.54	3	8.10	6	23.07	11	3.57	3	6.38	3	3.06			30	4.79
	No Choice							2	15.38	1	4.54	4	10.81	2	7.69	12	3.89	1	2.12	6	6.12	3	11.53	31	4.95
	By Accident	2	16.66			1	3.22	2	15.38	2	9.09	2	5.40	2	7.69	1	6.16	2	4.25	10	10.28	1	3.84	43	6.86
	Well-marked					1	3.22									6	1.94					1	3.84	8	1.27
	Michigan Trail Riders Association			1	16.66	4	12.90											1	2.12			3	11.53	9	1.43
	Love Hiking &/or Riding					4	12.90			8	36.36	3	8.10			14	4.54	23	48.93	8	8.16	3	11.53	63	20.06
	Have Been On It Before					1	3.22	1	7.69	1	4.54	3	8.10			27	8.76			5	5.10	1	3.84	39	6.23
	Nature Observation	2	16.66							3	13.63	1	2.70			7	2.27			1	1.02			14	2.23
	4-H Trail Ride					1	3.22							6	23.07									7	1.11
	Satisfactory Length					4	12.90					1	2.70	3	11.53	17	5.51			16	16.32	1	3.84	42	6.70
	Like It Better Than Others					1	3.22	1	7.69			3	8.10			31	10.06	4	8.51	4	4.08	2	7.69	46	7.34
	For Fun or Curiosity			1	16.66			1	7.69	2	9.09	1	2.70	3	11.53	25	8.11	2	4.25	7	7.14	3	11.53	45	7.18
	Water-Oriented															28	9.09							28	4.47
	Brochure, Leaflet, Map															3	0.97			1	1.02	1	3.84	5	0.79
	Other	3	25.00	3	50.00	4	12.90	2	15.38			2	5.40	1	3.84	23	7.46	1	2.12	18	18.36			57	9.10
	Total	12	100.00	6	100.00	31	100.00	13	100.00	22	100.00	37	100.00	26	100.00	308	100.00	47	100.00	98	100.00	26	100.00	626	100%

VIII. How Trail Learned																									
	Michigan Trail Riders Association			1	12.50	9	29.03	2	15.38					1	3.84			7	13.72			14	48.27	34	5.28
	Club, Organization, Assoc., Church	3	27.27					2	15.38	1	4.00	5	12.19	1	3.84					9	9.18	1	3.44	22	3.42
	Newspaper							4	30.76							2	0.64	3	5.88	1	1.02			10	1.55
	Have Been On It Before					3	9.67			1	4.00	3	7.31			55	17.74	2	3.92	10	10.20	4	13.79	78	12.13
	Through Friends			2	25.00	8	25.80	1	7.69	5	20.00	19	46.34	3	11.53	33	10.64	16	31.37	11	11.22	2	6.89	00	15.55
	Sign or Signboards			2	25.00			1	7.69	5	20.00					36	11.61	3	5.88	13	13.26	2	6.89	62	9.64
	By Accident or Chance	1	9.09	1	12.50	4	12.90	1	7.69	5	20.00	6	14.63			32	10.32	7	13.72	19	19.38	1	3.44	77	11.97
	Conservation Club	1	9.09			2	6.45			1	4.00	1	2.43			4	1.29	6	11.76	4	4.08			19	2.95
	Close To Home	2	18.18	2	25.00											6	1.93					1	3.44	11	1.71
	Map, Brochure, Trail Guide	2	18.18			1	3.22			5	20.00					96	30.96	6	11.76	18	18.36	1	3.44	29	20.06
	Office or Headquarters	1	9.09											1	3.84	9	2.90			3	3.06			14	2.17
	Through Parents, Relatives	1	9.09			1	3.22					4	9.75	2	7.69	16	5.16	1	1.96	2	2.04			27	4.19
	Heard About It									1	4.00	1	2.43	1	3.84	1	0.32			1	1.02			5	0.77
	Private Advertisement															7	26.92					2	6.89	9	1.39
	Word of Mouth					1	3.22					2	4.87	8	30.76	11	3.54							22	3.42
	Triple AAA					1	3.22							2	7.69									3	0.46
	Other					1	3.22	2	15.38	1	4.00					9	2.90			7	7.14	1	3.44	21	3.26
	Total	11	100.00	8	100.00	31	100.00	13	100.00	25	100.00	41	100.00	26	100.00	310	100.00	51	100.00	98	100.00	29	100.00	643	100%

IX. Activities Undertaken Along Trail

Activity I																									
	Swimming			1	12.50	2	9.52	3	27.27			1	3.44	12	52.17	5	2.79	12	32.43			2	12.50	38	9.40
	Hiking or Walking	1	14.28	3	37.50			2	18.18	7	33.33			1	4.34	66	36.87	1	2.70	26	50.00	1	6.25	108	26.73
	Horseback Riding			2	25.00	13	61.90	2	18.18			28	96.55	5	21.73	1	0.55	12	32.43			7	43.75	70	17.32
	Sight-seeing	2	28.57			1	4.76	1	9.09	3	14.28			1	4.34	15	8.37	2	5.40					25	6.18
	Birdwatching, Fishing, Nature					2	9.52			8	38.09					28	15.64	2	5.40	13	25.00			53	13.11
	Photography							1	9.09	2	9.52			1	4.34	12	6.70			4	7.69	1	6.25	21	5.19
	Camping/Picnicking					1	4.76	1	9.09					2	8.69	8	4.46	4	10.81	1	1.92			17	4.20
	Other	4	57.14	2	25.00	2	9.52	1	9.09	1	4.76			1	4.34	44	24.58	4	10.81	8	15.38	5	31.25	72	17.82
	Total	7	100.00	8	100.00	31	100.00	13	100.00	25	100.00	41	100.00	26	100.00	310	100.00	51	100.00	98	100.00	29	100.00	643	100%

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL		S
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	K
IX. Activities Undertaken Along Trail																										
Time 1																										
One Hour		1	20.00			1	6.25	5	62.50	2	16.66	18	69.23	1	6.66	66	52.38	8	24.62	18	50.00	5	38.46	125	43.25	
Two Hours				3	60.00			1	12.50	3	25.00	3	11.53	4	26.66	37	29.36	4	14.81	9	25.00	1	7.69	65	22.49	
Three Hours		2	40.00	1	20.00			1	12.50	1	8.33	2	7.69			10	7.93	3	11.11	2	5.55			22	7.61	
Four Hours		2	40.00			3	18.75			1	8.33	2	7.69	1	6.66	5	3.96	1	3.70	2	5.55	1	7.69	18	6.22	
Five Hours						1	6.25					1	3.84			3	2.38	1	3.70					6	2.07	
Six Hours				1	20.00	1	6.25	1	12.50					1	6.66	4	3.17	3	11.11			1	7.69	12	4.15	
Seven Hours						2	12.50									3	11.11					1	7.69	6	2.07	
Other						8	50.00			5	41.66			8	53.33	1	0.79	4	14.81	5	13.88	4	30.76	35	12.10	
Total		5	100.00	5	100.00	16	100.00	8	100.00	12	100.00	26	100.00	15	100.00	126	100.00	27	100.00	36	100.00	13	100.00	289	100%	1
Activity 2																										
Swimming				1	100.00	2	20.00	1	100.00			1	100.00	3	37.50	3	8.33			1	4.76	1	12.50	11	10.57	
Hiking or Walking		1	25.00			1	10.00			1	20.00					3	8.33							8	7.69	
Horseback Riding						2	20.00							2	25.00			3	33.33			2	25.00	9	8.65	
Sightseeing																				2	9.52			2	1.92	
Birdwatching, Fishing, Nature		1	25.00							4	80.00					9	25.00	1	11.11	8	38.09	3	37.50	26	25.00	
Photography						1	10.00							1	12.50	6	16.66							8	7.69	
Camping/ Picnicking		1	25.00											2	25.00	1	2.77	1	11.11	2	9.52			7	6.73	
Other		1	25.00			4	40.00									14	38.88	4	44.44	8	38.09	2	25.00	33	31.73	
Total		4	100.00	1	100.00	10	100.00	1	100.00	5	100.00	1	100.00	8	100.00	36	100.00	9	100.00	21	100.00	8	100.00	104	100%	
Time 2																										
One Hour		1	50.00			1	14.28	1	100.00	1	50.00					18	78.26	1	16.66	7	58.33	1	14.28	31	45.58	
Two Hours		1	50.00			1	14.28							1	16.66	4	17.39	1	16.66	2	16.66	1	14.28	11	16.17	
Three Hours												1	100.00											1	1.47	
Four Hours														1	16.66	1	4.34					1	14.28	3	4.41	
Five Hours																						1	14.28	1	1.47	
Six Hours						1	14.28																	1	1.47	
Seven Hours						3	42.85											1	16.66			1	14.28	5	7.35	
Other				1	100.00	1	14.28			1	50.00			4	66.66			3	50.00	3	25.00	2	28.57	15	22.05	
Total		2	100.00	1	100.00	7	100.00	1	100.00	2	100.00	1	100.00	6	100.00	23	100.00	6	100.00	12	100.00	7	100.00	68	100%	
Activity 3																										
Swimming																		1	50.00					1	7.69	
Hiking/Walking																			1	50.00				1	7.69	
Horseback Riding																				1	50.00			1	7.69	
Sightseeing																										
Birdwatching, Fishing, Nature																		1	50.00					1	7.69	
Photography																										
Camping/Picnicking						1	50.00									2	40.00							3	23.07	
Other		1	100.00			1	50.00					1	100.00			3	60.00	1	50.00					2	53.84	
Total		1	100.00			2	100.00					1	100.00			5	100.00	5	100.00					10	100%	

SELF - ADMINISTERED QUESTIONNAIRES

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NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL		
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
IX.	Time 3																									
	One Hour															2	100.00			1	50.00			3	50.00	
	Two Hours																	1	100.00					1	16.66	
	Three Hours																									
	Four Hours											1	100.00												1	16.66
	Five Hours																									
	Six Hours																									
	Seven Hours																									
	Other																			1	50.00			1	16.66	
	Total											1	100.00			2	100.00	1	100.00	2	100.00			6	100%	
X.	Type of Group																									
	One Family & Children	2	15.38	2	22.22	4	12.90	2	16.66	9	33.33	5	14.70			116	39.59	2	3.63	18	17.64	3	11.11	163	26.08	
	Two Families			1	11.11	3	9.67	3	25.00	1	3.70					23	7.84	1	1.81	10	9.80	1	3.70	43	6.88	
	One Couple	2	15.38			5	16.12	4	33.33	12	44.44	6	17.64	1	4.54	49	16.72	7	12.72	18	17.64	5	18.51	109	17.44	
	Organized Group	2	15.38	4	44.44	9	29.03	1	8.33	2	7.40	4	11.76	11	50.00	8	2.73	11	20.00	12	11.76	8	29.62	72	11.52	
	One Person Alone	2	15.38			3	9.67			1	3.70	5	14.70	1	4.54	18	6.14	6	10.90	9	8.82	2	7.40	47	7.52	
	Group of Friends	5	38.46	1	11.11	5	16.12	2	16.66	1	3.70	11	32.35	7	31.81	52	17.74	23	41.81	23	22.54	6	22.22	136	21.76	
	Other			1	11.11	2	6.45			1	3.70	3	8.82	2	9.09	27	9.21	5	9.09	12	11.76	2	7.40	55	8.80	
	Total	13	100.00	9	100.00	31	100.00	18	100.00	27	100.00	34	100.00	22	100.00	293	100.00	55	100.00	102	100.00	27	100.00	625	100%	
XI.	When Trip Began																									
	Month																									
	April																									
	May															1	0.33	2	4.25					3	0.47	
	June											2	4.44			3	1.00							5	0.79	
	July			1	11.11	4	13.79	3	30.00	3	13.04	17	37.77	10	40.00	39	13.08	11	23.40	8	8.08			96	15.31	
	August	7	53.84	5	55.55	13	44.82	7	70.00	19	82.60	24	53.33	15	60.00	144	48.32	27	57.44	37	37.37	17	58.62	315	50.23	
	September	1	7.69	2	22.22	1	3.44			1	4.34					82	27.51	4	8.51	27	27.27	12	41.37	130	20.73	
	October	3	23.07	1	11.11	10	34.48					1	2.22			28	9.39	2	4.25	9	9.09			54	8.61	
	Other	2	15.38			1	3.44					1	2.22			1	0.33	1	2.12	18	18.18			24	3.82	
	Total	13	100.00	9	100.00	29	100.00	10	100.00	23	100.00	45	100.00	25	100.00	298	100.00	47	100.00	99	100.00	29	100.00	627	100%	
	Day																									
	1st	2	15.38			1	3.57			2	8.69					19	6.35	2	4.44	6	6.06	1	3.44	33	5.28	
	2nd					1	3.57			1	4.34	1	2.27	1	4.00	4	1.33	2	4.44	12	12.12	1	3.44	23	3.68	
	3rd			1	11.11					1	4.34	1	2.27			7	2.34	7	15.55	2	2.02			19	3.04	
	4th					3	10.71					1	2.27	5	20.00	10	3.34	1	2.22	2	2.02	1	3.44	23	3.68	
	5th	1	7.69	2	22.22	1	3.57			1	4.34	2	4.54			3	1.00			2	2.02	1	3.44	13	2.08	
	6th			3	33.33	2	7.14					5	11.36			11	3.67	1	2.22	1	1.01	3	10.34	26	4.16	
	7th	1	7.69							1	4.34	2	4.54			9	3.01			4	4.04			17	2.72	
	8th					2	7.14					3	6.81			7	2.34			4	4.04			16	2.56	
	9th					1	3.57					1	2.27			7	2.34	1	2.22	1	1.01			11	1.76	
	10th									4	17.39					13	4.34	2	4.44	10	10.10			29	4.64	
	11th									1	4.34			7	28.00	9	3.01	3	6.66	6	6.06			26	4.16	
	12th			1	11.11	1	3.57					2	4.54			5	1.67	1	2.22			1	3.44	11	1.76	

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL		
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
XI.	Day																									
	13th	1	7.69			1	3.57									17	5.68	1	2.22	5	5.05			25	4.00	
	14th			1	11.11					1	4.34	1	2.27			12	4.01			3	3.03	2	6.89	20	3.20	
	15th	1	7.69					1	10.00	1	4.34					5	1.67					1	3.44	9	1.44	
	16th											1	2.27	1	4.00	6	2.00					4	13.79	12	1.92	
	17th									2	8.69	1	2.27	1	4.00	10	3.34					1	3.44	15	2.40	
	18th	2	15.38			1	3.57			2	8.69	1	2.27			8	2.67			6	6.06			20	3.20	
	19th							3	30.00					1	4.00	11	3.67			1	1.01	2	6.89	18	2.88	
	20th	1	7.69							3	13.04	11	25.00	1	4.00	13	4.34	5	11.11	3	3.03	4	13.79	41	6.57	
	21st			1	11.11	1	3.57									7	2.34			7	7.07	1	3.44	17	2.72	
	22nd													5	20.00	5	1.67	6	13.33	3	3.03	2	6.89	21	3.36	
	23rd	3	23.07			4	14.28			1	4.34					4	1.33			1	1.01	1	3.44	14	2.24	
	24th	1	7.69									1	2.27			19	6.35	1	2.22	2	2.02			24	3.84	
	25th							1	10.00	1	4.34	4	9.09	1	4.00	15	5.01	1	2.22	2	2.02			25	4.00	
	26th					1	3.57					4	9.09	1	4.00	9	3.01			7	7.07	2	6.89	24	3.84	
	27th					2	7.14	1	10.00							14	4.68			2	2.02			19	3.04	
	28th					1	3.57	1	10.00					1	4.00	9	3.01	1	2.22					13	2.08	
	29th					1	3.57	2	20.00							8	2.67	6	13.33	2	2.02	1	3.44	20	3.20	
	30th					4	14.28	1	10.00	1	4.34	1	2.27			8	2.67	3	6.66	1	1.01			19	3.04	
	31st											1	2.27			15	5.01	1	2.22	4	4.04			21	3.36	
	Total	13	100.00	9	100.00	28	100.00	10	100.00	23	100.00	44	100.00	25	100.00	299	100.00	45	100.00	99	100.00	29	100.00	524	100%	1
	Time																									
	1-2 AM																									
	2-3 AM																									
	3-4 AM					1	6.25																	1	0.18	
	4-5 AM									1	4.76				1	4.54								2	0.36	
	5-6 AM			1	14.28													1	2.38	2	2.10	1	5.00	5	0.91	
	6-7 AM									1	4.76					3	1.14	2	4.76					6	1.09	
	7-8 AM			1	6.25											2	0.76	2	4.76	1	1.05			6	1.09	
	8-9 AM	3	25.00			1	6.25					1	2.32	1	4.54	11	4.19	2	4.76	7	7.36	1	5.00	27	4.91	
	9-10 AM	1	8.33			1	6.25	1	11.11	1	4.76	3	6.97	9	40.90	18	6.87	4	9.52	8	8.42	2	10.00	48	8.74	
	10-11AM	3	25.00			4	25.00			3	14.28	3	6.97			46	17.55	9	21.42	14	14.73	1	5.00	83	15.11	
	11-12AM	1	8.33			1	6.25	3	33.33	1	4.76	9	20.93			39	14.88			10	10.52	2	10.00	66	12.02	
	12-1 PM					1	6.25	1	11.11	2	9.52	2	4.65			14	5.34	4	9.52	8	8.42	1	5.00	33	6.01	
	1-2 PM					2	12.50	1	11.11	5	23.80	4	9.30	2	9.09	37	14.12	2	4.76	16	16.84	3	15.00	72	13.11	
	2-3 PM	1	8.33	3	42.85					5	23.80	10	23.25	1	4.54	30	11.45	9	21.42	12	12.63	1	5.00	72	13.11	
	3-4 PM			1	14.28					1	4.76	7	16.29			17	6.48			5	5.26	1	5.00	32	5.82	
	4-5 PM	1	8.33					1	11.11	1	4.76	1	2.32	4	18.18	16	6.10	2	4.76	5	5.26	2	10.00	33	6.01	
	5-6 PM					1	6.25	1	11.11			2	4.65			13	4.96	1	2.38	2	2.10	2	10.00	22	4.00	
	6-7 PM	1	8.33			1	6.25	1	11.11							10	3.81			2	2.10	1	5.00	16	2.91	
	7-8 PM					1	6.25									3	1.14							4	0.72	
	8-9 PM			1	14.28													2	4.76					3	0.54	
	9-10 PM			1	14.28											2	0.76	1	2.38					4	0.72	
	10-11PM																	1	2.38					1	0.36	
	11-12PM					1	6.25									1	0.38					2	10.00	4	0.72	
	Other	1	8.33							1	2.32	4	18.18					3	3.15					9	1.63	
	Total	12	100.00	7	100.00	16	100.00	9	100.00	21	100.00	43	100.00	22	100.00	262	100.00	42	100.00	95	100.00	20	100.00	549	100%	1

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SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
XII. When Trip Completed																									
Month																									
	June									1	2.38			1	0.39									2	0.36
	July			1	3.84	3	30.00	2	14.28	17	40.47	9	37.50	34	13.28	9	18.75	6	6.89					81	14.75
	August	5	45.45	6	66.66	7	26.92	6	60.00	11	78.57	23	54.76	15	62.50	123	48.04	30	62.50	32	36.78	12	54.54	270	49.18
	September	1	9.09	2	22.22	8	30.76	1	10.00	1	7.14					70	27.34	5	10.41	25	28.73	10	45.45	123	22.40
	October	3	27.27	1	11.11	9	34.61					1	2.38			26	10.15	3	6.25	9	10.34			52	9.47
	November	2	18.18													1	0.39	1	2.08	13	14.94			17	3.09
	December					1	3.84													1	1.14			2	0.36
	Other																							1	0.36
	Total	11	100.00	9	100.00	26	100.00	10	100.00	14	100.00	42	100.00	24	100.00	256	100.00	48	100.00	87	100.00	22	100.00	549	100%
Day																									
	1st	2	18.18			5	20.00	1	10.00					1	4.16	20	7.72			6	6.97	1	4.54	36	6.54
	2nd					1	4.00					2	4.76			5	1.93			10	11.62			18	3.27
	3rd									1	7.14					8	3.08	1	2.08	2	2.32			12	2.18
	4th					1	4.00					1	2.38			8	3.08	9	18.75	1	1.16	1	4.54	21	3.81
	5th	1	9.09	1	11.11	2	8.00			1	7.14	2	4.76			3	1.15	2	4.16	3	3.48			15	2.72
	6th					3	12.00					5	11.90	1	4.16	1	3.86	3	6.25	1	1.16			23	4.18
	7th			1	11.11							2	4.76	1	4.16	9	3.47	1	2.08	4	4.65	3	13.63	21	3.81
	8th			4	44.44	1	10.00					3	7.14	3	12.50	8	3.08			3	3.48			22	4.00
	9th	1	9.09	1	11.11	1	4.00					1	2.38			5	1.93	2	4.16	1	1.16			12	2.18
	10th			1	11.11					4	28.57					9	3.47			9	10.46			23	4.18
	11th					3	12.00			1	7.14					9	3.47			5	5.81			18	3.27
	12th					4	16.00					2	4.76			5	1.93	2	4.16					13	2.36
	13th					1	4.00									12	4.63			3	3.48	1	4.54	17	3.09
	14th									1	7.14	1	2.38			11	4.23	1	2.08	3	3.48	1	4.54	18	3.27
	15th	1	9.09											6	25.00	5	1.93							12	2.18
	16th			1	11.11							1	2.38	1	4.16	3	1.15	3	6.25					9	1.63
	17th									1	7.14	1	2.38	1	4.16	7	2.70					3	13.63	13	2.36
	18th	2	18.18							1	7.14	1	2.38			7	2.70	1	2.08	3	3.48			15	2.72
	19th															14	5.40			2	2.32			16	2.90
	20th	1	9.09							2	14.28	10	23.80	2	8.33	10	3.86	3	6.25	2	2.32	3	13.63	33	6.00
	21st	1	9.09													5	1.93	1	2.08	6	6.97	2	9.09	15	2.72
	22nd					1	4.00									4	1.54	2	4.16	2	2.32	1	4.54	10	1.81
	23rd	2	18.18							1	7.14			1	4.16	2	0.77			1	1.16	1	4.54	8	1.45
	24th					1	4.00	3	30.00			1	2.38			10	3.86	6	12.50	3	3.48	3	13.63	27	4.90
	25th							1	10.00			4	9.52	5	20.83	14	5.40			2	2.32			26	4.72
	26th					1	4.00					3	7.14			10	3.86	1	2.08	7	8.13	2	9.09	24	4.36
	27th							1	10.00					2	8.33	9	3.47	2	4.16	2	2.32			16	2.90
	28th							1	10.00							8	3.08	1	2.08					10	1.81
	29th							1	10.00							9	3.47			2	2.32			12	2.18
	30th					1	4.00			1	7.14	1	2.38			10	3.86							13	2.36
	31st							1	10.00			1	2.38			10	3.86	7	14.58	3	3.48			22	4.00
	Total	11	100.00	9	100.00	26	100.00	9	100.00	14	100.00	42	100.00	24	100.00	259	100.00	48	100.00	86	100.00	22	100.00	550	100%

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL		S
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	N
XII. Time																										
	1-2 AM															1	0.46							1	0.21	
	2-3 AM															1	0.46	1	3.33					2	0.43	
	3-4 AM																									
	4-5 AM																									
	5-6 AM																	1	3.33					1	0.21	
	6-7 AM															1	0.46			1	1.19			2	0.43	
	7-8 AM																									
	8-9 AM																									
	9-10 AM										1	2.38				4	1.84	1	3.33	2	2.38			8	1.75	
	10-11AM									1	8.33	2	4.76			10	4.60	2	6.66	9	10.71			24	5.27	
	11-12AM							1	14.28			2	4.76			22	10.13			1	1.19			26	5.71	
	12-1 PM	1	16.66	2	25.00	1	10.00			1	8.33	10	23.80			31	14.28			8	9.52	2	11.76	56	12.30	
	1-2 PM					1	10.00	1	14.28	2	16.66	2	4.76	1	4.54	19	8.75	3	10.00	6	7.14	2	11.76	37	8.13	
	2-3 PM			3	37.50	1	10.00	1	14.28	3	25.00	3	7.14	1	4.54	21	9.67	4	13.33	20	23.80	2	11.76	59	12.96	
	3-4 PM			1	12.50	1	10.00			5	41.66	7	16.66	4	18.18	30	13.82	2	6.66	9	10.71	3	17.64	62	13.62	
	4-5 PM	1	16.66	1	12.50	2	20.00					9	21.42	5	22.72	28	12.90	10	33.33	11	13.09	3	17.64	70	15.38	
	5-6 PM	4	66.66			1	10.00	2	28.57			3	7.14	4	18.18	18	8.29	3	10.00	9	10.71	1	5.88	45	9.89	
	6-7 PM					1	10.00	2	28.57			2	4.76			17	7.83			3	3.57	3	17.64	28	6.15	
	7-8 PM			1	12.50											11	5.06	3	10.00	1	1.19	1	5.88	17	3.73	
	8-9 PM													1	4.54	3	1.38							4	0.87	
	9-10 PM																									
	10-11PM					1	10.00							1	4.54									2	0.43	
	11-12PM																							1	0.21	
	Other					1	10.00					1	2.38	5	22.74					3	3.57			10	2.19	
	Total	6	100.00	8	100.00	10	100.00	7	100.00	12	100.00	42	100.00	22	100.00	217	100.00	30	100.00	84	100.00	17	100.00	455	100%	1
XIII. Methods of Travel For The Past 12 Months																										
(a) Hiking																										
	1-2 Times	3	50.00	2	66.66	5	62.50	1	25.00	4	22.22	4	36.36			68	25.37	6	54.54	24	28.57	2	22.22	119	28.19	
	3-4 "	1	16.66							3	16.66	3	27.27			40	14.92	1	9.09	11	13.09	1	11.11	60	14.21	
	5-6 "			1	33.33							2	11.11	2	18.18					13	15.47	3	33.33	59	13.98	
	7-8 "					1	12.50									14	5.22			3	3.57			18	4.26	
	9-10 "	1	16.66					1	25.00	3	16.66					19	7.08	2	18.18	5	5.95			31	7.34	
	11-12 "					2	25.00			1	5.55					6	2.23			2	2.38			11	2.60	
	13-14 "							1	25.00							1	0.37			1	1.19			3	0.71	
	15-16 "									1	5.55					6	2.23			3	3.57			10	2.36	
	17-22 "															7	2.61			4	4.76			11	2.60	
	23-28 "															4	1.49			2	2.38			6	1.42	
	29-34 "															4	1.49			1	1.19			4	0.94	
	35-45 "							1	25.00	1	5.55					2	0.74	1	9.09					6	1.42	
	46-56 "															2	0.74							2	0.47	
	56 + "															2	0.74							2	0.47	
	Checked									3	16.66	2	18.18			52	19.40	1	9.09	13	15.47	1	11.11	72	17.06	
	Other	1	16.66													3	1.11			2	2.38	2	22.22	8	1.90	
	Total	6	100.00	3	100.00	8	100.00	4	100.00	18	100.00	11	100.00			268	100.00	11	100.00	84	100.00	9	100.00	422	100%	1

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
XIII. Methods of Travel for the Past 12 Months																									
(b) Horseback Riding																									
1-2 Times	2	50.00			1	4.76	1	20.00	2	100.00	9	29.00	8	36.36	9	55.55	6	20.00	5	41.66			43	26.54	
3-4 "					8	38.09					2	6.45	3	13.63			3	10.00	3	25.00	3	20.00	22	13.58	
5-6 "			1	50.00	2	9.52	1	20.00			5	16.12	5	22.72	1	5.55	3	10.00	1	8.33	6	40.00	25	15.43	
7-8 "					1	4.76					1	3.22			1	5.55					1	6.66	4	2.46	
9-10 "													1	4.54	2	11.11	2	6.66	1	8.33	1	6.66	7	4.32	
11-12 "					1	4.76					2	6.45	1	4.54			1	3.33	1	8.33			6	3.70	
13-14 "											1	3.22											1	0.61	
15-16 "					1	4.76					1	3.22			1	5.55	1	3.33					4	2.46	
17-22 "					1	4.76	1	20.00			2	6.45					2	6.66			1	6.66	7	4.32	
23-28 "			1	50.00													1	3.33					2	1.33	
29-34 "																									
35-45 "																									
46-56 "											1	3.22											1	0.61	
56 +						1	4.76				1	3.22											2	1.33	
Checked	2	50.00			3	14.28	2	40.00			4	12.90	3	13.63	3	16.66	11	36.66			2	13.33	30	18.51	
Other					2	9.52					2	6.45	1	4.54	1	5.55			1	8.33	1	6.66	8	4.81	
Total	4	100.00	2	100.00	21	100.00	5	100.00	2	100.00	31	100.00	22	100.00	18	100.00	30	100.00	12	100.00	15	100.00	162	100%	
(c) Motorbike Riding																									
1-2 Times	2	20.00	1	50.00	1	16.66					4	57.14			5	33.33	4	30.76	3	37.50			20	29.85	
3-4 "	2	20.00			2	33.33					1	14.28	2	66.66	3	20.00	1	7.69					11	16.41	
5-6 "	3	30.00											1	33.33	1	6.66	1	7.69	3	37.50			9	13.43	
7-8 "															1	6.66	1	7.69					2	2.98	
9-10 "	2	20.00					1	33.33							2	13.33	2	15.38					7	10.44	
11-12 "																									
13-14 "					1	16.66																	1	1.49	
15-16 "			1	50.00																			1	1.49	
17-22 "											1	14.28					1	7.69					2	2.98	
23-28 "					1	16.66																	1	1.49	
29-34 "																									
35-45 "	1	10.00															1	7.69					2	2.98	
46-56 "															1	6.66							1	1.49	
56 +																			1	12.50			1	1.49	
Checked					1	16.66	2	66.66			1	14.28			2	13.33	2	15.38	1	12.50			9	13.43	
Total	10	100.00	2	100.00	6	100.00	3	100.00			7	100.00	3	100.00	15	100.00	13	100.00	8	100.00			67	100%	
(d) Bicycling																									
1-2 Times				1	50.00	1	100.00	2	66.66	1	16.66				17	32.69	1	50.00	1	11.11			24	31.16	
3-4 "															7	13.46			2	22.22			9	11.68	
5-6 "								1	33.33						2	3.84			3	33.33	1	50.00	7	9.09	
7-8 "																									
9-10 "											2	33.33			6	11.53					1	50.00	9	11.68	

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NO.	CATEGORY	STATION 1	STATION 2	STATION 3	STATION 4	STATION 5	STATION 6	STATION 7	STATION 8	STATION 9	STATION 10	STATION 11	TOTAL			
									No. %	No. %	No. %	No. %	No. %			
XIII. Methods of Travel for the Past 12 Months																
(d) Bicycling																
	11-12 Times		1	50.00					1	1.92			2	2.59		
	13-14 "								1	1.92			1	1.29		
	15-16 "								1	1.92	1	11.11	2	2.59		
	17-22 "					1	16.66						1	1.29		
	23-28 "								1	1.92			1	1.29		
	29-34 "															
	35-45 "															
	46-56 "									1	50.00	1	11.11	2	2.59	
	56 +								1	1.92			1	1.29		
	Checked					2	33.33		15	28.84	1	11.11	18	23.36		
	Total		2	100.00	1	100.00	3	100.00	6	100.00	2	100.00	9	100.00	77	100%
(e) Snowshoeing																
	1-2 Times	2	100.00		1	100.00			1	20.00	1	20.00	5	38.46		
	3-4 "										1	20.00	1	7.69		
	5-6 "								1	20.00	1	20.00	2	15.38		
	7-8 "								1	20.00			1	7.69		
	9-10 "								1	20.00			1	7.69		
	11-12 "															
	13-14 "								1	20.00			1	7.69		
	15-16 "															
	17-22 "															
	23-28 "															
	29-34 "															
	35-45 "															
	46-56 "															
	56 +										1	20.00	1	7.69		
	Checked										1	20.00	1	7.69		
	Total	2	100.00		1	100.00			5	100.00	5	100.00	13	100%		
(f) Trailskiing																
	1-2 Times					1	100.00		1	14.28	1	50.00	2	50.00	5	35.71
	3-4 "															
	5-6 "								1	14.28			1	7.14		
	7-8 "															
	9-10 "															
	11-12 "															
	13-14 "															
	15-16 "															
	17-22 "										1	25.00	1	7.14		
	23-28 "															
	29-34 "								1	50.00			1	7.14		
	35-45 "								1	14.28			1	7.14		
	46-56 "															
	56 +															
	Checked								4	57.14	1	25.00	5	35.71		
	Total					1	100.00		7	100.00	2	100.00	4	100.00	14	100%

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
XIII. Methods of Travel for the Past 12 Months																									
(g) Snowmobiling																									
	1-2 Times	1	33.33	2	100.00	1	100.00			1	100.00	1	25.00	2	100.00	5	41.66	2	50.00	3	60.00	3	42.85	21	51.21
	3-4 "											1	25.00			1	8.33				1	14.28	3	7.31	
	5-6 "															1	8.33	1	25.00		1	14.28	3	7.31	
	7-8 "																			1	20.00		1	2.43	
	9-10 "	1	33.33																	1	20.00		2	4.87	
	11-12 "									1	25.00												1	2.43	
	15-16 "																								
	17-22 "	1	33.33												1	8.33							2	4.87	
	23-28 "																								
	29-34 "																								
	35-45 "																								
	46-56 "																								
	56 + "																								
	Checked											1	25.00			4	33.33	1	25.00			2	28.56	8	19.50
	Total	3	100.00	2	100.00	1	100.00			1	100.00	4	100.00	2	100.00	12	100.00	4	100.00	5	100.00	7	100.00	41	100%
XIV. Associated Activities for the Past 12 Months																									
(a) Fishing																									
	1-2 Times	1	50.00	1	100.00	5	50.00	3	60.00	2	66.66	2	50.00			28	40.00	4	44.44	1	11.11	1	33.33	48	41.37
	3-4 "					2	20.00	1	20.00							12	17.14			3	33.33	1	33.33	19	16.37
	5-6 "	1	50.00			2	20.00									5	7.14	1	11.11	1	11.11			10	8.62
	7-8 "															2	2.85							2	1.72
	9-10 "									1	33.33					3	4.28	2	22.22					6	5.17
	11-12 "																			1	11.11	1	33.33	2	1.72
	13-14 "															1	1.42							1	0.86
	15-16 "											1	25.00			3	4.28	1	11.11					5	4.31
	17-22 "															1	1.42							1	0.86
	23-28 "															1	1.42							1	0.86
	29-34 "															1	1.42							1	0.86
	35-45 "																								
	46-56 "																								
	56 + "															1	1.42							1	0.86
	Checked					1	10.00	1	20.00			1	25.00			12	17.13			3	33.33			19	16.37
	Total	2	100.00	1	100.00	10	100.00	5	100.00	3	100.00	4	100.00			70	100.00	9	100.00	9	100.00	3	100.00	116	100%
(b) Hunting																									
	1-2 Times	2	100.00	2	50.00	2	50.00			1	100.00					4	33.33			3	50.00			14	41.93
	3-4 "			1	25.00							1	50.00			2	16.66							4	9.67
	5-6 "					1	25.00					1	50.00			1	8.33			2	33.33	1	100.00	6	19.35
	7-8 "															1	8.33							1	6.45
	9-10 "															3	25.00							3	12.90
	11-12 "																								
	13-14 "																								
	15-16 "																								
	17-22 "																								
	23-28 "																								
	29-34 "															1	8.33							1	3.22

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL		
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
XIV. Associated Activities for the Past 12 Months																										
(b) Hunting																										
	35-45 Times					1	25.00	1	25.00															2	6.44	
	46-56 "																									
	56 + "																									
	Checked																									
	Total	2	100.00	4	100.00	4	100.00			1	100.00	2	100.00			12	100.00			5	100.00	1	100.00	21	100%	
(c) Nature Walks																										
	1-2 Times	2	66.66	1	25.00	1	11.11	1	16.66	2	12.50	3	37.50			44	26.99	3	23.07	16	32.65	1	16.16	74	26.52	
	3-4 "	1	33.33			2	22.22	1	16.66	5	31.25	1	12.50	1	50.00	20	12.26	2	15.38	8	16.32	1	16.66	42	15.05	
	5-6 "			3	75.00			1	16.66			2	25.00	1	50.00	21	12.88	1	7.69	6	12.24	1	16.66	36	12.90	
	7-8 "					2	22.22	1	16.66							7	4.29			1	2.04			11	3.94	
	9-10 "									2	12.50					11	6.74			2	4.08			15	5.37	
	11-12 "					1	11.11			2	12.50					6	3.68	1	7.69	1	2.04			11	3.94	
	13-14 "																									
	15-16 "					1	11.11									1	0.61			1	2.04			3	1.07	
	17-22 "															8	4.90	2	15.38	2	4.08			12	4.30	
	23-28 "																			1	2.04			1	0.35	
	29-34 "																					1	16.66	1	0.35	
	35-45 "															2	1.22					1	16.66	3	1.07	
	46-56 "															1	0.61							1	0.35	
	56 + "									1	6.25									1	2.04			2	0.71	
	Checked					2	22.22	2	33.33	3	18.75	2	25.00			42	25.76	4	30.76	10	20.40	2	33.32	67	24.00	
	Total	3	100.00	4	100.00	9	100.00	6	100.00	15	100.00	8	100.00	2	100.00	163	100.00	13	100.00	49	100.00	7	100.00	279	100%	
(d) Camping																										
	1-2 Times			1	100.00	6	40.00	1	20.00	1	20.00	3	75.00	6	33.33	37	38.94	5	19.23	16	47.05	1	7.14	77	35.15	
	3-4 "	1	50.00			5	33.33			1	20.00	1	25.00	5	27.77	8	8.42	4	15.38	4	11.76	4	28.57	33	15.06	
	5-6 "					1	6.66	1	20.00	1	20.00			5	27.77	9	9.47	3	11.53	4	11.76	4	28.57	28	12.78	
	7-8 "					1	6.66									3	3.15			1	2.94	1	7.14	6	2.73	
	9-10 "									1	20.00					5	5.26					1	7.14	7	3.19	
	11-12 "															3	3.15							3	1.36	
	13-14 "															3	3.15							3	1.36	
	15-16 "															1	1.05			1	2.94			2	0.91	
	17-22 "																	3	11.53			1	7.14	4	1.82	
	23-28 "															1	1.05	1	3.84			1	7.14	3	1.36	
	29-34 "																			1	2.94			1	0.45	
	35-45 "															1	1.05							1	0.45	
	46-56 "															1	1.05							1	0.45	
	56 + "															0	1.05							1	0.45	
	Checked	1	50.00			2	13.33	3	60.00	1	20.00			2	11.10	23	24.20	10	38.46	6	17.64	1	7.14	49	22.40	
	Total	2	100.00	1	100.00	15	100.00	5	100.00	5	100.00	4	100.00	18	100.00	96	100.00	26	100.00	33	100.00	14	100.00	219	100%	
(e) Sightseeing																										
	1-2 Times	5	55.55	1	50.00	3	33.33			2	15.38	4	44.44			34	21.25	3	20.00	15	39.47	1	20.00	67	24.81	
	3-4 "	1	11.11							4	30.76	2	22.22	1	16.66	16	10.00	2	13.33	4	10.52			30	11.11	

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
XIV. Associated Activities for the Past 12 Months																									
(e) Sightseeing																									
5-6 Times		1	11.11			1	11.11					1	11.11	1	16.66	14	8.68	1	6.66	3	7.89	2	40.00	24	8.88
7-8 "										2	15.38					9	5.62							11	4.07
9-10 "				1	50.00					1	7.69	2	22.22			11	6.87	2	13.33	2	5.26			19	7.03
11-12 "						1	11.11			1	7.69			1	16.66	7	4.37			1	2.63			11	4.07
13-14 "														1	16.66	1	0.62							1	0.37
15-16 "																1	0.62							1	0.37
17-22 "																4	2.50			1	2.63			5	1.85
23-28 "		1	11.11													2	1.25	1	6.66	2	5.26	1	20.00	7	2.59
29-34 "								1	25.00							3	1.87							4	1.48
35-45 "										1	7.69					2	1.25							3	1.11
46-56 "																3	1.87							3	1.11
56 + "																									
Checked		1	11.11			4	44.44	3	75.00	2	15.38			2	33.33	52	32.50	6	40.00	8	21.05	1	20.00	84	31.10
Other																2	1.25			1	2.63				
Total		9	100.00	2	100.00	9	100.00	4	100.00	13	100.00	9	100.00	6	100.00	161	100.00	15	100.00	37	100.00	5	100.00	270	100%
(f) Birdwatching																									
1-2 Times						1	50.00	2	66.66	3	42.85	2	66.66			12	13.95			7	33.33			27	21.09
3-4 "						1	50.00			1	14.28					2	2.32			4	19.04			8	6.25
5-6 "				1	100.00											7	8.13			1	4.76	2	100.00	11	8.59
7-8 "																4	4.65	1	50.00	1	4.76			6	4.68
9-10 "																10	11.62							10	7.81
11-12 "								1	14.28							5	5.81							6	4.68
13-14 "																									
15-16 "																1	1.16			2	9.52			3	2.34
17-22 "																4	4.65			1	4.76			5	3.90
23-28 "																1	1.16			1	4.76			2	1.56
29-34 "																1	1.16							1	0.78
35-45 "								1	14.28							1	1.16							2	1.56
46-56 "																									
56 + "																									
Checked								1	33.33	1	14.28	1	33.33	1	100.00	38	44.18	1	50.00	4	19.04			47	36.71
Total				1	100.00	2	100.00	3	100.00	7	100.00	3	100.00	1	100.00	86	100.00	2	100.00	21	100.00	2	100.00	128	100%
(g) Rock Hunting																									
1-2 Times		3	100.00	1	100.00					1	33.33	1	100.00			20	37.03	1	100.00	4	28.57			31	37.80
3-4 "								1	33.33	1	33.33					7	12.96			2	14.28			11	13.41
5-6 "																6	11.11			4	28.57			10	12.19
7-8 "																1	1.85							1	1.21
9-10 "																2	3.70							2	2.43
11-12 "																1	1.85							1	1.21
13-14 "																									
15-16 "																									
17-22 "																									
23-28 "																2	3.70							2	2.43

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1	STATION 2	STATION 3	STATION 4	STATION 5	STATION 6	STATION 7	STATION 8	STATION 9	STATION 10	STATION 11	TOTAL
		No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %
XVI. Permanent Residence													
Counties:													
	Clare		1 14.28										1 0.15
	Clinton		1 14.28						2 0.64				3 0.47
	Crawford			1 3.33			2 7.40						3 0.47
	Delta												
	Dickinson												
	Eaton			1 3.33				1 0.32					2 0.31
	Emmet												
	Genesee							6 1.93		4 4.25			10 1.59
	Gladwin												
	Gogebic												
	Grand Traverse							1 0.32	15 33.33		11 40.74		27 4.31
	Gratiot			3 10.00	1 7.69				6 13.33		1 3.70		11 1.75
	Hillsdale							1 0.32					1 0.15
	Houghton												
	Huron			1 3.33	1 7.69								2 0.31
	Ingham	2 15.38	1 14.28	1 3.33	1 7.69		2 7.40	7 2.25	1 2.22	4 4.25			19 3.03
	Ionia			1 3.33				1 0.32					2 0.31
	Iosco												
	Iron												
	Isabella							2 0.64			1 3.70		3 0.47
	Jackson							3 0.96	1 2.22	1 1.06			5 0.79
	Kalamazoo							6 1.93	1 2.22				7 1.11
	Kalkaska												
	Kent	1 7.69		4 13.33				54 17.41	1 2.22	2 2.12	1 3.70		63 10.06
	Keeweenaw												
	Lake												
	Lapeer			1 3.33									1 0.15
	Leelanau											2 7.40	2 0.31
	Lenawee												
	Livingston						8 8.33			3 3.19	1 3.70		7 1.11
	Luce												
	Mackinac												
	Macomb		1 14.28	2 6.66		1 4.16	3 8.33	4 14.81	1 0.32	1 2.22	2 2.12		15 2.39
	Manistee												
	Marquette												
	Mason					1 4.16		19 6.12			1 3.70		21 3.35
	Macosta							1 0.32					1 0.15
	Menominee												
	Midland	1 7.69						7 2.25		1 1.06	1 3.70		10 1.59
	Missaukee												
	Monroe				1 7.69					2 2.12			3 0.47
	Montcalm			3 10.00	1 7.69								4 0.63
	Montmorency												
	Muskegon							31 10.00					31 4.95

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1	STATION 2	STATION 3	STATION 4	STATION 5	STATION 6	STATION 7	STATION 8	STATION 9	STATION 10	STATION 11	TOTAL											
									No. %	NO. %	No. %	No. %	No. %											
XVI. Permanent Residence																								
Counties:																								
Newaygo																								
Oakland	2	15.38	1	14.28	4	13.33	1	7.69	14	58.33	17	47.22	4	14.81	18	5.80	3	6.66	5	5.31	69	11.02		
Oceana															1	0.32					1	0.15		
Ogemaw																								
Ontonagon																								
Oscoda			1	14.28											2	0.64					3	0.47		
Oscoda																								
Otsego																								
Ottawa															33	10.64					33	5.27		
Presque Isle																								
Roscommon			1	14.28																	1	0.15		
Saginaw							2	15.38							5	1.61	1	2.22			8	1.27		
Sanilac																								
Schoolcraft															1	0.32					1	0.15		
Shiawassee																	1	2.22			2	0.31		
St. Clair					3	10.00														1	3.70	3	0.47	
St. Joseph															1	0.32					1	0.15		
Tuscola							1	7.69													1	0.15		
Van Buren									1	4.16					2	0.64					3	0.47		
Washtenaw					1	3.33	1	7.69							4	1.29			35	37.23	2	7.40	43	6.86
Wayne	2	15.38			2	6.66	1	7.69	7	29.16	10	27.77	4	14.81	2	6.77	8	17.77	28	29.78	2	7.40	85	13.37
Wexford	1	7.69																					1	0.15
Other	3	23.07			2	6.66					1	2.77	7	25.92	52	16.76		7	7.44	1	3.70	73	11.66	
Total	13	100.00	7	100.00	30	100.00	13	100.00	24	100.00	36	100.00	27	100.00	310	100.00	45	100.00	94	100.00	27	100.00	626	100%
XVII. State																								
Michigan	9	69.23	8	100.00	27	93.10	12	100.00	24	92.30	28	90.32	15	65.21	226	80.14	41	83.67	87	92.55	24	92.30	301	84.48
Indiana	2	15.38													21	7.44					2	7.69	25	4.21
Illinois	2	15.38							1	3.84	1	3.22	7	30.43	18	6.38	4	8.16	1	1.06			34	5.73
Minnesota																								
Ohio													1	4.34	9	3.19	1	2.04	3	3.19			14	2.36
Wisconsin															2	0.70							2	0.33
Canada															1	0.35			1	1.06			2	0.33
Other					2	6.89			1	3.84	2	6.45			5	1.77	3	6.12	2	2.12			15	2.52
Total	13	100.00	8	100.00	29	100.00	12	100.00	26	100.00	31	100.00	23	100.00	282	100.00	49	100.00	94	100.00	26	100.00	593	100%

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
XVIII. <u>Head of Family: Age & Sex</u>																									
Age																									
	-20			1	12.50	2	6.45	1	8.33	1	4.16					7	2.22	1	2.17	4	4.44			17	2.71
	21-25			1	12.50	2	6.45			2	8.33	2	5.55	2	7.69	17	5.41	3	6.52	11	12.22	3	10.71	43	6.85
	26-30					4	12.90			4	16.66	4	11.11	2	7.69	24	7.64	6	13.04	10	11.11	2	7.14	56	8.93
	31-35	3	25.00			3	9.67	1	8.33	2	8.33	4	11.11	2	7.69	34	10.82	3	6.52	8	8.88	1	3.57	61	9.72
	36-40	2	16.66	2	25.00	3	9.67	3	25.00	2	8.33	3	8.33	4	15.38	70	22.29	3	6.52	18	20.00	4	14.28	114	18.18
	41-50	6	50.00	2	25.00	11	35.48	3	25.00	11	45.83	12	33.33	13	50.00	105	33.43	11	23.91	36	40.00	12	42.85	222	35.40
	51-60	1	8.33	2	25.00	5	16.12	2	16.66	1	4.16	11	30.55	3	11.53	43	13.69	14	30.43	3	3.33	5	17.85	90	14.35
	60 +					1	3.22	2	16.66	1	4.16					14	4.45	5	10.86			1	3.57	24	3.82
	Total	12	100.00	8	100.00	31	100.00	12	100.00	24	100.00	36	100.00	26	100.00	314	100.00	46	100.00	90	100.00	28	100.00	627	100%

Sex																									
	Male	12	100.00	9	100.00	26	86.66	11	100.00	23	85.18	30	93.75	22	100.00	298	96.75	47	90.38	85	91.39	21	91.30	584	94.34
	Female					4	13.33			4	14.81	2	6.25			10	3.24	5	9.61	8	8.60	2	8.69	35	5.65
	Total	12	100.00	9	100.00	30	100.00	11	100.00	27	100.00	32	100.00	22	100.00	308	100.00	52	100.00	93	100.00	23	100.00	619	100%

XIX. Head of Family Occupation																									
	Professional	2	18.18	2	28.57	2	6.89	2	16.66	9	36.00	10	26.31	6	25.00	121	40.06	16	33.33	35	39.32	6	23.07	211	34.53
	Self-employed	4	36.36			4	13.79			1	4.00	1	2.63	4	16.66	21	6.95	3	6.25	6	6.74	4	15.38	48	7.85
	Clerical and Sales					5	17.24	1	8.33	3	12.00	3	7.89	1	4.16	28	9.27	1	2.08	5	5.61	2	7.69	49	8.01
	Skilled Workers	1	9.09	2	28.57	11	37.93	6	50.00	5	20.00	14	36.84	3	12.50	69	22.84	9	18.75	15	16.85	4	15.38	139	22.74
	Semi-skilled Workers			1	14.28	2	6.89					7	18.42	4	16.66	21	6.95	1	2.08	2	2.24	2	7.69	40	6.54
	Service Workers	1	9.09			1	3.44	2	16.66	2	8.00			2	8.33	12	3.97	4	8.33	5	5.61	1	3.84	30	4.90
	Unskilled Workers	1	9.09			2	6.89			1	4.00			2	8.33	8	2.64			2	2.24			16	2.61
	Farm Operators	1	9.09	1	14.28					1	4.00	1	2.63	2	8.33	1	0.33	6	12.50					13	2.12
	Unemployed & Students			1	14.28					2	8.00	2	5.26			9	2.98	1	2.08	12	13.48	3	11.53	30	4.90
	Retired							1	8.33	1	4.00					7	2.31	3	6.25			1	3.84	13	2.12
	Housewife	1	9.09			1	3.44									2	0.66	3	6.25	3	3.37			10	1.47
	Other					1	3.44									3	0.99	1	2.08	4	4.49	3	11.53	12	1.96
	Total	11	100.00	7	100.00	29	100.00	12	100.00	25	100.00	38	100.00	24	100.00	302	100.00	48	100.00	89	100.00	26	100.00	611	100%

XX. Family Members - Male Ages																									
Male 1																									
	5 & less	5	55.55	1	12.50	4	20.00	1	16.66	5	33.33	3	9.67	1	5.88	35	14.89	3	11.53	6	10.90			64	14.61
	6-15	2	22.22	3	37.50	8	40.00	4	66.66	6	40.00	11	35.48	5	29.41	120	51.06	8	30.76	27	49.09	9	56.25	203	46.34

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL		
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
XX. Family Members-Male Ages																										
Male 1																										
16-25		1	11.11	4	50.00	6	30.00			4	26.66	15	48.38	11	64.70	59	25.10	10	38.46	21	38.18	4	25.00	135	30.82	
26-35						1	5.00					1	3.22			7	2.97	2	7.69	1	1.80	1	6.25	13	2.96	
36-45												1	3.22			7	2.97					1	6.25	9	2.05	
46-60		1	11.11					1	16.66							6	2.55	2	7.69			1	6.25	11	2.51	
60 +						1	5.00									1	0.42	1	3.84					3	0.68	
Total		9	100.00	8	100.00	20	100.00	6	100.00	15	100.00	31	100.00	17	100.00	235	100.00	26	100.00	55	100.00	16	100.00	438	100%	
Male 2																										
5 & less						2	40.00	1	50.00			1	6.25	1	11.11	15	12.00			5	15.15	1	11.11	26	12.68	
6-15		1	50.00	1	25.00	1	20.00	1	50.00			6	37.50	6	66.66	83	66.40			22	66.66	4	44.44	125	60.97	
16-25				3	75.00	2	40.00					7	43.75	2	22.22	24	19.20			5	15.15	4	44.44	47	22.92	
26-35		1	50.00																					1	0.48	
36-45												2	12.50			3	2.40			1	3.03			6	2.92	
46-60																										
60 +																										
Total		2	100.00	4	100.00	5	100.00	2	100.00			16	100.00	9	100.00	125	100.00			33	100.00	9	100.00	205	100%	
Male 3																										
5 & less				1	25.00											9	15.51			1	5.26			11	9.16	
6-15		2	40.00	1	25.00											32	55.17	8	66.66	12	63.15	1	33.33	68	56.66	
16-25		2	40.00	2	50.00	4	100.00			4	66.66	5	83.33	3	100.00	12	20.68	4	33.33	5	26.31	2	66.66	34	28.33	
26-35										2	33.33	1	16.66			1	1.72							1	0.83	
36-45																2	3.44							2	1.66	
46-60		1	20.00													2	3.44			1	5.26			4	3.33	
60 +																										
Total		5	100.00	4	100.00	4	100.00			6	100.00	6	100.00	3	100.00	58	100.00	12	100.00	19	100.00	3	100.00	120	100%	
Male 4																										
5 & less																			2	28.57					2	7.40
6-15				1	100.00							1	50.00	1	100.00	10	66.66			3	42.85	1	100.00	17	62.96	
16-25																4	26.66			1	14.28			5	18.51	
26-35																			1	14.28			1	3.70		
36-45																										
46-60																1	6.66							1	3.70	
60 +												1	50.00											1	3.70	
Total				1	100.00							2	100.00	1	100.00	15	100.00			7	100.00	1	100.00	27	100%	
Male 5																										
5 & less		1	33.33													4	36.36							5	18.51	
6-15		2	66.66	1	100.00											4	36.36	2	66.66	3	50.00	1	100.00	13	48.14	
16-25										2	100.00					2	18.18	1	33.33	2	33.33			7	25.92	
26-35																			1	16.66			1	3.70		
36-45																1	9.09							1	3.70	
46-60																										
60 +																										
Total		3	100.00	1	100.00							2	100.00			11	100.00	2	100.00	5	100.00					

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL		
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
XX. Family Members-Male Ages																										
Male 6																										
5 & less																			1	50.00					1	16.66
6-15																		1	100.00	1	50.00	1	100.00	3	50.00	
16-25										1	100.00			1	100.00									2	33.33	
26-35																										
36-45																										
46-60																										
60 +																										
Total										1	100.00			1	100.00			1	100.00	2	100.00	1	100.00	6	100%	
XXI. Family Members-Female Ages																										
Female 1																										
5 & less		4	36.36			1	4.16			2	9.09			1	4.76	16	5.69	2	5.88	1	1.36			27	5.00	
6-15		2	18.18	2	25.00	2	8.33			2	9.09	5	15.15	10	47.61	45	16.01	5	14.70	11	15.06	1	4.54	85	15.74	
16-25				2	25.00	5	20.83	3	27.27	7	31.81	11	33.33	4	19.04	33	11.74	10	29.41	21	28.76	4	18.18	100	18.51	
26-35		2	18.18			7	29.16	4	36.36	4	18.18	4	12.12	1	4.76	60	21.35	2	5.88	15	20.54	1	4.54	100	18.51	
36-45		3	27.27	3	37.50	4	16.66	1	9.09	5	22.72	6	18.18	3	14.28	86	30.60	5	14.70	19	26.02	8	36.36	143	26.48	
46-60				1	12.50	5	20.83	2	18.18	2	9.09	7	21.21	2	9.52	34	12.09	8	23.52	6	8.21	7	31.81	74	13.70	
60 +								1	9.09							7	2.49			2	5.88	1	4.54	11	3.03	
Total		11	100.00	8	100.00	24	100.00	11	100.00	22	100.00	33	100.00	21	100.00	281	100.00	32	100.00	75	100.00	22	100.00	540	100%	
Female 2																										
5 & less												3	11.11	2	12.50	10	5.58			7	18.91			22	7.28	
6-15		2	50.00	2	50.00	4	57.14	1	20.00	7	66.66	11	40.74	10	62.50	99	55.30	4	100.00	15	40.54	7	43.75	157	51.98	
16-25		1	25.00	2	50.00	1	14.28	4	80.00	1	33.33	9	33.33	3	18.75	50	27.93			10	27.02	8	50.00	89	29.47	
26-35												1	3.70			9	5.02					1	6.25	11	3.64	
36-45		1	25.00			2	28.57					2	7.40	1	6.25	11	6.14			4	10.81			21	6.95	
46-60												1	3.70							1	2.70			2	0.66	
60 +																										
Total		4	100.00	4	100.00	7	100.00	5	100.00	3	100.00	27	100.00	16	100.00	179	100.00	4	100.00	37	100.00	16	100.00	302	100%	
Female 3																										
5 & less				1	33.33	1	16.16			2	20.00	1	8.33			18	15.25			3	15.78			26	12.09	
6-15		3	50.00	2	66.66	2	33.33	3	75.00	1	10.00	9	75.00	3	33.33	68	57.62	8	42.10	8	42.10	6	66.66	113	52.55	
16-25						2	33.33	1	25.00	5	50.00	2	16.66	2	22.22	18	15.25	9	47.36	7	36.84	2	22.22	48	22.32	
26-35		1	16.66			1	16.66									4	3.38			1	5.26			7	3.25	
36-45		1	16.66											3	33.33	7	5.93	2	10.52			1	11.11	14	6.51	
46-60		1	16.66							2	20.00					3	2.54							6	2.79	
60 +														1	11.11									1	0.46	
Total		6	100.00	3	100.00	6	100.00	4	100.00	10	100.00	12	100.00	9	100.00	118	100.00	19	100.00	19	100.00	9	100.00	215	100%	

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
XXI. Family Members-Female Ages																									
Female 4																									
5 & less																7	18.42	1	50.00	1	10.00	1	33.33	11	17.46
6-15				1	50.00	2	66.66	1	100.00	2	66.66					25	65.78			6	60.00	2	66.66	39	61.90
16-25				1	50.00	1	33.33			1	33.33	1	100.00			3	7.89			1	10.00			7	11.11
26-35																2	5.26							2	3.17
36-45																1	2.63	1	50.00	1	10.00			3	4.76
46-60																				1	10.00			1	1.58
60 +																									
Total				2	100.00	3	100.00	1	100.00	3	100.00	1	100.00			38	100.00	2	100.00	10	100.00	3	100.00	63	100%
Female 5																									
5 & less																5	17.24	1	10.00	3	37.50			9	14.75
6-15		2	66.66			1	50.00	1	100.00	2	40.00	1	100.00			17	58.62	7	70.00	3	37.50	1	100.00	35	57.37
16-25		1	33.33			1	50.00			2	40.00			1	100.00	3	10.34	1	10.00	2	25.00			11	18.03
26-35																1	3.44							1	1.63
36-45										1	20.00					3	10.34							4	6.55
46-60																		1	10.00					1	1.63
60 +																									
Total		3	100.00			2	100.00	1	100.00	5	100.00	1	100.00	1	100.00	29	100.00	10	100.00	8	100.00	1	100.00	61	100%
Female 6																									
5 & less																2	40.00							2	22.22
6-15								1	100.00							3	60.00			2	100.00			6	66.66
16-25														1	100.00									1	11.11
26-35																									
36-45																									
46-60																									
60 +																									
Total								1	100.00					1	100.00	5	100.00			2	100.00			9	100%
XXII. Head of Family Education																									
1 Year																1	0.32							1	0.16
2 Years																2	0.65							2	0.32
3 "																									
4 "																									
5 "																1	0.32							1	0.16
6 "																									
7 "		1	8.33													1	0.32							2	0.32
8 "								1	7.69			1	2.85	1	4.16	9	2.96	3	6.12			2	8.00	17	2.76
9 "						2	6.45			1	3.84	1	2.85	1	4.16	6	1.97	1	2.04	4	4.49			26	2.60
10 "				1	14.21	4	12.90	1	7.69	1	3.84	3	8.57	1	4.16	10	3.28	3	6.12	1	1.12	2	8.00	17	4.39
11 "				1	14.28	2	6.45	1	7.69			1	2.85	2	8.33	6	1.97	1	2.04	1	1.12			15	2.43
12 "		1	8.33			13	41.93	2	15.38	12	46.15	12	34.28	3	12.50	71	23.35	8	16.32	19	21.34	6	24.08	147	23.90

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
XXII. Head of Family Education																									
	13 Years	2	16.66	1	14.28	4	12.90	1	7.69	1	3.84	5	14.28	2	8.33	30	9.86	2	4.08	6	6.74	1	4.00	55	8.94
	14 "	1	8.33	1	14.28	2	6.45					2	5.71	4	16.66	26	8.55	8	16.32	6	6.74	3	12.00	53	8.61
	15 "	1	8.33									4	11.42			23	7.56	1	2.04	4	4.49	1	4.00	34	5.52
	16 "	3	25.00	2	28.57			4	7.69			2	5.71	4	16.66	24	7.89	10	20.40	9	10.11	3	12.00	58	9.43
	17 or more	3	25.00	1	14.28	4	12.90	6	46.15	11	42.30	4	11.42	6	25.00	94	30.91	12	24.48	39	43.82	7	28.00	187	30.08
	Total	12	100.00	7	100.00	31	100.00	13	100.00	26	100.00	35	100.00	24	100.00	304	100.00	49	100.00	89	100.00	25	100.00	615	100%
XXIII. Total Family Income																									
	Under \$3,000					1	3.70			1	4.00	2	8.00			4	1.50	2	5.00	6	7.22	3	13.04	19	8.57
	\$3,000-\$5,000	1	8.33	1	14.28	4	14.81	2	16.66	2	8.00			2	8.69	13	4.88	2	5.00	6	7.22	3	13.04	36	6.62
	\$6,000-\$7,000			2	28.57	3	11.11			4	16.00	2	8.00	3	13.04	27	10.15	2	5.00	5	6.02	3	13.04	51	9.39
	\$8,000-\$9,000					3	11.11	2	16.66	5	20.00	3	12.00	5	21.73	55	20.67	4	10.00	10	12.04	4	17.39	91	16.75
	\$10,000-\$14,000	3	25.00	3	42.85	11	40.74	3	25.00	8	32.00	9	36.00	7	30.43	95	35.71	21	52.50	32	38.55	6	26.08	198	36.46
	\$15,000-\$24,000	7	58.33	1	14.28	3	11.11	2	16.66	5	20.00	5	20.00	6	26.08	53	19.92	9	22.50	16	19.27	4	17.39	111	20.44
	\$25,000 and over	1	8.33			2	7.40	3	25.00			4	16.00			19	7.13			8	9.62			37	6.81
	Total	12	100.00	7	100.00	27	100.00	12	100.00	25	100.00	25	100.00	23	100.00	266	100.00	40	100.00	83	100.00	23	100.00	543	100%
XXIV. Things Enjoyed On Trail																									
	Privacy, Tranquility, & Solitude	4	36.36			4	15.38	2	18.18	2	9.52	1	3.33	2	7.69	21	7.86	3	6.52	7	8.33	5	19.23	51	7.33
	Scenery, Beauty, and Nature	4	36.36	2	40.00	12	46.15	2	18.18	10	47.61	11	36.36	11	42.30	129	48.31	20	43.47	36	42.35	12	46.15	249	44.94
	Good Trail & Camp Facilities	1	9.09	2	40.00	2	7.69	3	27.27			1	3.33	1	3.84	5	1.87	3	6.52	4	4.70	1	3.84	23	4.15
	Hiking, Walking, Riding, Exercise			1	20.00	1	3.84					13	43.33	3	11.53	21	7.86	7	15.21	9	10.58	4	15.38	59	10.64
	Trees, Birds, Fish, Plants, Bridges					2	7.69	1	9.09	8	38.09	3	10.00			45	16.85	1	2.17	13	15.29	1	3.84	74	13.35
	River, Lake, Water					2	7.69	1	9.09					3	11.53	25	9.36	5	10.86	2	2.35	2	7.69	40	7.22
	Sightseeing and Adventure	1	9.09											5	19.23	6	2.24	1	2.17	4	4.70	1	3.84	18	3.24
	Other	1	9.09			3	11.53	2	18.18	1	4.86	1	3.33	1	3.84	15	5.61	6	13.04	10	11.76			40	7.22
	Total	11	100.00	5	100.00	26	100.00	11	100.00	21	100.00	30	100.00	26	100.00	267	100.00	46	100.00	85	100.00	26	100.00	554	100%
XXV. Recommendations																									
	Leave Trail As Is	2	16.66	1	33.33	2	9.52			1	4.76	1	3.57			20	10.36	6	13.63	7	11.11	1	4.34	41	9.27
	Better & More Marked Trails	4	33.33			5	23.80	4	40.00	5	23.80	12	42.85	9	37.50	51	26.42	9	20.45	24	38.09	6	26.08	129	29.18
	More Campsites, Restrooms, etc.	1	8.33	2	66.66	8	38.09	2	20.00	1	4.76	1	3.57	9	37.50	13	6.73	4	9.09	4	6.34	6	26.08	50	11.31
	Provide Benches, Trash Cans, etc.	1	8.33					1	10.00					3	10.71	1	4.16	44	22.79	5	11.36	3	4.76	59	13.34
	More Drinking Fountains, Water									1	4.76	2	7.14	3	12.50	16	8.29	7	15.90	4	6.34	1	4.34	33	7.46
	Keep Motor Vehicles & Motorcycles Off					1	4.76									2	1.03	1	2.27	2	3.17	5	21.73	12	2.71
	Ban Hunting and Motorcycling							1	10.00							8	4.14			6	0.52	2	8.69	17	3.84
	Other	4	33.33			5	23.80	2	20.00	13	61.90	9	32.14	2	8.33	39	20.20	12	27.27	13	20.63	2	8.69	101	22.85
	Total	12	100.00	3	100.00	21	100.00	10	100.00	21	100.00	28	100.00	24	100.00	193	100.00	44	100.00	63	100.00	23	100.00	442	100%

SELF - ADMINISTERED QUESTIONNAIRES

NO.	CATEGORY	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6		STATION 7		STATION 8		STATION 9		STATION 10		STATION 11		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
XXVI. Services Suggested																									
	More Rest Areas and Campgrounds	3	37.50	1	33.33	2	18.18					2	13.33	1	5.88	4	2.73	2	5.55	2	3.92	1	8.33	18	5.66
	More Maps, Leaflets, Labels, & Signs	2	25.00			2	18.18	3	60.00	3	21.42	2	13.33	3	17.64	16	10.95	1	2.77	11	21.56	2	16.66	45	14.15
	More Picnic Tables, Benches, Trashcans	1	12.50									2	13.33	3	17.64	20	13.69	3	8.33	3	5.88	2	16.66	34	10.69
	Enough Drinking Fountains, Pumps, Etc.			1	33.33	4	36.36	1	20.00	5	35.71	3	20.00	5	29.41	43	29.45	11	30.55	12	23.52	5	41.66	90	28.30
	Adequate And Better Restrooms									1	7.14	3	20.00	3	17.64	17	11.64	6	16.66	4	7.84			34	10.69
	Food Machines, Concession Stands					1	9.09					3	20.00	1	5.88	21	14.38	2	5.55	7	13.72	1	8.33	36	11.32
	First-Aid Station, Interpretation															10	6.84					1	8.33	11	3.45
	Other	2	25.00	1	33.33	2	18.18	1	20.00	5	35.71			1	5.88	15	10.27	11	3.55	12	23.52			50	15.72
	Total	8	100.00	3	100.00	11	100.00	5	100.00	14	100.00	15	100.00	17	100.00	146	100.00	36	100.00	51	100.00	12	100.00	318	100%

XXVII. Remarks

	Leave Trail As Is	1	14.28			1	8.33	1	14.28							2	1.35			2	5.26			7	2.42	
	Excellent Trail System	1	14.28									1	10.00	3	17.64	8	5.40	6	27.27	3	7.89	4	23.52	26	8.99	
	Nice Trail and Park	2	28.57			3	25.00	2	28.57	2	20.00	3	30.00	3	17.64	50	33.78	5	22.72	5	13.15			75	25.95	
	Enjoyed Trail and Stay			1	100.00	4	33.33	1	14.28	2	20.00	2	20.00	5	29.41	39	26.35	4	18.18	7	18.42	5	29.41	70	24.22	
	Mark Trails Better									1	10.00			2	11.76	9	6.08			2	5.26	1	5.88	15	5.19	
	Have Been On This Trail Many Times	1	14.28													5	3.37							6	2.07	
	Provide More Campsites													1	5.88	7	4.72					3	17.64	11	3.80	
	Some Questions Long, Hard, & Personal					1	8.33			5	50.00	1	10.00			8	5.40	7	31.81	8	21.05	1	5.88	31	10.72	
	Don't Allow Pets					2	16.66									1	0.67							3	1.03	
	Trail Too Sandy and Muddy											1	10.00	2	11.76	1	0.67					1	5.88	5	1.73	
	Other	2	28.57			1	8.33	3	42.85			2	20.00	1	5.88	18	12.16			11	28.94	2	11.76	40	13.82	
	Total	7	100.00	1	100.00	12	100.00	7	100.00	10	100.00	10	100.00	17	100.00	148	100.00	22	100.00	38	100.00	17	100.00	289	100%	

APPENDIX B

SELF-ADMINISTERED QUESTIONNAIRE SAMPLE

HELP PLAN YOUR TRAILS

The information you give will be used to help plan trail system improvements and provide the activities you enjoy.

PLEASE ANSWER EVERY QUESTION AND PLACE AN X IN THE RIGHT OF THE ONE. IT WILL TAKE ONLY A FEW MINUTES.

You may remain anonymous unless you wish to give your name. Your help will be greatly appreciated.

This study is being conducted by the Recreation Research and Planning Unit, Department of Park and Recreation Resources, Michigan State University in cooperation with Michigan Department of Natural Resources and the U.S. Forest Service.

1 WHAT IS YOUR PRESENT METHOD OF TRAVEL ON THIS TRAIL?

Check one:

☐

On foot

☐

Horseback

☐

Bicycle

☐

Other (specify) _____

2 WHAT IS YOUR AGE AND SEX? _____ years ☐ male ☐ female

3 DID YOU CAMP LAST NIGHT? ☐ YES ☐ NO

If yes, give name of campground. _____

4 WILL YOU CAMP TONIGHT? ☐ YES ☐ NO

If yes, give name of campground. _____

5 WHY DID YOU CHOOSE THIS TRAIL? _____

6 HOW DID YOU LEARN ABOUT THIS TRAIL? _____

- 7 WHAT RECREATIONAL ACTIVITIES (IF ANY) DID YOU UNDERTAKE ALONG THIS TRAIL? Please list them and indicate the approximate time spent on each.**

Activity	Time (hours)
_____	_____
_____	_____

- 8 WHICH OF THE FOLLOWING BEST DESCRIBES YOUR GROUP USING THE TRAIL TODAY?**

Check one:

- | | |
|--|--|
| ☐ one family & children | ☐ one person alone |
| ☐ two families | ☐ group of friends |
| ☐ one couple | ☐ Other (specify) _____ |
| ☐ organized group | |

- 9 WHEN DID YOU BEGIN YOUR PRESENT TRIP ON THIS TRAIL OR CONNECTING TRAILS?**

Date _____ Time _____

- 10 WHEN WILL YOU COMPLETE YOUR PRESENT TRIP ON THIS TRAIL OR CONNECTING TRAILS?**

Date _____ Time _____

- 11 INDICATE THE VARIOUS METHODS OF TRAVEL AND TYPES OF ACTIVITIES ASSOCIATED WITH YOUR USE OF TRAILS DURING THE PAST YEAR.**

In each case, state the approximate number of times you did each activity in the past 12 months.

Method of Travel On Trails	No. of times	Associated Activities Along Trails	No. of times
Hiking		Fishing	
Horseback-riding		Hunting	
Motor-bike riding		Nature walks	
Bicycling		Camping	
Snowshoeing		Sightseeing	
Trail-skiing		Bird watching	
Snowmobiling		Rock hunting	
Other: (specify)		Other: (specify)	

- 12 HOW MANY TIMES HAVE YOU USED THIS TRAIL IN THE PAST 12 MONTHS?

Number of times _____

WE NEED YOUR ANSWERS FOR FUTURE DEMAND FOR TRAILS IN MICHIGAN. IT IS NECESSARY FOR US TO BE ABLE TO RECREATE FAMILY CHARACTERISTICS TO TRAIL USE PATTERNS. PLEASE ASSIST US BY ANSWERING THE FOLLOWING QUESTIONS ABOUT YOUR FAMILY CHARACTERISTICS.

- 13 WHERE IS YOUR PERMANENT RESIDENCE? (Please indicate zip code.)

_____ Town or City _____ County _____ State _____ Zip Code _____

- 14 WHAT IS THE AGE AND SEX OF THE "HEAD OF YOUR FAMILY"?

Age: _____ years ☐ Male ☐ Female

- 15 WHAT IS THE OCCUPATION OF THE "HEAD OF YOUR FAMILY"?

_____ Occupation (not organization)

- 16 GIVE THE AGE AND SEX OF EACH FAMILY MEMBER LIVING IN YOUR HOUSEHOLD. (Do not include "head of the household").

Male - ages _____ Female - ages _____

- 17 WHICH OF THE ANSWERS BELOW BEST INDICATES THE TOTAL YEARS OF EDUCATION COMPLETED BY THE "HEAD OF THE FAMILY"? Check one:

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
or more

- 18 WHICH OF THE FOLLOWING BEST DESCRIBES THE TOTAL INCOME OF YOUR FAMILY IN 1969? Check one:

☐ under \$3,000 ☐ \$3,000 - 5,999 ☐ \$6,000 - 7,999
☐ \$8,000 - 9,999 ☐ \$10,000 - 14,999 ☐ \$15,000 - 24,999
☐ \$25,000 and over

19 WHAT DID YOU ENJOY MOST ON THIS TRAIL OR CONNECTING TRAILS?

20 WHAT RECOMMENDATIONS WOULD YOU LIKE TO MAKE CONCERNING
IMPROVEMENT OR CHANGES NECESSARY FOR THIS TRAIL TO MAKE
YOUR RECREATIONAL ACTIVITIES MORE ENJOYABLE?

21 WHAT "SERVICES" DO YOU FEEL SHOULD BE PROVIDED ALONG OR AT
THE ENDS OF THIS TRAIL?

22 PLEASE STATE THE DATE AND TIME YOU COMPLETED THE QUESTION-
NAIRE.

Date : _____ Time : _____

23 REMARKS:

THANKS FOR YOUR HELP! HAVE AN ENJOYABLE AND SAFE TRIP HOME!

*If you have accidentally carried this card away please mail
it to:*

*Recreation Research and Planning Unit
Department of Park & Recreation Resources
Room 312 Natural Resources Building
Michigan State University
East Lansing, Michigan 48823*

APPENDIX C

SAMPLE OF OPTICAL SCAN SHEETS

159
Summer Trail Use Study, 1969

Identification Number										Deck 1									
1	2	3	4	5	6	7	8	9	2	0	1	2	3	4	5	6	7	8	
									4		X								
			box location						6	0	1	2	3	4	age	5	6	7	
			travel						8		-15	-20	-25	-30	camped last night	-40	-50	-60	
									10		yes							60+	
			camp name						12	0	1	2	3	4	no				
			camp tonight?						14	X									
			camp name						16	0	1	2	3	4					
			why chosen?						18										
			how learned?						20	0	1	2	3	4					
			activity 1						22						time 1				
			activity 2						24	0	1	2	3	4	time 2				
			activity 3						26						time 3				
			group						28						month trip began?				
			day						30		ap	my	jn	jy	ag	sp	oc		
			time						32	0	1	2	3	4					
			month trip completed						34	X									
			day						36	0	1	2	3	4					
			time						38										
			hiking						40	0	1	2	3	4					
			horseback riding						42										
			motorbiking						44	0	1	2	3	4					
			bicycling						46										
			snowshoeing						48	0	1	2	3	4					
			trailskiing						50										
			snowmobiling						52	0	1	2	3	4					
			other						54										
			fishing						56	0	1	2	3	4					
			hunting						58										
			nature walks						60	0	1	2	3	4					
			camping						62										
			sightseeing						64	0	1	2	3	4					
			birdwatching						66										
			rock hunting						68	0	1	2	3	4					
			other						70										
			times on trail						72	0	1	2	3	4					
			county						74										
			state						76	0	1	2	3	4	zip code				
									78										
									80	0	1	2	3	4					

[illegible]

APPENDIX D

VARIABLES AND CATEGORIES USED IN

CHI-SQUARE (χ^2) TESTS OF

SIGNIFICANCE

APPENDIX D

VARIABLES AND CATEGORIES USED IN CHI-SQUARE (χ^2) TESTS OF SIGNIFICANCE

Hypothesis Number 3¹

3a. Method of Travel²

Foot
Bicycle
Horseback
Motorcycle/motorbike
Other

3b. Age

11-15 years
16-20 years
21-25 years
26-30 years
31-40 years
41-50 years
51-60 years
60+ years

3b. Sex

Male (M)
Female (F)

3c. Camping Participation

Camping
Not camping

¹All variables with asterisks (*) have been "collapsed" to raise cell frequencies above 5, thereby making the χ^2 values calculated portray the true nature of things. Original categories may be seen in Appendix A.

²Variables tested at 5 per cent level of significance.

3d. Why Trail Chosen*

Group I	Interesting, scenic, nice location, nature observation
Group II	By accident
Group III	Well-marked, satisfactory length
Group IV	Like it better than others
Group V	For fun or curiosity

3e. Type of Group

1. One family and children
2. Two families
3. One couple
4. Organized group
5. One person alone
6. Group of friends
7. One person alone

3f. Camping Frequency (f)*

Group I	1-2 times
Group II	3-56 times

3g. Sightseeing Frequency (f)*

Group I	1-2 times
Group II	3-56 times

3h. Trail Use Frequency (f)*

Group I	1-2 times
Group II	3-4 times
Group III	5-34 times

3i. Occupation*

Group I	Professional
Group II	Clerical and sales
Group III	Skilled workers
Group IV	Semi-skilled, service, unskilled, and farm operators
Group V	Unemployed, students, and retired
Group VI	Housewife and other

3j. Education*

Group I	8-12 years
Group II	13-16 years
Group III	17 or more years

3k. Income*

Group I	Less \$3,000-\$5,000
Group II	6,000- 9,000
Group III	10,000-14,000
Group IV	15,000-or more

3l. Enjoyment*3m. Enjoyment*

Group I	Privacy, tranquility, solitude, scenery, beauty, and nature
Group II	Hiking, walking, riding, exercise, sightseeing, and adventure
Group III	Trees, birds, fish, plants, bridges, river, lake, and water

3n. Recommendation*

Group I	Leave trail as is
Group II	Better and more marked trails
Group III	More campsites, restrooms, benches, trash cans, drinking fountains, water
Group IV	Keep motorized vehicles off the trail, ban hunting and motorcycling

APPENDIX E

**EXAMPLE OF TEST OF SIGNIFICANCE:
DIFFERENCES BETWEEN PROPORTIONS**

APPENDIX E

EXAMPLE OF TEST OF SIGNIFICANCE: DIFFERENCE BETWEEN PROPORTIONS

For Ludington State Park (8) and Pinckney State Recreation Area (10)

HO: 1. There is no difference in the proportion of male trail users between the two recreational areas.¹
($p_1 = p_2$)
Given data.²

Station	Male	Female	M/F Ratio	Total
Ludington	190	121	.61/.39	311
Pinckney	<u>76</u>	<u>25</u>	.75/.25	<u>101</u>
Total	266	146		412

$$S_{D_P} = \sqrt{\frac{(.61)(.39)}{311} + \frac{(.75)(.25)}{101}} = \sqrt{.00261} = .051$$

$$z = \frac{.61 - .75}{.051} = -2.74$$

¹Calculations and tests of significance will be included here in detail for Ludington and Pinckney only. For other park and/or forest areas, procedures used and variables tested were the same but will not be shown.

²Data included here and those for succeeding tables were directly obtained from Appendix A.

- HO: 2. There is no difference in the proportion of trail users more than 30 years of age between the two recreational areas.
($P_1 = P_2$).

Given data:

Station	> 30 Years	≤ 30 Years	>30/≤30	Total
Ludington	134	176	.42/.58	310
Pinckney	<u>34</u>	<u>67</u>	.34/.66	<u>101</u>
Total	168	243		411

$$S_{D_P} = \sqrt{\frac{(.42)(.58)}{310} + \frac{(.34)(.66)}{101}} = \sqrt{.003000} = .054$$

$$S_{D_P} = .054$$

$$z = \frac{.42 - .34}{.054} = \frac{.080}{.054} = 1.48$$

- HO: 3. There is no difference in the proportion of trail users who camped between the two recreational areas
($P_1 = P_2$)

Given data:

Station	Camped	Did Not Camp	C/NC	Total
Ludington	227	100	.69/.31	327
Pinckney	<u>31</u>	<u>73</u>	.30/.70	<u>104</u>
Total	258	173		431

$$S_{D_P} = \sqrt{\frac{(.69)(.31)}{327} + \frac{(.30)(.70)}{104}} = \sqrt{.00266} = .052$$

$$S_{D_P} = .052$$

$$z = \frac{.69 - .30}{.052} = \frac{.39}{.052} = 7.50$$

HO: 4. There is no difference in the proportion of trail users who had 17 or more years of education between the two recreational areas
($P_1 = P_2$)

Given data:

Station	Education 17 or More	<17	<u>$\geq 17 / < 17$</u>	Total
Ludington	94	210	.31/.69	304
Pinckney	<u>99</u>	<u>50</u>	.44/.56	<u>89</u>
Total	133	260		393

$$S_{D_P} = \sqrt{\frac{(.31)(.69)}{304} + \frac{(.44)(.56)}{89}} = \sqrt{.00325} = .056$$

$$S_{D_P} = .056$$

$$z = \frac{.31 - .44}{.056} = \frac{-.13}{.056}$$

$$z = -2.32$$

- HO: 5. There is no difference in the proportion of trail users who were professionals between the two recreation areas
($P_1 = P_2$)

Given data:

Station	Professional	Non-Professional	P/NP	Total
Ludington	121	181	.40/.60	302
Pinckney	<u>35</u>	<u>54</u>	.39/.61	<u>89</u>
Total	156	235		391

$$S_{D_P} = \sqrt{\frac{(.40)(.60)}{302} + \frac{(.39)(.61)}{89}} = \sqrt{.00346}$$

$$S_{D_P} = .058$$

$$z = \frac{.40 - .39}{.058} = \frac{.01}{.058}$$

$$z = 0.17$$

- HO: 6. There is no difference in the proportion of trail users who had \$10,000 or more annual income between the two recreational areas
($P_1 = P_2$)

Given data:

Station	Income \$10,000>	Income <\$10,000	\$10,000/ <\$10,000	Total
Ludington	167	99	.63/.37	266
Pinckney	<u>56</u>	<u>27</u>	.67/.33	<u>83</u>
Total	223	126		349

$$s_{D_p} = \sqrt{\frac{266}{(.63)(.37)} + \frac{83}{(.67)(.35)}} = \sqrt{.00354} = .059$$

$$s_{D_p} = .059$$

$$z = \frac{.63 - .67}{-.04} = \frac{.059}{.059}$$

$$z = -0.68$$

APPENDIX F

ADVANTAGES OF USING AND METHOD OF COMPUTING CHI-SQUARE VALUES

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"Chi-square (χ^2) statistics" also known as non-parametric or distribution-free statistics has many applications. It tells us whether our observations differ from what we could expect by chance. "Chi-square is used as a test of significance when we have data that are expressed in frequencies or data that are in terms of percentages or proportions and that can be reduced to frequencies."¹ Many of its applications are with discrete data as well as continuous data that can be reduced to categories. This method is useful in this study since the data obtained are recorded in frequencies, percentages, or proportions and various categories. It is helpful in the sense that tests conducted with this method would determine whether or not observations made by the researcher are different from what is expected by chance at a certain level of significance.

¹Downie and Heath, Statistical Methods, p. 160.

Some of the advantages of chi-square test are the following:

1. Popular measure of significance of difference for nominal-level information.¹
2. Determination of whether observed results are consonant with those predicted by some theory.²
3. No assumptions are necessary about the shape of the parameter distribution.³
4. Categories can be increased or decreased depending on the desired degree of precision.
5. Observed values of χ^2 can be interpreted with the use of tabular values.

In solving the χ^2 values a basic formula is used:

$$\chi^2 = \frac{\sum (O - E)^2}{E}$$

where,

O = the frequency of observations in any particular category.

E = the frequency of observations expected under the probability model in any particular category.

χ^2 = the numerical value which tells whether or not observations obtained could have occurred by chance.

¹Champion, Basic Statistics, p. 136.

²A. Pierce, Fundamentals of Nonparametric Statistics (Belmont, Calif.: Dickenson Publishing Co., Inc., 1970), p. 195.

³Downie and Heath, Statistical Methods, p. 160.

Example: A researcher is interested in testing the hypothesis that in Group A, males and females are equally represented in a particular sample.

Null Hypothesis (H_0): The number of males is equal to the number of females in Group A.

Alternative Hypothesis (H_1): The number of males is not equal to the number of females in Group A.

The data obtained are tabulated below:

Group A: Observed Frequencies:

Males	15
Females	25
Total (N)	40

Group A: Expected Frequencies:

Males	20
Females	20
Total (N)	40

Using the formula above the χ^2 value can be readily obtained.

$$\chi^2 = \frac{(15 - 20)^2}{20} + \frac{(25 - 20)^2}{20} = \frac{25}{20} + \frac{25}{20} = \chi^2 = 2.50$$

Using any statistical tabular value for χ^2 distribution and with corresponding level of significance (say 5 per cent) and degree of freedom, the observed χ^2 value can be evaluated either significant or not significant. In the above example the tabular value for χ^2 at 5 per cent

level of significance and one degree of freedom is 3.841. Since the calculated χ^2 value 2.50 is less than the χ^2 tabular value 3.841, it can be concluded that the observed difference in sex distribution in Group A is not significant. Hence, the null hypothesis stands. The preceding solution is an example of a one-way table chi-square analysis. The same basic principle holds for two-way contingency tables which are used to compare two variables at a time.