

ATTITUDES, CHARACTERISTICS, AND USE
PATTERNS OF RIPARIAN BOATERS ON
THREE HEAVILY USED LAKES IN
SOUTHEAST MICHIGAN

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ABSTRACT

ATTITUDES, CHARACTERISTICS, AND USE PATTERNS OF RIPARIAN BOATERS ON THREE HEAVILY USED LAKES IN SOUTHEAST MICHIGAN

By

Robert Warner Dittrick, Jr.

The demand for outdoor recreation opportunities is continuing to increase with a resultant growing pressure on existing recreation resources. This is especially true in the case of water-based recreation. The responsibility for providing public access for recreational purposes to Michigan's waters lies with the Waterways Commission in the Michigan Department of Natural Resources.

A majority of the lakes in Michigan are now surrounded by year round or seasonal private dwellings. In the past, the development of public access sites on these lakes has often led to problems between these lake shore owners (the "riparian owners") and the transient boater using these sites. Many times the Waterways Commission has met strong opposition from riparians who express displeasure with the opening of the lake on which they reside to use by the general public.

The Waterways Commission sponsored this study to better understand the characteristics and attitudes of riparian owners and obtain improved guidelines for planning their programs in order to provide a maximum benefit to all boaters.

When compared with transient boaters in Oakland County and Michigan boaters as a whole, the riparian populations on the study lakes were found to have a higher percentage of persons in professional-technical occupations and fewer in the craftsman-operative categories. Boats were distributed quite evenly among riparian respondents and there seems to be no significant relationship between the number and type of boats owned and occupation.

Riparians on the study lakes also had substantially higher incomes than other Michigan boaters. It was found that one riparian was just as likely to own a particular number and type of boat as any other riparian regardless of income.

As in the case of income and occupation, riparian boaters on the study lakes had attained higher educational levels than both the transient boaters and Michigan boaters as a whole. Again there seemed to be no relationship between educational achievement levels and the number and type of boats owned.

Although no apparent relationships were found between any of the socio-economic characteristics and boat ownership, the riparians owned an average of two boats each. The consistency of this finding for all the study lakes suggests that this level of ownership may be typical for riparians in at least the Oakland County area if not for a much larger region.

It was found that all the riparians were just as apt to have negative attitudes and be dissatisfied with boating conditions, regardless of their occupation, income, or education levels. This uniform pattern of attitudes was found on all the study lakes.

There appeared to be no direct relationship between the amount of time spent boating and the negative attitudes of riparians. This finding indicates that the attitudes of riparians are probably not the result of recent experiences on their lake but are due to problems which they have encountered over a period of time.

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I would like to dedicate
this thesis to my wife, Nanette,
for her unparalleled patience
and sacrifices.

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CHAPTER I

INTRODUCTION

Early in 1969, the Waterways Commission of the Michigan Department of Natural Resources entered into contract with Michigan State University to conduct a study of the carrying capacity of inland lakes for boating. Previously the state had gathered limited information concerning the number of boats launched at different launching sites, but no information was available on how much boating various types of lakes can support before the quality of the recreational experience deteriorates for different types of users.

One of the responsibilities of the Waterways Commission is to provide public access to Michigan's inland lakes and streams. Since the state has 36,000 miles of streams and 5,500 inland lakes of ten acres or more,¹ providing adequate public access is a major task.

¹Michigan Department of Natural Resources, Recreation Planning Division, "Michigan Recreation Future" (Lansing, Mich.: Michigan Department of Natural Resources, September, 1966), p. 4.

The recreational boaters on an inland body of water can generally be divided into two categories: first, the boaters who do not own property adjacent to the water but gain access for their boat through the use of a public facility or across private lands, and second, boaters who are riparian¹ land owners.

This thesis will deal with the boating use patterns and characteristics of riparians on three selected lakes. Information concerning the behavior and characteristics of transient boaters² on these three selected lakes, has been reported in a previous thesis by Peter Geoffrey Ashton.³

Statement of the Problem

The common problem facing most agencies which provide outdoor recreational opportunities is the tremendous increase in the demand for such opportunities in recent years. This increase is attributable to greater

¹The term "riparian" will be used in this thesis to describe anyone owning land which includes lake frontage or lake access rights. A "riparian boater" is defined as anyone using a boat owned by a riparian.

²The term "transient boater" will be used to denote any boater who gains access to the water by way of a public facility.

³Peter Geoffrey Ashton, "Recreational Boating Carrying Capacity: A Preliminary Study of Three Heavily Used Lakes in Southeastern Michigan" (unpublished Ph.D. dissertation, Department of Resource Development, Michigan State University, 1970).

participation in various types of outdoor recreation activity: increased population, more leisure time, greater mobility, and higher disposable incomes. Increasing demand is a problem because this greater participation is taking place on a relatively fixed resource base so user pressures on land and water often lead to overcrowding and conflicts between users. Indications are that participation will continue to increase in the foreseeable future. It is important to examine existing trends and projections in order to understand the entire scope of this problem.

In 1962, it was predicted that the population of the United States would double between 1960 and the year 2000 from 179 million to 350 million.¹ The 1970 census already has shown a population of 205 million people.

The growing movement in the nation's working population to obtain shorter work weeks, longer vacations, and earlier retirement is steadily increasing the amount of leisure time available for the pursuit of various recreational activities. Automatically this results in an increased demand for recreational facilities. Available

¹U.S. Outdoor Recreation Resources Review Commission, Projections to the Years 1976 and 2000: Economic Growth, Population, Labor Force and Leisure, and Transportation, Study Report No. 23 (Washington, D.C.: Government Printing Office, 1962), p. 120.

leisure time for Americans is expected to increase 2.5 times within the period from 1950 to 2000.¹

Better highways, faster automobiles, and more time to use them results in creasing mobility for the population. This has placed the limited recreation resources within reach of growing numbers of people, resulting in more use of those resources.

In the case of boating, the greater amount of available leisure time allows boaters additional time to boat while higher mobility permits boaters to reach more lakes at greater distances. These factors, along with higher disposable incomes and easier credit financing, have contributed to boating becoming a favorite recreational activity for many people. Easier financing has increased the purchasing power of the public, making the acquisition of a boat possible even for persons in lower income brackets.

The Outdoor Recreation Resources Review Commission reported that water is a prime factor in most outdoor recreation activities. The Commission's National Recreation Survey showed that 44 per cent of the population prefer water-based recreation activities over any others.²

¹Marion Clawson and Jack L. Knetsch, Economics of Outdoor Recreation (Baltimore, Md.: Johns Hopkins Press, 1966), p. 20.

²U.S. Outdoor Recreation Resources Review Commission, Outdoor Recreation for America (Washington, D.C.: Government Printing Office, 1962), p. 173.

This study also demonstrated that a greater percentage of the population in the north central region participates in boating than in any other region.¹ From industry statistics for outboard motors in use and boat and motor sales, it appears that Michigan has the highest participation in boating of any state in this region.²

This high level of demand for recreational boating opportunities has long been recognized as a resource management problem by the Michigan Department of Natural Resources. In a public statement made in 1961, Floyd Fanselow noted:

There is an urgent need for more public access to Michigan's lakes and streams. The problem is a serious one and it can be expected to grow more acute in the future. Many existing sites are already overcrowded. Each year additional thousands of hunters, fishermen, pleasure boaters, canoeists, water skiers, picnickers, and campers are swarming to our waters for their recreation.³

In 1966, the Waterways Commission completed a study of recreational boating in order to determine the probable

¹U.S. Outdoor Recreation Resources Review Commission, National Recreation Survey, Study Report No. 19 (Washington, D.C.: Government Printing Office, 1962), p. 24.

²Michigan State University, Department of Resource Development, Michigan Outdoor Recreation Demand Study, Vol. II (Lansing, Mich.: State Resource Planning Program, Michigan Department of Commerce, July, 1966), p. 10.2.

³Floyd Fanselow, "The Public Access Program" (paper read before the meeting of the Michigan Marine Dealers Association Seminar, Detroit, Michigan, February 16, 1961), p. 2.

level of boating demand by 1980. The study was based on a questionnaire mailed to 10,000 registered boaters. According to the study there were approximately 400,000 recreational boats registered with the Department of State on December 1, 1966. In addition, there were an estimated 50,000 sailboats and row boats which were not required to register, making the total of 450,000 recreational boats. The study estimated there will be 762,000 registered boats and 90,000 nonregistered boats in the state by 1980, making a total recreational boating fleet of around 852,000.¹

There are some indications that recreation demand is generally increasing at a more rapid rate than anticipated earlier. By 1967, the Bureau of Outdoor Recreation found that the ORRRC predictions made in 1960 for the participation in major summertime activities were far below actual participation.² Some evidence, however, exists to show that the present rate of increase in boating participation in Michigan is not as great as in the mid-1960's.³

¹Program Statement Public Access Site Program, Michigan State Waterways Commission, Department of Natural Resources (Lansing, Mich.: Michigan Waterways Commission, 1970), p. 6.

²U.S., Department of the Interior, Bureau of Outdoor Recreation, Outdoor Recreation Trends (Washington, D.C.: Government Printing Office, April, 1967), p. 12.

³Discussion of current boating demand-study work with Dr. Michael Chubb, Director, Recreation Research and Planning Unit, Department of Park and Recreation Resources, Michigan State University, 1971.

The Waterways Commission is attempting to meet the increasing demand for boating in Michigan by its Public Access Site Program which is providing more places where the public can boat. However, the development of public access to lakes which have previously been completely surrounded by privately owned land has raised questions and conflicts.

As the need for recreational opportunities increases, the amount of available recreational land is decreasing in relation to the growing amount of riparian land utilized as homesites. Large numbers of people are seeking shoreline areas outside the cities as desirable places to live. It is therefore frequently becoming necessary for governmental institutions responsible for providing recreational land to exercise their powers of purchase or eminent domain in order to satisfy these needs. In doing so, these agencies are often facing considerable opposition from riparian land owners, who in many cases, have organized lake associations to protect their interests.

By sponsoring a study of the carrying capacity of lakes for boating, the Waterways Commission is attempting to better understand the relationships between boating and the water resources necessary for this activity. This will aid in the administration of the Public Access Site Program and possibly result in the alleviation of some

of the problems which exist due to conflicts between various types of boating.

Study Objectives

The objective of the present study was to collect and analyze data which would characterize the riparian, his use patterns, and his attitudes toward other boaters in order to provide information necessary to make management decisions relative to access sites. The specific goals of the investigation were to gather data on the characteristics typical of the people who own land adjacent to the three Oakland County lakes studied, to obtain information on the amount of time they spend on the lakes, what factors determine this usage, and to determine their feelings toward other boaters both riparian and transient.

The purpose of this thesis is not to present a solution to the problem of conflicts between riparian owners and other lake users; rather it is to provide information for the Waterways Commission which will aid in a better understanding of the riparian owners' behavior and attitudes toward the Public Access Site Program.

An attempt is made to describe and analyze these attitudes and characteristics and to test the following three hypotheses:

1. There is a direct relationship between socio-economic characteristics of riparians and the number and types of boats owned. It is theorized that as income, education, and occupational level (from unemployed to professional-technical)

increases, the number of boats owned will also increase and there will be a tendency for certain classes of riparians to own certain types of boats.

2. The level of riparian owner dissatisfaction with boating conditions is directly related to socio-economic characteristics. It is suggested that as income, education, and occupational level increase there is an increase in dissatisfaction.
3. There is a direct relationship between the level of dissatisfaction of the riparian owner and the amount of boating he does.

Riparian Ownership and the Public Access Site Program

Riparian Rights

The riparian doctrine is of major concern in this study because in the state of Michigan, water law is governed primarily by this system. The basic principle of the riparian doctrine is that only land owners with frontage on a particular body of water have water rights. These owners are designated as "riparians" and may use water for domestic purposes--drinking, cooking, washing, stock watering, navigation, and recreational uses. Non-riparians do not normally have any water rights unless specified by easement or other special legal agreements. Riparian water rights go with the land. A riparian is entitled to use water entering upon his land, but cannot reduce its quantity or impair its quality. Water rights cannot be lost by non-use, and the size of a riparian holding does not affect priority of water use. The

riparian doctrine is not compatible with consumptive uses, but tends to encourage multiple use of water resources.¹

Public Access Site Program

At one time, city dwellers had to be adventurers in order to enjoy the more remote beauty spots and fishing places of this country. Only a few from urban areas were privileged to enjoy nature's wonders. However, with today's automobile, a majority of people have the opportunity to enjoy a wide variety of recreational activities further from their homes.²

The revolutionary change in transportation in the last half century has allowed many urban residents to reach their favorite fishing and recreation spots a sufficient number of times each year to justify the ownership of a parcel of water frontage. Year-round commuting from cities and towns to nearby lakes and streams has also been made possible. As a result, much of the shoreline of Michigan's lakes and streams has been divided into small cottage lots. Frequently this greatly limits opportunities for water-based recreation by non-riparians. However, as Fanselow pointed out:

¹C. R. Humphrys, Watershed Management, Department of Resource Development, Michigan State University (Lansing, Mich.: by the author), pp. 50-51.

²Floyd G. Fanselow, "Public Access to Lakes and Streams in Michigan" (paper read before the Fourteenth Midwest Wildlife Conference, Des Moines, Iowa, December 18, 1952), p. 1.

Water is like air, owned by no one yet owned by all. Therefore, no one can claim an exclusive right to take fish on the basis of water ownership. In Michigan, the riparian owners of inland waters have title to the land under the water; but the right to take fish is shared by all, provided the water in which they are taken is public. It is therefore necessary to provide a legal expedient to convey rights which would provide public fishing over private lands.¹

In the late 1930's it became evident that something would have to be done to give the general public access to the state's lakes and streams; the best way to do this was to obtain public ownership of selected shoreline property. At that time, these sites were primarily intended to give the fisherman access to game fish populations which were maintained by the state.

In 1939, organized recreation groups sought an amendment to existing statutes from the Michigan legislature which would increase the cost of fishing licenses and earmark the extra money for the purchase of additional access points on lakes and streams. In the early 1940's, the Fish Division assumed responsibility for acquisition and development of these new access sites. This program continued until 1962, when an austerity program practically eliminated the purchase and development of new sites.²

The Department of Natural Resources went through a re-organization in 1962 in which the responsibility for the operation of all land-based programs such as fishing

¹Ibid., p. 3.

²Ibid.

sites was transferred from the administering division to the department's three regional field offices. The Fish Division retained its planning responsibilities for access sites but relinquished control over site operation and maintenance. About the same time, the "public fishing sites" were re-designated "public access sites" because it was recognized that boating was becoming a popular recreational activity in its own right.

In 1966, negotiations began with the Michigan State Waterways Commission to determine whether or not that agency could assume responsibility for the Public Access Site Program if funds were made available by the legislature. The legislature responded by increasing the marine fuel tax appropriation from one-half of 1 per cent to 1-1/2 per cent of the total gasoline taxes collected by the state, effective January 1, 1968. In May 1968, responsibility for administration of the Public Access Site Program was transferred to the Waterways Commission.¹

The Waterways Commission thus became legally and administratively responsible for the acquisition, development, and maintenance of access sites. Subsequently, an active program of acquiring and developing new sites was adopted. Problems with objections from riparian owners were subsequently encountered where it was feared new or

¹Ibid., p. 4.

expanded access sites would result in lakes being overcrowded or use conflicts occurring.

CHAPTER II

METHODS AND PROCEDURES

Review of Related Research

Previous research concerned specifically with riparian boaters seems to be almost nonexistent. Earlier boating studies usually did not separate riparian and non-riparian boaters. In most cases, such studies were done by means of a sample of registered boat owners on a state-wide basis. Some comparison between the results of such studies and the current investigation will be made in Chapter III.

Boater attitudes toward other boaters are related to levels of satisfaction. Threinen investigated conflicts among boaters in his boating studies of counties in southeastern Wisconsin; it is conflicts of the type he mentions that affect the levels of satisfaction among lake users. He wrote:

Boating demand is consumptive of shore and water space and that space consumption of water is directly proportional to speed. Therefore consumption of water-space is much higher for fast boats and for indiscriminate travel such as with waterskiing. . . . Waterskiing is the activity of fast boats and it is an activity which keeps them occupied for extended periods. Without waterskiing, fast boating would

find less employment on the small inland waters. Speed is not a very significant element for the transportation of fishermen or for sightseeing because sightseeing is most enjoyed at lower speeds.

The spatial demand on water for boating at lower speeds causes a negligible amount of intra-activity, and inter-activity interference arises. Waves from speeding boats drive out the fishing boats, likewise the rowing, paddling, and sail-boating. Water skiing is density dependent and when pursued to excess, it limits the number of participants. Aerial counts frequently illustrate that the density of waterskiing seldom builds up more than about one boat per twenty acres of water. As the number builds up an element of fear influences the downed waterskier, therefore twenty acres is the minimum spatial requirement of waterskiing.¹

The Michigan Outdoor Recreation Demand Study provides a good description of the average Michigan boater and discusses the Oakland County respondent as an example. This is particularly significant since this present study is concerned with three lakes in Oakland County. The Michigan Outdoor Recreation Demand Study states that:

Like most other survey respondents, Oakland County respondents were employed in professional-technical positions or as skilled craftsmen. Incomes of Oakland County boaters were found to be generally higher than most respondents; with 72.7 percent having family incomes of \$8,000 or more compared to 58 percent in this income category for the state as a whole. Educational levels of Oakland County respondents were also generally higher than for all survey respondents. Fifty-three percent of this county's respondents indicated they were educated beyond the high school level as compared with 42.4 percent among all survey respondents.

¹W. W. Threinen, "An Analysis of Space Demands for Water and Shore," Transactions of the Twenty-ninth North American Wildlife and Natural Resources Conference (Washington, D.C.: Wildlife Management Institute, March, 1964), pp. 358-59.

Few significant differences were observed between the annual frequency of boat use for Oakland County respondents and all respondents in general. Oakland County boaters, however, used their boats slightly more in the July-August period and less in September-October than all survey respondents. Respondents from this county also concentrated more on boat use during vacations (24.3 percent) than did all other respondents (19.6 percent).

The percentages of Oakland County respondents listing various lengths of boating outings were about the same as for all survey respondents. Slightly more of the respondents from this county indicated that they preferred full-day trips than did respondents in general, and fewer Oakland County boaters indicated a preference for outings of less than one-half day.

As with all persons sampled in this survey, the popular boating activities for Oakland County respondents were fishing, short pleasure cruising, and waterskiing, in that order.¹

The Study Area

Selection

Three lakes in Oakland County were selected for investigation for the following reasons:²

1. This study was intended to be complementary to the Ashton investigation and therefore the same lakes were chosen.
2. The Waterways Commission requested that the study be conducted on heavily used lakes.

¹Michigan State University, Demand Study, pp. 10.28-10.29.

²More details on the process of selecting the three lakes in Oakland County are given in Ashton, "Boating Carrying Capacity," pp. 21-23.

3. Oakland County is part of the Detroit metropolitan area and together with Wayne County accounts for one-fourth of all registered boats in Michigan.

Physical Features and Development

The three lakes selected, Union, Cass, and Orchard are among approximately 1,000 natural lakes and ponds in Oakland County. They are located some five miles southwest of Pontiac, Michigan.

All three lakes have relatively clear water and a wide variety of fish. Union Lake is 465 acres in size and has a depth of 110 feet at its deepest point. It has been intensively developed as can be seen in Figure 1. Observations indicated that almost all the residences on this lake were permanent year-round homes. Most of the 328 houses are small and of about the same value except for a section at the eastern end of the lake where they are obviously of greater value. Most of the homes have septic tank systems for sewage disposal. There are no facilities for storm drainage except open ditches along the roads which empty into inlet and outlet streams. The roads around the lake are mostly dirt, with a few paved areas.

Union Lake has a public access site at its west end. Some parcels of riparian land on Union Lake are owned and maintained by back lot subdivision associations for the purpose of permitting their residents access to



Figure 1.--Union Lake with its surrounding development
at the time of the riparian study.



the lake; these riparian owners were not included in the survey. There is also a private business on Union Lake which sells boat fuel and rents boats. On Union Lake, attempts are made to regulate use by means of an organized lake association.

Cass Lake (Figure 2) is the largest of the three lakes studied. It has an area of 1280 acres and many places deeper than 100 feet, the deepest being 123 feet. Like Union Lake, Cass Lake has been intensively developed. The 625 homes on Cass Lake are permanent residences which vary from small run-down cottages to large expensive estates and include trailers in a mobile home park on riparian land. Cass Lake has many riparian owners who live on a network of canals dredged away from the lake. These riparians have all normal riparian rights but do not have frontage on the lake proper. Most residents on Cass Lake use septic tank systems. Most of the roads are dirt and gravel with open ditch storm drainage. The public access is through the Dodge Brothers No. 4 State Park which also has an extensive swimming beach. There is some private commercial development in the form of a sailing marina, a swimming beach, and power boat marina. Like Union Lake, Cass Lake has riparian lots owned by groups of non-riparians in order to secure access to the lake. There is apparently no organized lake association on Cass Lake comparable to the Union Lake Association.

Figure 2.--Cass Lake with its surrounding development
at the time of the riparian study.



Orchard Lake (Figure 3) is 788 acres in extent with a maximum depth of 110 feet. Its shores are occupied by a country club, ninety permanent residences, and a public access site. All the residences around Orchard Lake are large expensive estates with considerable lake frontage. Orchard Lake Village maintains its own police force, the roads around the lake are paved, and there is an extensive storm sewer system. Many riparian residences are connected to city sewers. The private country club maintains a sail boat marina and there is one other small boat rental operation. Orchard Lake is in close proximity to Cass Lake as can be seen in Figure 2 (Orchard Lake is in the upper left-hand corner of the photograph). A culvert connects the two lakes and allows the level of Orchard Lake to be regulated. The riparian owners of Orchard Lake have organized a lake association.

The Questionnaire

A self-administered questionnaire (see Appendix A) distributed by hand with a pre-stamped and addressed return envelope was adopted as the best method of obtaining the desired information with available financial resources. The objective was to reach 100 per cent of the riparian owners and to obtain as high a percentage response as possible. A personal interview would probably have been the best way to secure maximum accuracy and compliance but

Figure 3.--Orchard Lake with its surrounding development
at the time of the riparian study.



funds were not available to hire the additional staff needed to obtain an adequate sample by this method.

Questionnaire Design

The self-administered questionnaire has been used more frequently in social investigation than any other type of survey instrument. However, like other personal survey research techniques, the self-administered questionnaire is an imposition on the potential respondent's privacy. A resulting inclination by the respondent not to respond must be anticipated and all reasonable steps taken to overcome this tendency.¹ The following factors have been found to influence the percentage in a given population that will respond to a questionnaire:

1. The nature of the population being surveyed: Individuals with higher economic status have a tendency to respond more frequently.²
2. The subject of the survey: A high level of interest in the subject of the survey by the respondents

¹Douglas Crapo and Michael Chubb, Recreation Area Day-Use Investigation Techniques: Part I, A Study of Survey Methodology (East Lansing, Mich.: Recreation Research and Planning Unit, Department of Park and Recreation Resources, Michigan State University, 1969), Technical Report No. 6, pp. 19-20.

²Ibid., p. 20, citing Mildred Parten, Surveys, Polls and Samples: Practical Procedures (New York: Harper and Brothers, 1950), p. 82.

results in a higher response rate.¹ The surprisingly high response to the two open-ended questions on the questionnaire (see Appendix A, Questions 23 and 24), in which the respondents were simply asked for "suggestions or remarks concerning boating on this lake," appears to substantiate this claim. The study was conducted at a time when boating on the lakes was at its peak with a probable correspondingly high level of interest in boating problems.

3. The sponsorship of the survey: "A survey with official backing will normally get a bigger response than one emanating from say, a university or a research agency."² Due to considerable opposition to the Public Access Site Program by riparian owners in the past, it was believed that mentioning the Waterways Commission as the sole sponsor would have a detrimental effect on response. However, due to publicity concerning "campus unrest" at Michigan State University it was felt that mention only of the university might also have a detrimental effect in some cases. Therefore, both the Department of Park and Recreation Resources at Michigan State University and the

¹Ibid., citing C. A. Moser, Survey Methods in Social Investigation (London: Heineman Educational Books, Ltd., 1958), p. 181.

²Ibid., quoting R. M. Jackson, "Differential Value of the Mailed Questionnaire and the Interview in a Follow-up Study of High School Graduates" (unpublished Ph.D. dissertation, University of Wisconsin, 1959), p. 110.

Waterways Commission of the Michigan Department of Natural Resources were mentioned in the cover letter (see Appendix C) to show the recipients that the study was a cooperative effort by organizations interested in recreation resource management.

4. The questionnaire length:¹ In order to give the impression of limited length, the questionnaire was designed to fit on one folded sheet, or two pages printed both sides.

5. The attractiveness of the questionnaire:² The study of recreation area day-use investigation techniques mentioned previously found that questionnaires on blue paper resulted in a slightly higher response rate followed by questionnaires on white, brown, tan, yellow, and orange paper, in that order.³ Blue paper was therefore used for the questionnaire in this study. A cover letter (see Appendix C) typed on the letterhead stationery of the Department of Park and Recreation Resources at Michigan State University, was photocopied to create the impression of an originally typed letter. An italicized type was used to further add to the attractiveness.

¹Ibid., citing Claire Selltiz, et al., Research Methods in Social Relations (New York: Holt, Rinehart and Winston, 1967), p. 241.

²Ibid., citing Parten, p. 391.

³Ibid., p. 97.

6. The ease with which the questionnaire can be completed and returned:¹ The questionnaire was designed to be easy to read and complete. The questions with which respondents might have difficulty or which might cause antagonism were placed at the end of the questionnaire to avoid an early loss of interest.

Distribution

The questionnaires were distributed by hand. The only other feasible method (without considerable prior field investigation to create a list of names and addresses) would have been mailing the questionnaires to "occupant" or the equivalent, and it was felt this would probably decrease response. Federal law made it impossible to use the convenient mailbox so it was necessary to deliver the letter and questionnaire to the door. This meant a considerable additional expenditure of time and effort, but it was time well spent, in that it avoided some of the problems associated with a mailed questionnaire.

The questionnaire was placed inside the screen or storm door to keep it out of the weather and yet to avoid personal contact if possible. The staff members distributing the survey instrument found that while personal contact would probably increase response, it often lead

¹Ibid., p. 21.

to extensive conversations which would have made it impossible to complete distribution on schedule.

A stamped reply envelope was used because studies have shown that this method tends to result in a larger percentage response than an envelope printed with "return postage paid." The author believes that when a prospective respondent receives a stamped envelope, he appreciates the extra effort made by the researcher and is apt to reciprocate with an effort to complete the questionnaire. For this reason, the stamped envelope was placed on top to catch the respondent's attention. The stamped envelope method is more expensive than the "return postage paid" method. However, with the relatively small sample size in this study, the additional expense was small enough to be considered a worthwhile investment under the circumstances.

The questionnaires were distributed twice in successive weeks to every residence on the three lakes. The first distribution was on August 25, 1969, and the second on September 2, 1969. The second distribution included an additional two-by-five-inch piece of blue paper in each set (self-addressed stamped envelope, cover letter, and questionnaire) which bore the message, "If you have completed this questionnaire before, please indicate in question #1 and fill out questions 11 thru 17." This note was merely a restatement of question #1.

It was felt this blue slip would catch the eye of the respondent and be read immediately because of its short length. It explained that if they failed to return the first distribution this was a second chance or in case they had responded previously that it was only necessary to complete part of the questionnaire. It was felt that a better response would be received by making the completion of the entire questionnaire on the second distribution unnecessary. The blue note also helped the respondent realize that the second distribution was not an accidental repeat of the first.

It was necessary to know the general location on the lake of each respondent's property but it was felt that asking the respondents to give names or addresses would probably lower the percentage response appreciably. It was therefore decided to divide the lakeshore in each case into numbered sections, based on a classification of the types of residences. It was observed that the homes around the lakes tended to be divided into groups. The homes of higher value were at one location on the lake, and homes of lower value were grouped elsewhere. This made the sections easily definable. As the questionnaires were distributed, field staff wrote the lakeshore section number inconspicuously on the last page so it was possible to subsequently identify the location of each respondent.



Originally, the purpose of the second distribution was to gain data on two different weekends for comparison purposes. However, the number of respondents which filled out questionnaires from both distributions was so low it was decided not to use the second wave questionnaires in the analysis. The second distribution therefore served as an effective follow-up to bolster response.

Summary of Questionnaire Contents

The first part of the questionnaire (see Appendix A) is a series of questions about the respondent's riparian property and its recreation related features. Page two makes inquiry into the type and amount of boating in which the respondent engages. Experiences, attitudes, and opinions are invited on page three. Beginning at the bottom of page three and continuing to page four are the socio-economic questions which caused the most problems in terms of objections and non-response. The last two questions on the questionnaire are open ended, inviting respondent's "suggestions or remarks concerning boating on this lake." It was the surprisingly large response to these questions which allowed the attitudes of riparians to be studied in depth.

The data from the returned questionnaires was transferred to optical scan forms. The data from one questionnaire required three forms. This information

was then automatically punched onto computer cards and analysis carried out in the Michigan State University CDC 3600 computer.

The Interview

Boaters using the public access sites on the three lakes were interviewed (see Appendix B) as part of the overall study conducted by Ashton. Weather permitting, the interview was administered between 1000 hours and 1930 hours on the weekends sampled, up to and including Labor Day weekend. Almost every transient boater leaving the lakes before 1500 and after 1700 hours and 80 per cent of those leaving during the busiest time between 1500 and 1700 hours were interviewed. The interview was divided into three sections: the first part dealt with information about the boating party and type of boat, the second section asked for information about boating activity, and the final portion contained questions about socio-economic characteristics of boaters.¹

Aerial photography was used to assist in recording and interpreting boating use patterns on the lakes. During the days interviewing was taking place, aerial photographs were taken every hour on the hour and these were subsequently used to determine the densities of various types of boating activities on the lakes.

¹Ibid., pp. 29-30.

Response to the Questionnaire

The total response to the riparian owner questionnaire was 51 per cent. Since the questionnaire was distributed to all riparians on the three selected lakes, this number represents 51 per cent of the total riparian population.

The response from the individual lakes varied. Union Lake which had 328 riparian residents produced a return of 188 questionnaires for a response rate of approximately 58 per cent. Orchard Lake with 90 riparian residents had 58 questionnaires returned for a 64 per cent response. Cass Lake had a lower response rate with 291 of the 625 riparian residents mailing in the questionnaires for a 47 per cent response. The types of riparian land probably had an effect on the response from Cass Lake residents. Response was markedly lower for sections which riparians did not own frontage on the lake proper but lived on one of the networks of canals or in the mobile home park which owned some riparian land, giving the residents collective riparian rights.

Response to most questions on the questionnaire was satisfactory. As expected, the question concerning the respondent's income resulted in more objections than any other.

Non-Respondent Interviews

In order to determine if the information obtained from voluntary respondents was significantly different from similar data from non-respondents, a sample of non-respondents was interviewed. Locating non-respondents proved to be quite difficult and time consuming. An unrealistically high proportion of the riparians said they had returned a questionnaire, which seems to indicate a reluctance to be interviewed. Because of the time involved and the limited funds available, it was only possible to obtain fourteen interviews. While this only represents 3 per cent of the non-respondents, these interviews involved riparians with a wide range of characteristics and appears to be representative of a cross-section of the riparian owners that did respond. The main reason for non-response seemed to be lack of time necessary for completing the questionnaire. The riparians who did not respond to the questionnaire tended to not own a boat.

CHAPTER III

RESULTS OF THE STUDY

General Characteristics of Riparians

Chapter II discussed some characteristics of the study area, the lakes and the homes around the lakes. This chapter will be concerned with the riparian owners, their boating behavior, and attitudes based on the responses to the questionnaires.

Ownership

When the respondents were asked about the property they were occupying, 92 per cent indicated that they owned the property, 7 per cent were renting, and 1 per cent did not respond to that question (see Table 1).

TABLE 1.--1969 riparian survey respondent property-ownership by lake of residence

Lake	Own	Rent	Guest	No Response
Union	91%	6%	0%	2%
Orchard	97	2	0	2
Cass	91	9	0	0
All three lakes	92	7	0	1

It can be seen that almost all riparians own their property while only a few rent lakeside property in the study area.

A large percentage of these homes are permanent year-round residences. Respondents indicated that 77 per cent lived on their lake the entire year while 22 per cent resided for only part of the year. A more detailed breakdown showed that 66 per cent of the respondents on Union Lake lived there year-round while 33 per cent were there only part of the year. On Orchard Lake, 81 per cent were year-round and 17 per cent part year residents. Cass Lake had 83 per cent year-round residents and 17 per cent who use their property seasonally.

It was desirable to gain an indication of why the riparians decided to live on the lakes being investigated. It was felt that boating opportunities might be one reason for selecting riparian property. In order to investigate this matter, the following open-ended question was asked: "Why did you choose to live on this lake?" (see Appendix A, question 5). The following results were obtained (Table 2). The high response for recreation potential and for environment could be most significant when considering the riparians' attitudes toward boating on their lakes.

Length of Lake Frontage

The length of lake frontage owned by riparians varied a great deal. The property frontages of Union Lake

TABLE 2.--Reasons given by 1969 riparian survey respondents from all study lakes for choosing lake location.

Reason	Number of Responses
For its recreation potential	91
Because of the environment	62
Its location	56
Its physical features	56
Like the lake	56
Combination of location, physical and family reasons	39
Acquired from the family	33
Property was available for rent or sale	33
Location and size or price	28
Because of its beauty	20
Family reasons (considered a nice place for children)	17
Water level is controlled	3
Other	16

were generally much smaller than those of Cass and Orchard lakes. Union Lake averaged 72.5 feet of frontage per respondent, which was well below the 101 foot average of the three lakes combined. When analyzed by shoreline section, only two of the seven sections of Union Lake were above the overall average; the other five were far below. The section with the largest number of respondents was section six. While section six had over twice as many respondents, its average frontage was only 57 feet. (For data on the number of respondents per section and the average frontage per section see Appendix D.)

Orchard Lake frontage averaged 166 feet per riparian owner. This is the largest average frontage of the three lakes. The limited number of riparian owners

on Orchard Lake resulted in sections with low numbers of respondents, the section with the largest response contained only 10. Orchard Lake varied from a section with eight owners averaging 74 feet per property to a section with five owners averaging 310 feet per parcel (see Appendix D for details of per section averages).

Cass Lake with an average frontage of 121 feet was also a good deal above the 101 overall average. Cass also had the widest range of frontage, widths ranging from a section with a 48-foot average to one with a 315-foot average (see Appendix D).

Boat Types

All three lakes combined show an average of approximately two boats per respondent. Union Lake averages 1.9, Orchard 2.3, and Cass 1.9 boats per riparian. For a detailed breakdown of the average number of boats per respondent in each section see Appendix D.

A problem arose when asking people about the types of boats that they owned because the same boat can be used for a variety of activities. For instance, a boat with a powerful outboard motor could be used for fishing, cruising, or water skiing. Nevertheless, reliable information concerning boat usage was obtained by being specific in the categories when relating them to activities. They were asked to answer by checking the following: canoe, sailboat, fishing boat, drag boat, pontoon boat, houseboat,

water skiing boat, rowboat, cruiser, or other. The response therefore was related to the activity.

Boat types according to lake appears to follow a general pattern for all three lakes (see Table 3).

Each of the three lakes had more boats used for water skiing than for any other purpose. Fishing boats ranked second and were among the top three types in frequency for each of the lakes. Rowboats and sailboats were the next most numerous boats, both being in the top four frequency groups for each lake. Canoes were next, followed by pontoon boats, cruisers, and drag boats in that order. Each of the individual lakes closely followed this pattern.

Socio-Economic Characteristics

Questions concerning socio-economic characteristics had the fewest number of responses. This is probably because many respondents consider such questions an invasion of privacy and simply refuse to answer them. Although the number of responses were lower, they were substantial enough to make valid observations.

This section is concerned primarily with a comparison of the number and types of boats owned to the socio-economic characteristics of occupation, income, and education. Later in this chapter these same socio-economic characteristics will be compared to attitudes and use patterns.

TABLE 3.--Number of each type of boat on each lake owned by 1969 riparian survey respondents.

Boat Type	Number of Boats			
	Total for Three Lakes	Union Lake	Orchard Lake	Cass Lake
Canoe	72	19	12	41
Sailboat	125	42	22	61
Fishing Boat	158	55	26	77
Drag Boat ^a	7	3	1	3
Pontoon Boat ^b	64	21	12	31
Water-skiing Boat	274	110	26	138
Rowboats	129	58	13	58
Crusier or Runabout	43	7	3	33
Other	32	14	4	14
Total	904	329	119	456

^aA "drag boat" is a high-powered boat capable of high speeds. They are often powered by automobile motors and used for racing.

^bA "pontoon boat" is a boat which has pontoons to enable it to float. They are capable of carrying a number of people at a time and are often called "party boats."

Occupation

The pattern of response to the question asking about the occupation of the "head of the family" is represented in Table 4. For the purposes of this study the occupations were grouped into the following categories:

1. Professional and technical--including managerial, clerical, sales, and service.
2. Craftsmen and operatives--including foremen and laborers.
3. Self-employed.
4. Retired.
5. Other--including unemployed, housewives, and students.

TABLE 4.--Distribution of 1969 riparian survey respondents from all study lakes among occupation classes.

Occupation	Number	Percentage
Professional and technical	280	59
Craftsmen and operatives	91	19
Self-employed	34	7
Retired	65	14
Other	8	2
Total	478	101

When this occupational distribution is compared with that of Michigan recreational boaters in general there seems to be a substantial difference in the percentages in each category. Table 5, with figures taken from the Michigan Outdoor Recreation Demand Study, makes it possible to compare the distribution of occupation classifications among 1964 Michigan recreational boaters as a whole, with the distribution revealed by the present study of riparians.

There seems to be a substantially higher percentage in the professional-technical category, for the riparians, 59 per cent, compared to an estimated 33 per cent for recreational boaters as a whole. There is a much lower number of respondents in the craftsmen-operative category, 19 per cent in the riparian study compared to approximately 40 per cent for boaters as a whole. The self-employed category is 7 per cent compared to 12 per cent for boaters as a whole. The retired boater shows a higher percentage living on the lakes as riparians (14%) than there are boat owners as a whole (10%).

It may be concluded that while among Michigan boaters as a whole there are more craftsmen-operative boat owners than any other occupational group, professional-technical riparian owners predominate on the lakes studied because they have the financial capability to own lake front property. There also seems to be a tendency for a retired person to live on lake front property but these

TABLE 5.--Occupation of boaters responding to the 1964
Michigan Recreational Boating Survey.^a

Occupation	Percentage of Response ^b
Skilled Craftsman	16.49
Factory Worker	14.50
Sales and Clerical	7.21
Manager or Foreman	12.39
Business Owner	12.87
Professional-Technical	20.13
Farmer	1.21
Retired	9.70
Student	1.35
Unskilled Worker	4.50
Total	100.00

^aFigures are taken from the Michigan Outdoor Recreation Study.

^bThese figures cannot be grouped into those used for the 1969 riparian study because some of the figures which are grouped here are in separate categories in the riparian study.

people are likely to have retired from higher paid occupations. The difference in the self-employed categories, 7 per cent, for riparians to 12 per cent for boaters as a whole, suggests that self-employed people may have less time and money or there is a possibility that the category was vague or inaccurate. It must be kept in mind when comparing these figures that the category of recreational boaters as a whole includes riparians.

Ashton's interviewing of transient boaters resulted in the following distribution: 17 per cent were professionals, 7 per cent technicians, 5 per cent were in sales work, 10 per cent were managers, 20 per cent of boating party heads were craftsmen, 7 per cent were students, and 8 per cent miscellaneous occupations. A total of 26 per cent did not respond.¹

A comparison of distribution within occupation categories for riparians on each of the three lakes individually discloses similar distributions for Union and Cass lakes (see Table 6). The professional-technical workers on both Union and Cass lakes consisted of well over one-half of the riparian population of these lakes. The craftsmen-operative worker category contains approximately one-fifth of the responses on both Union and Cass lakes. The retired category consisted of 15 per cent and

¹Ashton, "Boating Carrying Capacity," p. 117.

TABLE 6.--The comparison of the percentage of 1969 riparian survey respondents on the study lakes and the percentage of boats owned.

Occupation	Union Lake		Orchard Lake		Cass Lake		3 Lakes	
	% Resp.	% Boats Owned	% Resp.	% Boats Owned	% Resp.	% Boats Owned	% Resp.	% Boats Owned
Professional-technical	58	57	76	77	55	53	59	59
Craftsmen-operative	20	19	2	2	22	23	19	19
Self-employed	5	6	5	5	9	9	7	7
Retired	15	14	13	10	13	13	14	13
Other	2	3	4	5	1	1	2	2

13 per cent respectively. For all practical purposes, these two lakes show the same distributions. Orchard Lake had approximately the same proportion of retirees as Union and Cass Lakes but it had approximately 20 per cent more of its population than the other two lakes in the professional-technical class and almost none in the craftsmen-operative category. This was to be expected because the residences on Orchard Lake are of obviously higher value.

As mentioned before, there was an average of approximately two boats per riparian respondent in the present study. When a closer examination of the number of boats owned by respondents in each occupation category is made, an interesting relationship is revealed. The percentage of respondents in each of the categories corresponds exactly with the percentage of boats owned by those respondents in each category (see Table 6). This relationship suggests that boat ownership is evenly distributed throughout the riparian population regardless of the occupation of the "head of the family." This conclusion is reinforced by the data for each of the study lakes when examined individually (see Table 6).

Closer examination of the distribution of boat ownership reveals that water-skiing boats are the kinds of boats most frequently owned by riparians (see Table 7). In every occupation category with the exception of retired

TABLE 7.--The number and type boat owned per 1969 riparian survey respondent for each occupation category on the three study lakes.

Occupation	Canoe	Sail Boat	Fishing	Drag	Water-skiing	Row Boat	Pontoon	Cruiser	Other	Total
Professional-technical	.13	.31	.30	.01	.61	.28	.13	.09	.06	1.93
Craftsmen-operatives	.14	.15	.37	.03	.60	.26	.13	.11	.09	1.90
Self-employed	.18	.26	.35	.00	.59	.21	.21	.21	.00	2.00
Retired	.22	.26	.46	.00	.34	.34	.14	.02	.09	1.86
Other	.25	.25	.25	.00	.38	.38	.13	.13	.13	2.38

persons, water-skiing boats were the kind of boat owned most frequently by the riparian owners; well over half had boats used for this purpose.

Retirees most often owned fishing boats but water-skiing boats were second along with rowboats. Sailboats were next in frequency of retiree ownership. The higher frequencies among passive type boating (fishing, rowboat, and sailboat) shows a tendency toward less active boating by retired persons.

It is interesting to note that while sailboats ranked second in frequency of ownership with professional-technical workers, they had a relatively low popularity among craftsmen-operative workers.

Overall, the frequency ranking shows boats used for water skiing are most numerous followed by fishing boats, rowboats, and sailboats in that order. The other categories of boats are far less numerous than those mentioned (see Appendix E-2 for a detailed frequency table).

Tables showing the frequency of each type boat in the various occupation categories for the individual lakes can be found in Appendix E-2.

Income

The annual income of the riparian family was grouped into the following categories in order to correspond with the categories used in Ashton's companion study:

- (1) \$4,999 or under
- (2) \$5,000 to 6,999
- (3) \$7,000 to 7,999
- (4) \$8,000 to 9,999
- (5) \$10,000 to 14,999
- (6) \$15,000 to 19,999
- (7) \$20,000 to 24,999
- (8) \$25,000 and over

Table 8 shows the distribution of responses for each of the income categories.

The income data in Table 8 shows that one-third of the riparians responding to the income question¹ earned less than \$15,000 while one-third fell between \$15,000 and \$24,999 and one-third earned \$25,000 and over. These findings are significantly higher than those of both Ashton's study of transient boaters on the three study lakes, and the Michigan Outdoor Recreation Demand Study's figures on Michigan recreational boaters as a whole.

The Michigan Outdoor Recreation Demand Study found that over two-thirds of the respondents had family incomes

¹The percentage response to the income question was 42 per cent compared to 51 per cent which was the response for the questionnaire. Of those responding 82 per cent answered the income question.

TABLE 8.--The distribution of 1969 riparian survey respondents by family income groups compared to the 1964 Michigan Outdoor Recreation Demand Study and national values.

Income Group	Union, Cass, & Orchard Lake Riparians 1969		Michigan Registered Boaters ^a 1964	U.S. Families in 1963 ^a	Families and Individuals in Michigan 1960 ^a
	Number of Respondents	Percentage of Total			
\$4,999-under	17	4%	9.5%	b	b
\$5,000-6,999	12	2	32.2		
\$7,000-7,999	8	1			
\$8,000-9,999	20	5	20.4		
\$10,000-14,999	98	21	24.7		
\$15,000-19,999	86	23	13.2	5.4%	14.3%
\$20,000-24,999	42	11			
\$25,000-over	124	33			

^aFigures were taken from the Michigan Outdoor Recreation Demand Study, p. 10.9.

^bData for equivalent categories not available.

of from \$6,000 to \$15,000.¹ The largest response was in the \$10,000-\$14,999 income level with 24.7 per cent.²

Ashton found that approximately one-half of the "boating party heads" of transient boaters had incomes of less than \$15,000 per year. One-fourth did not respond.³

When the responses to the question of family income in the three studies mentioned are compared substantial differences are found. Eighty-seven per cent of the respondents to the Michigan Outdoor Recreation Demand Study (Michigan recreational boaters as a whole) had incomes of less than \$15,000 a year, 67 per cent of the respondent transient boaters on the study lakes had an annual salary below \$15,000 and only 33 per cent of the riparian respondents had incomes under \$15,000. The boaters of Oakland County have higher incomes than the average boater in the state of Michigan. Within Oakland County, the riparians have an average income significantly higher than that of transient boaters. Only one-third of the transient boaters have incomes in excess of \$15,000 per year, while the riparians have one-third making \$25,000 and over.

When considered alone, Union Lake had basically the same pattern among the higher income categories as the

¹Michigan State University, Demand Study, p. 10.9.

²Ibid.

³Ashton, "Boating Carrying Capacity," p. 116.

three lakes combined. Orchard Lake had 65 per cent of its respondents in the \$25,000 a year and over category; this amounted to 31 responses in the \$25,000 and over and only 16 in the other seven categories. Cass Lake had only 37 respondents with incomes lower than \$10,000 a year and 168 with incomes which were above this level. When income is compared to the number of boats owned a relationship similar to that with occupation is observed. Comparison of the percentage of respondents in each income category and the percentage of the boats owned by each of those categories reveals the greatest difference between any pair of percentages is only 3 per cent (see Table 9). The three study lakes show the same parallel relationship individually and in no case does the percentage of respondents in each income category compared to the percentage of boats owned by that category differ by more than 4 per cent. The consistency of this relationship indicates that there are no tendencies for respondents in any income group to own more boats than respondents in the other income categories.

Correlation of income to boat type is another aspect of the data which deserves mention. The frequencies for the four lowest incomes become too small for analysis when tabulated by individual lakes. There will be no attempt to use these figures except when combined and used for the three lakes together.

TABLE 9.--Comparison of the percentage of 1969 riparian survey respondents in various income classes on the study lakes and the percentage of boats owned.

Income	Union Lake		Orchard Lake		Cass Lake		3 Lakes	
	% Resp.	% Boats Owned	% Resp.	% Boats Owned	% Resp.	% Boats Owned	% Resp.	% Boats Owned
\$4,999-under	3	3	2	2	5	5	4	4
\$5,000-6,999	3	2	2	1	3	3	3	2
\$7,000-7,999	2	1	0	0	2	2	2	1
\$8,000-9,999	3	4	2	2	7	6	5	5
\$10,000-14,999	23	20	8	6	28	26	24	21
\$15,000-19,999	29	33	15	16	17	17	21	23
\$20,000-24,999	14	15	6	5	9	9	10	11
\$25,000-over	23	24	65	68	28	31	30	33

Table 10 indicates the distribution of respondents among income categories for each lake; note the low percentage of respondents in the income levels below \$10,000 per year.

TABLE 10.--The distribution of 1969 riparian survey respondents by income categories and lake.

Income	Per Cent Response by Lake		
	Union Lake	Orchard Lake	Cass Lake
\$ 4,999 and under	3	2	5
\$ 5,000- 6,999	3	2	3
\$ 7,000- 7,999	2	0	2
\$ 8,000- 9,999	3	2	7
\$10,000-14,999	23	8	28
\$15,000-19,999	29	15	17
\$20,000-24,999	14	6	9
\$25,000 and over	23	65	28

Respondents with incomes lower than \$10,000 favored water skiing and fishing boats but rowboats were also popular. For the three lakes combined (see Table 11), water-skiing boats were owned by more riparians in each of the high income categories (\$10,000 and above) than any other type of boat. Fishing boats ranked second. Fairly high frequencies among sailboats and rowboats were also recorded.

For detailed data concerning the ranking of boat popularity by individual lake for income see Appendix E-4.

TABLE 11.---The number and type boat per 1969 riparian survey respondent in each income category for the three study lakes.

Income Group	Canoe	Sail Boat	Fishing	Drag	Pontoon	Water-skiing	Row Boat	Cruiser	Other	Total
\$4,999 and under	.12	.14	.28	.00	.06	.28	.18	.06	.12	1.71
\$5,000-6,999	.17	.08	.33	.00	.00	.25	.25	.08	.25	1.42
\$7,000-7,999	.13	.13	.26	.00	.13	.26	.38	.00	.13	1.38
\$8,000-9,999	.05	.20	.35	1.00	.20	.50	.15	.10	.15	1.80
\$10,000-14,999	.13	.13	.31	.01	.14	.56	.28	.08	.03	1.68
\$15,000-19,999	.22	.35	.37	.01	.14	.64	.28	.03	.03	2.08
\$20,000-24,999	.17	.21	.40	.00	.12	.60	.38	.12	.05	2.02
\$25,000-over	.16	.39	.30	.02	.15	.65	.28	.09	.10	2.14

The same patterns of boat ownership seems to persist regardless of lake or income category so it appears that income has little to do with the number and type of boats owned by the riparians on the three study lakes. However, the Michigan Outdoor Recreation Demand Study, did find a close relationship between types of boat owned and owner incomes for Michigan recreational boaters:

The rowboat was by far the most popular boat type for those respondents who had incomes of \$3,000 or less, over two-thirds of the respondents in this income group owned rowboats, whereas only 30.1 percent owned the more costly runabout. With each higher income group, the percentage of respondents owning rowboats decreased and the percentage owning runabouts increased until for the \$10,000-14,999 income class, 62.2 percent of the respondents indicated they owned a runabout and 22.7 percent owned a rowboat. The percentage owning runabouts decreased slightly to 51.0 for the \$15,000 and over group, and the percentage of this group who owned a rowboat reached a low of 13.0 percent.¹

Some additional support for the Michigan Outdoor Recreation Demand Study's conclusion was found in the steady increase in the number of cabin cruisers as income increased.²

Education

The amount of formal education completed by the "heads of the household" was grouped into the following categories:

¹Michigan State University, Demand Study, pp. 10.20-10.21.

²Ibid., p. 10.21.

- (1) Eighth grade or less
- (2) Some high school
- (3) High school graduate
- (4) Some college
- (5) College graduate
- (6) Post graduate work
- (7) Advanced degree
- (8) Student

The riparians on the three study lakes fell into the distributions with the education level categories shown in Table 12.

Table 12 indicates that 62 per cent of the riparians on the study lakes had formal education above the high school graduate level. This is significantly higher than both the transient boaters on the same lakes and Michigan recreational boaters as a whole. Ashton found that the boating party heads had the following education distributions: 5 per cent of the boating party heads had completed eight years of formal education, 7 per cent had completed some high school, 20 per cent had completed high school, 30 per cent were college graduates or had some college, 5 per cent had advanced degrees or post graduate work, 8 per cent were students, and 25 per cent did not respond.¹ Michigan boaters as a whole responded

¹Ashton, "Boating Carrying Capacity," pp. 116-17.

TABLE 12.--Distribution of 1969 riparian survey respondents by the household head educational level for the study lakes.^a

Education Level	No. Resp.	Per Cent of Response			% of Boats Owned
		Union	Orchard	Cass	
8th Grade or less	14	1%	4%	4%	2%
Some High School	65	8	2	17	13
High School Graduate	101	24	6	24	20
Some College	147	36	29	28	31
College Graduate	83	16	31	16	19
Post Graduate Work	23	4	15	4	5
Advance Degree	42	9	13	8	10

^aThe "student" category was omitted because of low frequencies.

to the Michigan Outdoor Recreation Demand Study questionnaire in the following manner:

. . . 47.6 percent had between 9 and 12 years of schooling, 23.9 percent between 13 and 15 years of schooling, 18.5 percent 16 or more years, and 10.0 percent 8 years or less of schooling.¹

The conclusion that riparians on the study lakes have more education than boaters generally is probably related to the fact that with more education there is a better chance of obtaining an occupation with a high salary, and this higher income enables a person to afford the more costly riparian land.

Further analysis of the educational level data indicates that Union and Cass lakes have similar distributions of educational achievement by family heads while Orchard Lake has a substantially smaller percentage of responses in the lower educational levels. Union and Cass lakes have 34 per cent and 45 per cent respectively of responses in the high school graduate or below levels, while Orchard has only 12 per cent in these categories (see Table 12).

Education follows the same trend as occupation and income when compared to the number of boats owned. The same parallel relationship exists when the percentage of respondents in each education category is compared with the percentage of the total number of boats owned. The

¹Michigan State University, Demand Study, p. 10.11.

greatest difference between pairs of percentages is 2 per cent (see Table 12). This relationship holds true when the lakes are examined individually.

These data appear to indicate that the level of education among the riparian household heads on the three study lakes is not related to the number of boats owned. A riparian with an eighth grade or less education is apt to own the same number of boats as a riparian with a higher educational attainment level.

When the data from all three lakes is aggregated (see Table 14), water-skiing boats seem to be the most frequently owned type of boat in every education category except "8th grade or less" where fishing boats have the highest ranking. Fishing boats had the second highest occurrence in all categories except 8th grade or less, college graduate and advanced degree. Fishing boats ranked third among the latter two while sailboats were second. Rowboats had a consistently high occurrence for all categories. For this same data by individual lakes see Appendix E-3.

Use Patterns

The use patterns of riparian and transient boaters can be expected to differ for a variety of reasons. The proximity of residence in relation to water has an effect upon the time required for a boating experience. A boater who must travel to a lake with public access spends time

TABLE 13.--The comparison of the percentage of 1969 riparian survey respondents and the percentage of boats owned on each individual study lake by household head educational attainment class.^a

Educational Level	Union Lake		Orchard Lake		Cass Lake	
	% Resp.	% Boats Owned	% Resp.	% Boats Owned	% Resp.	% Boats Owned
8th Grade or Less	1	1	4	4	4	3
Some High School	8	8	2	3	17	19
High School Graduate	24	23	6	5	24	22
Some College	36	36	29	26	28	28
College Graduate	16	17	31	32	16	17
Post Graduate Work	4	4	15	20	4	3
Advanced Degree	9	10	13	10	8	9

^aThe "student" category was omitted because of low frequencies.

TABLE 14.--The number and types of boats owned per 1969 riparian survey respondent in each educational category for the three study lakes.

Educational Levela	Types of Boats Owned									
	Canoe	Sail Boat	Fishing	Drag	Pontoon	Water- skiing	Row Boat	Cruiser	Other	Total
8th Grade or less	.07	.00	.57	.00	.14	.28	.21	.07	.14	1.50
Some High School	.12	.15	.34	.05	.10	.55	.23	.15	.10	1.78
High School Graduate	.12	.22	.34	.01	.13	.53	.26	.11	.05	1.82
Some College	.16	.24	.30	.01	.16	.59	.27	.07	.07	1.88
College Graduate	.14	.37	.34	.01	.12	.64	.30	.08	.04	2.05
Post Graduate Work	.13	.26	.39	.04	.26	.52	.35	.09	.09	2.13
Advance Degree	.19	.45	.29	.00	.07	.64	.29	.10	.10	2.05

^aThe "student" category was omitted because of low frequencies.

in transit and in the launching of his boat. Many boaters are unwilling to spend so much time in preparation for anything less than a full day's boating. It is to be expected that transient boaters would boat less frequently during the week, but use the public access sites heavily on weekends.

The Michigan Outdoor Recreation Demand Study discovered the following facts about boat usage by Michigan boaters as a whole:

When asked about the times when they made most use of their boats 58.7 percent indicated that their most popular time of use was on weekends, 13.2 percent used their boats mostly on weekdays, and 8.6 percent reported that their boats were used mainly on weekday evenings. Nearly a fifth of the respondents (19.6%) listed vacations as the time when their boat received most use.¹

(It is important to keep in mind that riparian boaters were represented in the above figures.)

A problem arises when examining data from the present study for the time of week riparians on the three study lakes usually boated. One of the two study weeks included a national holiday (Labor Day), and therefore that Monday cannot be considered typical. To solve this problem, data from the two Mondays were separated from the other weekdays in the analyses. Riparians were shown to do 43.3 per cent of their boating on weekends and 44.3 per cent during the Tuesday through Friday period.

¹Ibid., p. 10.16.

Mondays (including Labor Day) accounted for 12.2 per cent of the total riparian boating use for the three lakes.

The percentage of Michigan boaters who boat at specific times cannot be directly compared with the percentages of riparians who boat at these times, because comparable data is not available. However, a general comparison can be made. The tendency is for the riparian to do a much smaller proportion of his boating on weekends, even though both riparians on the study lakes and Michigan boaters generally spend more hours boating per weekend day than per weekday.

Detailed information comparing the amount of use during different periods by riparians in various income, occupation, and education classes is contained in Appendices F-1 through F-3.

Attitudes

The large response to the open-ended questions number 23 and 24 of the riparian questionnaire together with responses to the open-ended portion of question 16, made an analysis of riparian attitudes possible. Attitudes were evaluated by counting the number of positive and negative remarks made by the riparian respondents about boating and boaters. The remarks and complaints, though worded differently by various respondents, all fall into the following general categories.

Negative Response Categories

1. Complaints about crowdedness, the number of boats or people.
2. Complaints about the speed at which boats traveled or the amount of power they had.
3. Complaints about water pollution.
4. Complaints specifically concerning litter.
5. Complaints that their rights or property had been abused.
6. Complaints about boat handling and rules for boating. (The usual comment was that there was a need for more rules.)
7. Complaints about patrolling by the Marine Safety Division of the Oakland County Sheriff's Department. Remarks here varied from excessive enforcement to the lack of sufficient enforcement.
8. General complaints about the public access site or the lake.
9. Complaints about laws governing boating.
10. Complaints about fishing conditions. (Poor fishing was usually blamed on the number of boaters.)
11. Complaints about physical lake problems like siltation or over abundant water plants, etc.
12. Complaints about the noise level of boats.
13. Complaints about swimming. These were either that it was too dangerous to swim because of the

number of motor boats, or that the abundance of marked off swimming areas significantly reduced the amount of water surface available for boating.

14. Complaints about private enterprise on the lakes.
(Boat rentals adding to the number of boats.)
15. Remarks that there were problems which might be solved by the zoning of the lake for various uses or establishing times at which only certain activities could be undertaken.
16. Complaints about water skiing.
17. General negative response. (This category covers the unusual responses and had very few entries.)

The positive remarks were as follows.

Positive Response Categories

1. Remarks about law enforcement personnel. (These responses were either personal compliments or praise for the general effectiveness of boating law enforcement.)
2. General positive responses which were unusual.
3. Praise of existing boating laws.
4. Compliments about the public access site on the lake.

For the purposes of this study, attitudes will be compared with the socio-economic characteristics used

in previous analyses. It must be remembered that one respondent may have made several remarks each of which are included in these figures so the total number of positive and negative remarks is not equal to the total number of respondents.

Analysis of Attitudes

The different attitudes expressed will be examined for each lake. The values for this analysis were taken from the attitudes compared to occupation tables for each lake because, of the three socio-economic characteristics studied, occupation had the highest percentage response. The ranking of attitudes would be the same for all the socio-economic characteristics but because of the better response to the occupation question there will be a higher frequency of attitudes to work with. Table 15 shows the number of responses and ranking of each of the negative response categories. The greatest number of negative responses from respondents on each of the lakes expressed the attitude that there were too many boats or too many people; that is, there the resource was too crowded. In many instances, the respondents attributed this to uncontrolled access being allowed via the public access sites.

A close second in frequency were complaints concerning boat speed or the amount of power boats have. Respondents were concerned about safety on their respective

TABLE 15.--Frequency and ranking of 1969 riparian survey respondent negative responses for the three study lakes.

Negative Attitudes	All 3 Lakes			Union			Orchard			Cass		
	Rank	No.	No. Resp.	Rank	No.	No. Resp.	Rank	No.	No. Resp.	Rank	No.	No. Resp.
Crowded	1	172	.32	1	53	.28	1	18	.31	1	102	.35
Speed and Power	2	150	.28	2	48	.26	1	18	.31	2	84	.29
Boat Handling	3	81	.15	6	26	.14	12	6	.31	3	49	.17
Litter	4	76	.14	4	28	.15	1	18	.31	6	31	.11
Rights and Property	5	75	.14	5	27	.14	5	12	.21	5	36	.12
Noise	6	70	.13	12	14	.07	8	8	.14	4	48	.16
Pollution	7	59	.11	3	32	.17	9	7	.12	14	20	.07
Fishing	8	55	.10	9	22	.12	9	7	.12	8	26	.09
General Lake Problems	8	55	.10	11	16	.09	7	11	.19	7	28	.10
Law Enforcement	10	53	.10	7	24	.13	13	4	.07	9	25	.09
Water-skiing	11	47	.09	16	10	.05	5	12	.21	9	25	.09
Access Site	12	46	.09	7	24	.13	4	16	.28	16	6	.02
Law	13	42	.08	10	20	.11	15	2	.03	14	20	.07
Time Zone and Uses	14	39	.07	13	12	.06	9	7	.12	12	21	.07
Swimming	15	36	.07	13	12	.06	14	3	.05	12	21	.07
Private Enterprise	16	33	.06	14	11	.06	16	0	.00	11	22	.08

lakes because of the dangers associated with high-powered boats traveling at high speeds.

Another significant finding is that noise ranked sixth in frequency for all the lakes combined. However, its position varied from fourth on Cass Lake to twelfth on Union Lake. One possible explanation of why a greater number of people consider noise a problem on Cass Lake is that, because of its size, it attracts a larger number of high-powered "drag" boats which are associated with high noise levels.

Pollution is considered a major problem on Union Lake, ranking third. On Cass Lake it was considered of less importance, ranking fourteenth. Orchard Lake respondents placed pollution in the middle of the scale at ninth position.

It is interesting to note that while Orchard Lake respondents ranked pollution as being of less significance, litter was first with the same number of complaints as crowdedness, and speed and power. Orchard Lake riparians also considered water-skiing much more of a problem, placing it in fifth position, while Cass and Union respondents ranked it ninth and sixteenth respectively.

Complaints about the public access sites ranked high among Orchard and Union lakes riparian owners but was ranked last for Cass Lake. This may be due to the influence of the organized lake associations, which tend to strongly oppose public access sites on their lakes.

There were only two positive attitude categories which received a significant number of responses (see Table 16). These were the "general positive response" group and "law enforcement" class. It is interesting to note that there were very few positive responses from Orchard Lake riparians.

From an examination of the questionnaires from respondents who answered the question about their experiences on the lake (question 16) and also indicated an attitude of some kind in questions 23 and 24, it was found that having good boating experiences apparently had little to do with their attitudes. The respondents who said they had enjoyed positive type experiences were responsible for 102 complaints and only two responses of a positive type. Those who said they had negative experiences generated 539 negative attitude responses and 13 positive attitude responses. This indicates that the attitudes expressed in the questionnaire were not based on temporary emotions triggered by an unfortunate experience but rather are general attitudes strongly felt by the respondent.

Attitudes and Socio-economic Characteristics

When income data from all three lakes are examined in aggregate, a relationship which appears to be generally common to each lake individually is revealed. The values in the columns headed "percentage of negative responses"

TABLE 16.--Ranking, number, and number per respondent of positive attitudes revealed by 1969 riparian survey respondents from all three lakes.

Positive Attitudes	All 3 Lakes			Union			Orchard			Cass		
	Rank	No.	No. Resp.	Rank	No.	No. Resp.	Rank	No.	No. Resp.	Rank	No.	No. Resp.
General Positive Response	1	35	.07	1	16	.09	1	2	.03	1	24	.08
Law Enforcement	2	26	.05	2	15	.08	1	2	.03	2	9	.03
Laws	3	1	.00	3	1	.01	0	0	.00	0	0	.00
Access Site	3	1	.00	3	1	.01	0	0	.00	0	0	.00
Boat Handling and Rules	3	1	.00	0	0	.00	0	0	.00	1	0	.01

^aNumber of positive attitudes divided by the number of respondents.

and "percentage of respondents" show a direct relationship. The figures are almost the same in each column for each income category. This indicates that generally user satisfaction did not vary with income (see Table 17).

However, there does seem to be a slight inclination for the respondents in income categories \$10,000 to \$14,999 and \$15,000 to \$19,999 to express a higher percentage of positive attitudes than other respondents. Orchard Lake is the exception with 100 per cent of its positive responses coming from the \$25,000 and over category. For detailed data concerning the frequency of attitudes compared to income categories by individual lakes refer to Appendices G-1 through G-3.

When the attitude responses are arranged and analyzed in a similar manner by education levels, the pattern is almost as regular as it is for income (see Table 18 and Appendices H-1 through H-3). The "percent of negative responses" values in Table 18 differ from the "percentage of riparians" by a maximum of 2 per cent in any one class. This also appears to indicate that there is no appreciable difference between the attitudes of riparians with different head of household educational attainment levels.

The "percentage of positive response" values also correspond closely to the "percentage of respondents" values except for the "some college" and "college graduate" categories. The "some college" category has a

TABLE 17.--Frequency of positive and negative attitudes by income class for 1969
riparian survey respondents from all three lakes.

Income	No. Neg. Resp.	No. Pos. Resp.	No. Respon- dents	%	%	%	Respondents	
							Neg. Resp.	Pos. Resp.
\$4,999 & Under	41	3	7	4	4	6	5.9	0.2
\$5,000-6,999	24	0	12	3	3	0	2.0	0.0
\$7,000-7,999	15	0	8	2	2	0	1.9	0.0
\$8,000-9,999	46	0	26	5	5	0	1.8	0.3
\$10,000-14,999	202	16	98	24	22	30	2.1	0.2
\$15,000-19,999	224	14	86	21	24	26	2.6	0.1
\$20,000-24,999	85	5	42	10	9	9	2.0	0.1
\$25,000 & Over	281	15	124	30	31	28	2.3	0.3



TABLE 18.--Frequency of positive and negative attitudes by education level for 1969 riparian survey respondents from all three lakes.

Education Level	No. Neg. Resp.	No. Pos. Resp.	No. Respondents	% Resp.	% Neg. Resp.	% Pos. Resp.	Respondents	
							Neg. Resp.	Pos. Resp.
8th Grade or Less	30	3	14	3	3	5	2.1	0.2
Some High School	119	7	55	12	11	11	2.2	0.1
High School Graduate	208	12	101	22	20	19	2.1	0.1
Some College	344	27	147	32	33	43	2.3	0.2
College Graduate	169	6	83	18	16	10	2.0	0.1
Post Graduate Work	78	2	23	5	7	3	3.4	0.1
Advanced Degree	105	6	42	9	10	10	2.5	0.1
Student	4	0	2	0	0	0	2.0	0.0

slightly higher percentage of positive attitudes per respondent while the "college graduate" group exhibits a lower value.

A similar analysis of the data by occupational classes showed that none of the classes had more of a tendency toward negative attitudes than any other (see Table 19 and Appendices I-1 through I-3). The same is true for the positive attitudes with the exception of the "other" category; however, it only accounts for 2 per cent of the total respondents.

Use Patterns

When the total hours per respondent are analyzed by occupation, income, and education classes (see Appendices F-1 through F-3 respectively) and compared with the number of negative responses per respondent (Tables 17, 18, and 19) no relationships appear to exist. Unlike Ashton's finding that "the level of boat user dissatisfaction was found to be directly related to the intensity of use,"¹ it seems that riparian attitudes are not related to the amount of boating done by the respondent. On high use lakes, the riparian lives constantly with the various uses and environmental problems of his lake, and is likely to be dissatisfied regardless of the amount of time he uses the lake. In many instances, respondents

¹Ashton, "Boating Carrying Capacity," p. 120.

TABLE 19.--Frequency of positive and negative attitudes by occupation for 1969 riparian survey respondents from all three lakes.

Occupation	No. Neg. Resp.	No. Pos. Resp.	No. Respon- dents	%	%	%	Respondents	
							Neg. Resp.	Pos. Resp.
Professional- technical	638	39	280	5	59	61	2.3	0.1
Craftsmen- operatives	187	12	91	19	17	19	2.1	0.1
Self-employed	94	4	34	7	9	6	2.8	0.1
Retired	152	7	65	14	14	10	2.3	0.1
Other	19	2	8	2	2	3	2.4	0.3

indicated they did not boat during certain periods because of the crowdedness. So, for the riparian, dissatisfaction is often the reason for lower use levels. On the other hand, the transient boater who is highly dissatisfied will probably go to another lake rather than modify his boating to avoid unsatisfactory conditions. This situation is unfortunate when it is recollected, from Table 2, that riparians when asked why they chose to live on the lake have as the two most frequent responses: (1) for its recreational potential, and (2) because of the environment. The riparian boater cannot escape the problems of overcrowdedness as easily as the transient boater so he is forced to live with them.

CHAPTER IV

SUMMARY AND CONCLUSIONS

The goal of this investigation was to determine whether certain relationships exist between riparian boat owner behavior, attitudes, and socio-economic characteristics. It was felt that if a definite relationship could be established between the number of boats per riparian, or the amount of boat use by riparians, and some measurable characteristic of that riparian (like socio-economic characteristics) then the Waterways Commission could use it as a guide in future predictions. If the Waterways Commission could predict the number of boats and amount of use by riparians, they could obtain a better understanding of the demand for boating placed on an inland lake by the riparian sector. With the addition of this data to other information concerning boating demand, the Waterways Commission would have an improved basis for predicting total demand. This would result in better planning of their public access site program. It was also felt that if such relationships could be identified, it might be possible to predict

changes in riparian behavior and attitudes in a manner that would be useful to the Waterways Commission in its planning activities.

In order to determine if such relationships did exist, the following hypotheses were formulated and tested.

Number and Type of Boat Owned

First, it was hypothesized that there was a direct relationship between the socio-economic characteristics of the riparians and the number and type of boats owned. It was theorized that as income, education, and occupation (from unemployed to professional-technical) increases, the number of boats owned will also increase and there will be a tendency for certain classes of riparians to own certain types of boats.

There was a slightly higher number of boats per respondent on Orchard Lake (2.3) than there was for Union or Cass lakes (both 1.9). As a whole, the riparians studied averaged approximately two boats per respondent. Compared with transient boaters in Oakland County and Michigan boaters as a whole, there was a higher percentage of riparian boaters in the professional-technical occupational category and fewer in the craftsmen-operative category. Boats were distributed quite evenly among respondents with no appreciable tendency for any occupational category to own more or less boats. There was

a slight tendency for retired riparians to own a higher proportion of boats used in more passive forms of recreation such as fishing.

The incomes of the riparian respondents were substantially higher than either the transient boaters using the same lakes or Michigan boaters as a whole. However, no income group within the riparian population studied was more likely to own a certain number or type of boat than any other group.

As in the case of occupation and income, riparians on the average had higher levels of education than other boater groups. These findings were expected because they are all interrelated. The riparian land is more expensive, so it was obvious that the people who would own such land would have to receive higher incomes than the average boater; this is obtained through better paying occupations (professional-technical) for which normally a higher level of education is required. Education was not found, however, to be related to the number of boats owned by riparians. The same types of boats were generally found to be popular regardless of educational achievement level.

Although no relationships were found between any of the socio-economic characteristics and the number of boats owned, it is significant that the three lakes averaged two boats per riparian respondent. Even though

the three lakes studies represented three substantially different patterns of riparian owner socio-economic characteristics, boat ownership remained remarkably constant. The figure of approximately two boats per riparian may be reasonably typical for lakes in Oakland County, and could be representative of a much larger region.

Level of Dissatisfaction

It was hypothesized that the level of riparian owner dissatisfaction with boating conditions is directly related to socio-economic characteristics. It was suggested that as income, education, and occupational levels increase there is a greater level of dissatisfaction. It was found, however, that on the study lakes, any respondent regardless of his income, education, or occupational level was as likely to have negative attitudes and to be dissatisfied as any other respondent. This seems to indicate that the attitudes of riparians have developed from his experiences rather than his status in life. The survey also showed that riparians on all the lakes experienced the same problems and shared similar attitudes toward boating. In fact, the attitudes were so similar among these riparians that it is believed that they may be typical for riparians in general who live on a lake which is provided with public access

facilities.¹ The understanding of these attitudes and feelings can provide the Waterways Commission a better indication of the problems and thereby aid them in avoiding similar problems in the future.

Amount of Boating and Attitudes

It was also hypothesized that there is a direct relationship between the amount of boating undertaken by a riparian respondent and his propensity to have a negative attitude toward conditions on his lake. Although this was found to be true in Ashton's study of transient boaters on the study lakes, this was not the case among the riparian boaters. Many respondents indicated that they refused to boat during periods of high use because of the problems they encounter.

Recommendations for Improvement of the Questionnaire

Even though none of the hypotheses proved to be true, a great deal was learned about the riparian and his attitudes. If future studies along these lines are undertaken, more could be learned about attitudes by improving the section designed to gain this data. The attitudes information for this study came from a surprisingly good

¹However, it must be remembered that nearly all of the riparian respondents on the three lakes surveyed were in the middle and upper income groups; 89 per cent earned \$10,000 or more. Riparian populations with more substantial representation from lower income categories may exhibit different attitude patterns.

response to the open ended questions asking for remarks and suggestions (Questions 23 and 24, Appendix A). This response was interpreted to be an indication of a willingness and interest among the riparians to make his attitudes known. It was found that these attitudes fell into the seventeen negative and four positive categories listed at the beginning of the attitudes section of this thesis. By using these categories as a basis, some questions directly concerned with attitudes could be included without "leading" the respondent.

Information received in some questions proved to be unusable and it is suggested these questions be dropped. Question 7 dealing with facilities present at the property provided no useful data because of poor response. The time and date portions of Question 16 resulted in such vague information that it was of little value. Question 17 seemed to be difficult for respondents to understand and few followed the directions. The large number of lakes listed in this question led to data so spread out that it could not be used in any analysis. If Questions 13, 14, and 15 are to be used again they should be refined in order to be easier to understand and result in more meaningful information.

The socio-economic questions were as well received as could be expected; a method of printing the justification of that section in a way to better catch the eye

it is felt would result in increased response to these questions.

Distribution of the questionnaire by hand proved to be extremely time consuming and should only be attempted if plenty of time can be allotted. Also this method had some logistical problems such as carrying enough questionnaires to prevent constant backtracking to a vehicle, walking around fences between homes, and avoiding unfriendly dogs.

Future Demand on Public Access Sites

It must be realized that the creation of a public access site on a lake automatically causes problems for riparians. While Michigan's people are entitled to use its resources, the rights of the individual must also be protected. The problem of the disregard for property which does not belong to an individual is an old one, and attempts should be made to alleviate some of the common problems like crowding, pollution, and litter.

The demand for recreational activities is growing and there will be constant pressure for the public access sites to be used for other activities. The Outdoor Recreation Resources Review Commission study indicated that by the year 2000 swimming will be the most popular single outdoor recreation activity exceeding even driving for

pleasure, which now holds first place.¹ It is felt by the author that the typical Michigan public access site is too small to support other water-based recreation activities and that policies must be established which are directed towards limiting the types and volume of use at problem sites. Users must be directed to more satisfactory locations wherever possible. Wide scale use of the sites for other activities will cause additional friction between the Waterways Commission and riparian and should be avoided. There is a need to work with the riparian rather than against him in future attempts at meeting the growing demand for recreational opportunities.

¹U.S. Outdoor Recreation Resources Review Commission, Outdoor Recreation in America, p. 173.

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APPENDICES

APPENDIX A

THE QUESTIONNAIRE DISTRIBUTED TO THE
RIPARIANS OF THE STUDY LAKES

DATE _____

1. HAVE YOU COMPLETED THIS QUESTIONNAIRE BEFORE? ☐ yes ☐ no
IF YES COMPLETE ONLY QUESTIONS 11 THRU 17 OF THIS QUESTIONNAIRE.

-
2. DO YOU OWN OR RENT THIS PROPERTY? (Check one) ☐ own ☐ rent ☐ guest
-

3. DO YOU RESIDE HERE THE ENTIRE YEAR? ☐ yes ☐ no

IF NO ON THE AVERAGE, HOW LONG DO YOU OCCUPY THIS RESIDENCE EACH YEAR?

_____ months _____ weeks or if only weekends how many _____

PLEASE COMPLETE THE FOLLOWING INFORMATION CONCERNING YOUR
PERMANENT RESIDENCE.

_____ zip code _____ city _____ county

4. HOW LONG HAVE YOU OWNED OR RENTED THIS PROPERTY? _____ years _____ months
-

5. WHY DID YOU CHOOSE TO LIVE ON THIS LAKE?

6. HOW MUCH FRONTAGE, ON THE WATER, DO YOU HAVE WITH THIS PROPERTY? _____ feet
-

7. PLEASE CHECK ALL THE FACILITIES WHICH ARE PRESENT ON THIS PROPERTY:

☐ DOCK
☐ BOAT HOUSE
☐ SAND BEACH
☐ ANCHORED FLOAT FOR
SWIMMING

☐ BOAT HOIST
☐ TRAILER LAUNCH FACILITY
☐ OTHER (specify) _____

8. HOW MANY BOATS DO YOU OWN? _____
-

9. HOW MANY OF THE BOATS YOU OWN ARE KEPT AT THIS LAKE? _____
-

10. DO YOU KEEP ANY BOATS OTHER THAN YOUR OWN AT THIS LAKE?

☐ no ☐ yes how many _____

11. PLEASE COMPLETE THE FOLLOWING INFORMATION ABOUT THE BOATS KEPT ON YOUR PROPERTY.

TYPE	NUMBER	LENGTH	HORSEPOWER	DO YOU OWN? (Check)	
				YES	NO
CANOE					
SAILBOAT					
FISHING BOAT					
DRAG BOAT					
PONTON BOAT					
HOUSE BOAT					
WATER SKIING BOAT					
ROWBOAT					
CRUISER					
OTHER					

12. FOR EACH DAY DURING THE PAST WEEK INDICATE THE NUMBER OF HOURS THAT THE BOATS KEPT ON THIS PROPERTY WERE ACTUALLY USED FOR THE FOLLOWING ACTIVITIES:

BOATING ACTIVITIES	MON. (hours)	TUE. (hours)	WED. (hours)	THURS. (hours)	FRI. (hours)	SAT. (hours)	SUN. (hours)
CANOEING							
SAILING							
FISHING							
DRAG BOATING							
PONTON BOATING							
HOUSE BOATING							
WATER SKIING							
ROWING							
CRUISING							
SWIMMING							
OTHER							

13. IS THE PATTERN IN QUESTION 12 TYPICAL OF YOUR NORMAL USE? ☐ yes ☐ no
IF NO PLEASE BRIEFLY DESCRIBE HOW THIS DIFFERS FROM YOUR NORMAL USE.

14. WHAT FACTORS DETERMINE YOUR TYPICAL SCHEDULE OF ACTIVITIES AS YOU HAVE INDICATED THEM ABOVE?

15. HOW DO YOU FEEL ABOUT YOUR EXPERIENCES ON THIS LAKE DURING THE PAST WEEK?

16. IS THERE ANYTHING WHICH STANDS OUT IN YOUR MIND ABOUT YOUR EXPERIENCES ON THE LAKE THIS PAST WEEK?

☐ no
☐ yes

specify
 WHAT STANDS OUT?

TIME DATE

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

WHY DO THESE STAND OUT IN YOUR MIND?

17. DO YOU BOAT ON OTHER LAKES?

☐ no ☐ yes

WHAT LAKES? _____

WHEN? (Check one) WEEKDAYS ☐ WEEKENDS ☐ HOLIDAYS ☐

HOW MANY TIMES PER BOATING SEASON? _____

IF YES WHY DO YOU CHOOSE ANOTHER LAKE? _____

18. HAVE YOU USED THIS LAKE'S PUBLIC ACCESS SITE TO LAUNCH YOUR BOAT THIS SUMMER?

☐ no ☐ yes, number of times _____

IN ORDER TO FORECAST WHAT FUTURE BOATING CHARACTERISTICS IN MICHIGAN WILL BE IT IS NECESSARY FOR US TO BE ABLE TO RELATE FAMILY CHARACTERISTICS TO BOATING USE PATTERNS. PLEASE ASSIST US BY ANSWERING THE FOLLOWING QUESTIONS ABOUT YOUR FAMILY CHARACTERISTICS.

19. WHAT IS THE AGE AND SEX OF THE "HEAD OF YOUR FAMILY?"

AGE: _____ years ☐ MALE ☐ FEMALE

1

20. WHAT IS THE OCCUPATION OF THE "HEAD OF YOUR FAMILY?"

OCCUPATION (not organization)

21. WHICH OF THE FOLLOWING REPRESENTS THE AMOUNT OF FORMAL EDUCATION COMPLETED BY THE "HEAD OF THE HOUSEHOLD?" (Check one)

- ☐ EIGHTH GRADE OR LESS
☐ SOME HIGH SCHOOL
☐ HIGH SCHOOL GRADUATE
☐ SOME COLLEGE

- ☐ COLLEGE GRADUATE
☐ POST GRADUATE WORK
☐ ADVANCED DEGREE
☐ STUDENT

22. WHICH OF THE FOLLOWING INDICATES THE TOTAL INCOME OF YOUR FAMILY IN 1969? (Check one)

- ☐ \$4,999 or under
☐ \$5,000 to 6,999
☐ \$7,000 to 7,999
☐ \$8,000 to 9,999

- ☐ \$10,000 to 14,999
☐ \$15,000 to 19,999
☐ \$20,000 to 24,999
☐ \$25,000 and over

23. SUGGESTIONS OR REMARKS CONCERNING BOATING ON THIS LAKE:

24. OTHER REMARKS: _____

THANK YOU FOR YOUR COOPERATION.

IF YOU HAVE MISPLACED THE RETURN ENVELOPE PLEASE SEND THE QUESTIONNAIRE TO:

Robert Dittrick
Recreation Research and Planning Unit
Department of Park and Recreation Resources
Room 131 Natural Resources Building
Michigan State University
East Lansing, Michigan 48823

APPENDIX B

**THE INTERVIEW USED BY ASHTON TO GATHER DATA
FROM THE TRANSIENT BOATERS USING
THE STUDY LAKES**

APPENDIX B

INTERVIEW SCHEDULE USED AT PUBLIC ACCESS SITES

DATE _____ TIME _____ LAKE _____ INTERVIEWER _____

1. Have we interviewed you before? *Yes _____ No _____

*2. What time did you arrive at this lake today?

*3. What time are you leaving this lake today?

*4a. How many people are in your boating party? _____

b. Could we have your age and the sex and age of the others in your party?

Member interviewed	2	3	4	5	6	7	8	9
Sex _____	_____	_____	_____	_____	_____	_____	_____	_____
Age _____	_____	_____	_____	_____	_____	_____	_____	_____

*5. How many boats are in your party? _____

Boats	Horsepower	Length	Type	
1	_____	_____	_____	A. Cruiser
				B. Sailboat
				C. Fishing
				D. Water skiing
2	_____	_____	_____	E. Drag boat
				F. Houseboat
3	_____	_____	_____	G. Canoe
				H. Runabout
				I. Other (specify)

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- *6. What was the main reason you picked _____ Lake today? (close to home, open water, other launch ramps crowded, good fishing, etc.)

7. Do you own property on this lake? Yes _____ No _____

8. Are you a guest of a person who owns property on this lake? Yes _____ No _____

- *9. How many days have you used _____ Lake this summer?

- *10. How many days have you spent boating this summer? (anywhere) _____

- *10A. How many times have you used _____ Lake between Monday and Friday of this past week? _____

- *11. Place of residence: Zip _____ or street and city _____ or city and county _____

- *12. Approximately how long did you spend on the following activities today? (Approximate quarter hours) (Hand the boater a card) **Ask specifically

- | | | | |
|-----------------|-------|--------------------|-------|
| A. Water skiing | _____ | H. Waiting in line | _____ |
| B. Motor boat | _____ | to launch boat | _____ |
| cruising | _____ | I. Waiting in line | _____ |
| C. Fishing | _____ | to load on | _____ |
| D. Sailing | _____ | ramp | _____ |
| E. Picnicking | _____ | J. Tied to private | _____ |
| F. Sunbathing | _____ | dock | _____ |
| G. Swimming | _____ | K. Paddling or | _____ |
| | | rowing | _____ |
| | | L. Other | _____ |

- *13. OVER

13. On the other side of the card would you please show me where your activities took place today?

Lake Zone	Activity										
	Water skiing	Motor boat cruising	Fishing	Sailing	Picnicking	Sun bathing	Swimming	Other			
	1								WHY (Ask why they selected these areas as to other areas)		LEAVE FOR #18 OPEN
	2										
	3										
	4										
	5										
	6										
	7										
8											
9											

*14a. How do you feel about your experience on this lake today? (Don't ask about conflicts or crowded conditions at first, this is misleading the boater!! If boater indicates conflicts or crowding, then ask his perception of the problem!)

b. What things stood out in your mind as you used the lake today?

c. Do you have any opinions?

15. Employment (specific) _____

116. (Hand the boater a second card and ask) Would you please give me the letter which corresponds with your total family income? _____

17. On the reverse side of the card, would you please give me the letter which corresponds with your completed education? _____

VERY GOOD! JUST ONE FINAL QUESTION!!

*18. During any of the activities you did today, did you ever notice or feel that you were crowded? (Refer to #13 OPEN to answer question)

a. Ask which areas did you feel crowded in?

b. What time in each area did you begin to feel crowded?

THANK YOU VERY MUCH FOR YOUR ASSISTANCE!! GOOD DAY, ETC.

BOAT REGISTRATION NUMBER or IF SAILBOAT, TRAILER LICENSE NO.

MC _____

APPENDIX C

COVER LETTER FOR RIPARIAN QUESTIONNAIRE

DEPARTMENT OF PARK AND RECREATION RESOURCES • NATURAL RESOURCES BUILDING

Dear Lake User:

There is little known about the characteristics of boating and boat owners in Michigan. Through this study an attempt is being made to better understand the Michigan boater. The study is being conducted by the Department of Park and Recreation Resources at Michigan State University under the supervision of, and funded by, the Waterways Division of the Michigan Department of Natural Resources. Your lake is one of three chosen for this study. Your cooperation by returning the attached questionnaire in the enclosed stamped, self-addressed envelope is appreciated.

For several weekends we have been interviewing boaters as they leave the public access site. The results obtained from your questionnaire will be related to the interviews taken at the public access site and to aerial photographs being taken of your lake each hour. All these will help us gain a complete perspective of the boating on your lake.

We are especially concerned with your boating this past week ending Sunday, so the prompt return of your questionnaire is of utmost importance.



Robert Dittrick
Graduate Assistant

APPENDIX D

A TABLE SHOWING THE NUMBER OF 1969 RIPARIAN SURVEY
RESPONDENTS, AVERAGE LAKE FRONTAGE, AND AVERAGE
NUMBER OF BOATS OWNED PER
RIPARIAN SECTION

TABLE D-1.--Number of 1969 riparian survey respondents, average lake frontage, and average number of boats owned per riparian section.

Section Number	Number of Respondents	Average Frontage Ft.	Average Number of Boats per Respondent
UNION LAKE			
1	25	67.0	2.3
2	20	75.9	1.9
3	19	65.8	2.0
4	10	108.6	2.2
5	31	80.4	2.0
6	64	57.2	1.9
7	13	116.6	1.6
ORCHARD LAKE			
9	1	100.0	1.0
10	5	310.2	1.4
11	3	97.7	3.0
12	4	231.0	2.2
13	2	155.0	4.0
14	10	112.2	2.1
15	8	226.5	2.3
16	8	74.3	2.9
17	3	309.0	2.0
18	8	108.3	2.0
19	4	196.5	1.8
CASS LAKE			
20	17	182.6	2.2
21	12	107.0	2.1
22	7	76.3	1.7
23	4	106.3	1.3
24	8	186.9	1.7
25	9	80.0	2.1
26	10	64.7	1.6
27	8	51.9	1.6
28	16	48.2	1.6
29	12	50.3	1.8

TABLE D-1.--Continued

Section Number	Number of Respondents	Average Frontage Ft.	Average Number of Boats per Respondent
CASS LAKE, continued			
30	28	105.2	2.0
31	18	130.2	2.4
32	17	107.5	1.4
33	61	114.4	1.8
34	22	93.6	2.8
35	2	315.0	3.0
36	20	109.2	2.1

APPENDIX E

TABLES COMPARING THE NUMBERS AND TYPES OF BOATS
OWNED TO SOCIO-ECONOMIC CHARACTERISTICS
OF 1969 RIPARIAN SURVEY
RESPONDENTS

TABLE E-1.--The percentage of each type boat owned by 1969 riparian survey respondents in each individual occupation category for all study lakes.

Occupation	Per Cent Response	Canoe	Sail Boat	Fishing	Drag	Pontoon	Water- skiing	Row Boat	Cruiser	Other	Total
Professional- technical	59%	52%	68%	52%	57%	55%	62%	58%	56%	55%	59%
Craftsmen- operative	19	18	11	21	43	17	20	18	23	24	19
Self- employed	7	8	7	7	0	11	7	5	16	0	7
Retired	14	19	13	19	0	14	8	17	2	18	13
Other	2	3	2	1	0	2	3	2	2	3	2

TABLE E-2.--Occupation of 1969 riparian survey respondents compared to the number of each type boat owned for the study lakes.

Occupation	No. Resp.	Type of Boat per Respondent							Lakes
		Canoe	Sail Boat	Fishing	Drag	Pontoon	Water- skiing	Row Boat	
Professional- technical	98	.07	.24	.27	.01	.10	.68	.38	1.92
	42	.21	.45	.48	.02	.24	.52	.21	2.29
	140	.14	.33	.26	.01	.11	.59	.22	1.66
	280	.13	.31	.30	.01	.13	.61	.28	1.93
Craftsmen- Operative	33	.09	.21	.39	.06	.18	.64	.24	1.88
	1	1.00	.00	.00	.00	.00	1.00	1.00	3.00
	57	.16	.12	.37	.02	.11	.58	.26	1.89
	91	.14	.15	.37	.03	.13	.60	.26	1.90
Self- employed	8	.23	.50	.63	.00	.38	.75	.13	2.63
	3	.00	.33	.67	.00	.33	.33	.00	2.00
	23	.17	.17	.22	.00	.13	.57	.26	1.65
	34	.18	.26	.35	.00	.21	.59	.21	2.00
Retired	26	.12	.31	.27	.00	.08	.42	.38	1.73
	7	.14	.14	1.00	.00	.14	.00	.43	1.86
	32	.31	.25	.50	.00	.19	.34	.28	1.97
	65	.22	.26	.46	.00	.14	.34	.34	1.86
Other	4	.25	.25	.50	.00	.00	1.00	.25	2.50
	2	.50	.50	.00	.00	.00	1.00	1.00	3.00
	2	.00	.00	.00	.00	.50	.50	.00	1.50
	8	.25	.25	.25	.00	.13	.88	.38	2.38

TABLE E-3.---Education of 1969 riparian survey respondents compared to the number of each type boat owned for the study lakes.

Education	No.	Type of Boat per Respondent								Lake		
		Canoe	Sail Boat	Fishing	Drag	Pontoon	Water-skiing	Row Boat	Cruiser		Other	Total
8th Grade or Less	2	.00	.00	.50	.00	.00	.50	.00	.00	.50	1.50	Union
	2	.00	.00	1.00	.00	.50	.50	.50	.00	.00	2.50	Orchard
	10	.10	.00	.50	.00	.10	.20	.20	.10	.10	1.30	Cass
	14	.07	.00	.57	.00	.14	.28	.21	.07	.14	1.50	Total
Some High School	13	.07	.15	.30	.17	.15	.92	.30	.00	.07	2.07	Union
	1	.00	1.00	2.00	.00	.00	.00	.00	.00	.00	3.00	Orchard
	41	.17	.17	.39	.05	.10	.56	.27	.24	.12	2.10	Cass
	65	.12	.15	.34	.05	.10	.55	.23	.15	.10	1.78	Total
High School Graduate	40	.15	.22	.35	.02	.15	.55	.35	.07	.05	1.92	Union
	3	.00	.67	.00	.00	.33	.33	.67	.00	1.00	2.00	Orchard
	58	.00	.67	.00	.00	.33	.33	.67	.00	1.00	2.00	Cass
	101	.12	.22	.34	.01	.13	.53	.26	.11	.05	1.82	Total
Some College	63	.11	.25	.34	.02	.18	.56	.30	.05	.08	1.89	Union
	15	.40	.40	.33	.00	.07	.73	.07	.00	.07	2.01	Orchard
	69	.14	.20	.25	.00	.17	.59	.29	.12	.06	1.85	Cass
	147	.16	.24	.30	.01	.16	.59	.27	.07	.07	1.88	Total
College Graduate	27	.11	.22	.37	.00	.07	.78	.37	.04	.07	2.04	Union
	16	.25	.44	.50	.00	.19	.44	.38	.13	.06	2.38	Orchard
	40	.13	.45	.25	.03	.13	.63	.23	.10	.00	1.93	Cass
	83	.14	.37	.34	.01	.12	.64	.30	.08	.04	2.05	Total

TABLE E-3.--Continued

Education	No.	Type of Boat per Respondent										Lake
		Canoe	Sail Boat	Fishing	Drag	Pontoon	Water-skiing	Row Boat	Cruiser	Other	Total	
Post Graduate Work	6	.00	.83	.17	.00	.00	.83	.50	.00	.00	2.00	Union
	8	.25	.38	.63	.13	.63	.38	.25	.13	.25	3.00	Orchard
	9	.11	.00	.33	.00	.11	.44	.33	.11	.00	1.44	Cass
	23	.13	.26	.39	.04	.26	.52	.35	.09	.09	2.13	Total
Advanced Degree	16	.13	.31	.13	.00	.00	.75	.50	.00	.19	2.00	Union
	7	.00	.43	.57	.00	.14	.43	.14	.00	.00	1.71	Orchard
	19	.32	.56	.32	.00	.11	.63	.16	.05	.05	2.21	Cass
	42	.19	.45	.29	.00	.07	.64	.29	.02	.10	2.05	Total
Student	2	.00	.50	.50	.00	.00	1.00	.00	.00	.00	2.00	Union
	0	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	Orchard
	0	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	Cass
	2	.00	.50	.50	.00	.00	1.00	.00	.00	.00	2.00	Total

TABLE E-4.--Number and type of boats owned per 1969 riparian survey respondent in the higher income categories, Union and Cass lakes.^a

Income	Lake	Type of Boat per Respondent									
		Canoë	Sail Boat	Fishing	Drag	Pontoon	Water-skiing	Row Boat	Cruiser	Other	Total
\$10,000-14,999	Union	.11	.17	.25	.03	.23	.47	.36	.08	.00	1.67
	Cass	.14	.10	.33	.00	.10	.62	.26	.09	.05	1.68
\$15,000-19,999	Union	.16	.33	.40	.02	.18	.67	.33	.04	.07	2.20
	Cass	.26	.32	.32	.00	.12	.56	.21	.03	.00	1.82
\$20,000-24,999	Union	.14	.29	.43	.00	.00	.76	.43	.05	.05	2.14
	Cass	.22	.17	.33	.00	.22	.50	.28	.17	.00	1.89
\$25,000-Over	Union	.09	.31	.26	.00	.06	.83	.34	.03	.14	2.06
	Cass	.14	.40	.22	.03	.16	.59	.26	.16	.07	2.20

^a Orchard Lake had a low frequency of respondents so was not included in this table.

APPENDIX F

TABLES COMPARING SOCIO-ECONOMIC CHARACTERISTICS
OF 1969 RIPARIAN SURVEY RESPONDENTS
TO USE PATTERNS

TABLE F-1.--Occupation of 1969 riparian survey respondents compared to the number of hours boated.

No. Resp.	Number of Hours Boated per Respondent				Lake
	Monday	Weekdays	Weekends	Total	
PROFESSIONAL-TECHNICAL					
104	1.16	4.75	4.74	10.65	Union
44	.93	4.68	5.36	10.97	Orchard
154	1.13	4.25	4.36	9.74	Cass
302	1.11	4.49	4.64	10.24	Total
CRAFTSMEN-OPERATIVE					
34	1.76	6.06	4.97	12.79	Union
1	.00	.00	8.00	8.00	Orchard
64	1.19	2.67	3.23	7.09	Cass
99	1.37	3.81	3.88	9.06	Total
SELF-EMPLOYED					
9	1.78	5.33	4.66	11.66	Union
3	2.00	8.33	3.00	13.33	Orchard
26	1.04	4.96	3.88	9.88	Cass
38	1.29	5.32	4.00	10.61	Total
RETIRED					
30	.40	2.67	3.07	6.13	Union
7	.43	1.86	1.14	3.48	Orchard
39	1.79	4.36	3.00	9.15	Cass
76	1.12	3.46	2.86	7.43	Total
OTHER					
5	1.00	4.20	2.60	7.80	Union
2	1.00	6.50	5.33	6.20	Orchard
5	.40	.80	1.00	2.20	Cass
12	.75	3.17	2.83	6.75	Total

TABLE F-2.--Income of 1969 riparian survey respondents compared to the number of hours boated.

No. Resp.	Number of Hours Boated per Respondent				Lake
	Mondays	Weekdays	Weekends	Total	
\$4,999 & UNDER					
10	.30	1.50	1.30	3.10	Union
1	.00	3.00	.00	3.00	Orchard
14	1.50	4.36	3.29	9.14	Cass
25	.96	3.16	2.36	6.48	Total
\$5,000-6,999					
5	.20	1.00	.60	1.80	Union
1	.00	.00	.00	.00	Orchard
11	1.00	1.27	2.36	4.64	Cass
17	.71	1.12	1.71	2.94	Total
\$7,000-7,999					
4	2.75	11.25	8.25	22.25	Union
0	.00	.00	.00	.00	Orchard
7	.57	.57	1.14	2.29	Cass
11	1.36	4.45	3.73	7.00	Total
\$8,000-9,999					
6	1.17	9.50	5.83	16.50	Union
1	1.00	1.00	.00	2.00	Orchard
16	1.06	1.94	3.44	6.44	Cass
23	1.09	3.87	3.91	8.87	Total
\$10,000-14,999					
39	.95	3.46	3.36	7.77	Union
4	.00	1.25	2.50	3.75	Orchard
64	1.16	3.27	3.67	8.09	Cass
107	1.03	3.26	3.15	7.81	Total

TABLE F-2.--Continued

No. Resp.	Number of Hours Boated per Respondent				Lake
	Mondays	Weekdays	Weekends	Total	
\$15,000-19,999					
46	1.30	4.24	5.20	10.74	Union
7	.86	5.14	8.57	14.57	Orchard
39	1.35	4.46	2.69	8.51	Cass
92	1.29	4.40	4.39	10.09	Total
\$20,000-24,000					
21	2.33	7.81	6.29	16.43	Union
4	.25	2.25	3.25	5.75	Orchard
18	1.56	5.50	5.94	13.00	Cass
43	1.81	6.33	5.86	14.00	Total
\$25,000-OVER					
35	.97	4.88	4.00	9.86	Union
32	1.03	4.91	5.50	11.44	Orchard
62	1.26	5.39	5.24	11.89	Cass
129	1.12	5.13	4.97	11.53	Total

TABLE F-3.--Education of 1969 riparian survey respondents compared to the number of hours boated.

No. Resp.	Number of Hours Boated per Respondent				Lake
	Mondays	Weekdays	Weekends	Total	
8TH GRADE OR LESS					
3	.00	2.33	1.00	3.33	Union
2	.00	3.00	4.50	7.50	Orchard
13	.23	1.15	.92	2.31	Cass
18	.17	1.56	1.33	3.06	Total
SOME HIGH SCHOOL					
16	.94	4.63	6.06	11.63	Union
1	.00	2.00	.00	2.00	Orchard
48	2.04	6.27	3.90	12.15	Cass
65	1.74	5.77	4.37	11.86	Total
HIGH SCHOOL GRADUATE					
43	1.28	5.33	3.67	10.28	Union
3	.67	1.00	.67	2.33	Orchard
65	1.31	3.69	3.75	8.75	Cass
111	1.28	4.25	3.64	9.17	Total
SOME COLLEGE					
67	1.34	4.81	4.31	10.46	Union
15	.80	4.53	4.67	10.00	Orchard
79	1.05	3.57	3.90	8.52	Cass
161	1.15	4.17	4.14	9.47	Total
COLLEGE GRADUATE					
28	.92	4.39	5.79	11.11	Union
17	1.12	4.76	5.82	11.71	Orchard
43	.95	3.47	3.84	8.26	Cass
88	.98	4.01	4.84	9.83	Total

TABLE F-3.--Continued

No. Resp.	Number of Hours Boated per Respondent				Lake
	Mondays	Weekdays	Weekends	Total	
POST GRADUATE WORK					
7	1.29	5.43	6.00	12.71	Union
9	2.00	9.56	7.44	19.00	Orchard
9	.22	2.22	2.44	4.89	Cass
25	1.16	5.76	5.24	12.16	Total
ADVANCED DEGREE					
16	1.19	3.81	3.19	8.19	Union
7	.14	1.57	3.14	4.86	Orchard
21	1.29	4.14	6.19	11.62	Cass
44	1.07	3.61	4.61	9.30	Total
STUDENT					
2	.50	.50	1.00	2.00	Union
0	.00	.00	.00	.00	Orchard
0	.00	.00	.00	.00	Cass
2	.50	.50	1.00	2.00	Total

APPENDIX G

TABLES COMPARING FREQUENCIES OF POSITIVE AND
NEGATIVE ATTITUDES OF 1969 RIPARIAN
SURVEY RESPONDENTS TO INCOME ON
THE STUDY LAKES

TABLE G-1.--Frequency of positive and negative attitudes of Union Lake 1969 riparian survey respondents compared to income.

Income	No. Neg. Resp.	No. Pos. Resp.	No. Respon- dents	% Resp.	% Neg. Resp.	% Pos. Resp.	Respondent	
							Neg. Resp.	Pos. Resp.
\$4,999-Under	18	0	5	3	5	0	3.6	0.0
\$5,000-6,999	9	0	4	3	3	0	2.3	0.0
\$7,000-7,999	4	0	3	2	1	0	1.3	0.0
\$8,000-9,999	19	0	5	3	5	0	3.8	1.2
\$10,000-14,999	91	6	36	23	26	24	2.5	0.3
\$15,000-19,999	107	9	45	29	31	36	2.4	0.1
\$20,000-24,999	36	5	21	14	10	20	1.7	0.2
\$25,000-Over	65	5	35	23	19	20	1.9	0.7

TABLE G-2.--Frequency of positive and negative attitudes of Orchard Lake 1969 riparian survey respondents compared to income.

Income	No. Neg. Resp.	No. Pos. Resp.	No. Respon- dents	%	Resp.	%	Neg. Resp.	%	Pos. Resp.	Respondent	
										Neg. Resp.	Pos. Resp.
\$4,999-Under	2	0	1	2	2	0	2	0	0	2.0	0.0
\$5,000-6,999	0	0	1	2	0	0	0	0	0	0.0	0.0
\$7,000-7,999	0	0	0	0	0	0	0	0	0	0.0	0.0
\$8,000-9,999	4	0	1	2	3	0	4	0	0	4.0	0.0
\$10,000-14,999	7	0	4	8	6	0	1	0	0	1.8	0.0
\$15,000-19,999	25	0	7	15	20	0	3	0	0	3.6	0.0
\$20,000-24,999	12	0	3	6	10	0	4	0	0	4.0	0.0
\$25,000-Over	76	3	31	65	60	100	2	0	0	2.5	0.1

TABLE G-3.--Frequency of positive and negative attitudes of Cass Lake 1969 riparian survey respondents compared to income.

Income	No. Neg. Resp.	No. Pos. Resp.	No. Respon- dents	% Resp.	% Neg. Resp.	% Pos. Resp.	Respondent	
							Neg. Resp.	Pos. Resp.
\$4,999-Under	21	3	11	5	5	12	1.9	0.3
\$5,000-6,999	15	0	7	3	3	0	2.1	0.0
\$7,000-7,999	11	0	5	2	3	0	2.2	0.0
\$8,000-9,999	23	0	14	7	5	0	1.6	0.0
\$10,000-14,999	104	10	58	28	24	40	1.8	0.2
\$15,000-19,999	92	5	34	17	21	20	2.7	0.1
\$20,000-24,999	27	0	18	9	6	0	1.5	0.0
\$25,000-Over	140	7	58	28	32	28	2.4	0.1

APPENDIX H

**TABLES COMPARING FREQUENCIES OF POSITIVE AND
NEGATIVE ATTITUDES OF 1969 RIPARIAN
SURVEY RESPONDENTS TO EDUCATION
ON THE STUDY LAKES**

TABLE H-1.--Frequency of positive and negative attitudes of Union Lake 1969 riparian survey respondents compared to education.

Level of Education	No. Neg. Resp.	No. Pos. Resp.	No. Respondents	% Resp.	% Neg. Resp.	% Pos. Resp.	Respondent	
							Neg. Resp.	Pos. Resp.
8th Grade or Less	9	0	2	1	2	0	4.5	0.0
Some High School	24	3	13	8	7	12	1.8	0.2
High School Graduate	98	6	40	24	27	23	2.5	0.2
Some College	124	10	63	37	34	38	2.0	0.2
College Graduate	53	2	27	16	14	8	2.0	0.1
Post Graduate Work	20	1	6	4	5	4	3.3	0.2
Advanced Degree	37	4	16	9	10	15	2.3	0.3
Student	4	0	2	1	1	0	--	--

TABLE H-2.--Frequency of positive and negative attitudes of Orchard Lake 1969 riparian survey respondents compared to education.

Level of Education	No. Neg. Resp.	No. Pos. Resp.	No. Respondents	% Resp.	% Neg. Resp.	% Pos. Resp.	Respondent	
							Neg. Resp.	Pos. Resp.
8th Grade or Less	4	0	2	4	3	0	2.0	0.0
Some High School	5	0	1	2	3	0	5.0	0.0
High School Graduate	0	0	3	6	0	0	0.0	0.0
Some College	34	2	15	29	23	67	2.3	0.1
College Graduate	47	1	16	31	32	33	2.9	0.1
Post Graduate Work	35	0	8	15	24	0	4.4	0.0
Advanced Degree	21	0	7	13	14	0	3.0	0.0
Student	0	0	0	0	0	0	--	--

TABLE H-3.--Frequency of positive and negative attitudes of Cass Lake 1969 riparian survey respondents compared to education.

Level of Education	No. Neg. Resp.	No. Pos. Resp.	No. Respondents	% Resp.	% Neg. Resp.	% Pos. Resp.	Respondent	
							Neg. Resp.	Pos. Resp.
8th Grade or Less	17		10	4	3	9	1.7	0.3
Some High School	90	4	41	17	17	12	2.2	0.1
High School Graduate	110	6	58	24	20	18	1.9	0.1
Some College	186	15	69	28	34	44	2.7	0.2
College Graduate	69	3	40	16	13	9	1.7	0.1
Post Graduate Work	23	1	9	4	4	3	2.6	0.1
Advanced Degree	47	2	19	8	9	6	2.5	0.1
Student	0	0	0	0	0	0	--	--

APPENDIX I

TABLES COMPARING FREQUENCIES OF POSITIVE AND
NEGATIVE ATTITUDES OF 1969 RIPARIAN
SURVEY RESPONDENTS TO OCCUPATION

TABLE I-1.--Frequency of positive and negative attitudes of Union Lake 1969 riparian survey respondents compared to occupation.

Occupation	No. Neg. Resp.	No. Pos. Resp.	No. Respon- dents	%	%	%	Respondent	
							Neg. Resp.	Pos. Resp.
Professional- technical	216	19	98	58	57	73	2.2	0.2
Craftsmen- operative	72	4	33	20	19	15	2.2	0.1
Self-employed	25	2	8	5	7	8	3.1	0.3
Retired	56	1	26	15	15	4	2.2	0.0
Other	9	0	4	2	2	0	2.3	0.0

TABLE I-2.--Frequency of positive and negative attitudes of Orchard Lake 1969 riparian survey respondents compared to occupation.

Occupation	No. Neg. Resp.	No. Pos. Resp.	No. Respon- dents	%	%	%	Respondent	
							Neg. Resp.	Pos. Resp.
Professional- technical	116	3	42	76	78	75	2.8	0.1
Craftsmen- operative	0	0	1	2	0	0	0.0	0.0
Self-employed	6	0	3	5	4	0	2.0	0.0
Retired	25	0	7	13	17	0	3.6	0.0
Other	1	1	2	4	0	25	0.5	0.5

TABLE I-3.--Frequency of positive and negative attitudes of Cass Lake 1969 riparian survey respondents compared to occupation.

Occupation	No. Neg. Resp.	No. Pos. Resp.	No. Respon- dents	%	%	%	Respondent	
							Neg. Resp.	Pos. Resp.
Professional- technical	306	17	140	55	54	50	2.2	0.1
Craftsmen- operative	115	8	57	22	20	24	2.0	0.1
Self-employed	63	2	23	9	11	6	2.7	0.1
Retired	71	6	32	13	13	18	2.2	0.2
Other	9	1	2	1	2	3	4.5	0.5



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