

JMB:15



3 1293 10246 4777

L

6307

V-041

NC
3

02010338

29-26-10

100-7100

MAY 06 1900

SEP 13 2001
070001

MAY 22 2002

OCT 19 88
200 A 280

MAY 15 1999

JUN 14 1999

MAG 12

FEB 05 1999

THE IMPACT OF GREAT LAKES RECREATIONAL
BOATING ON THE ECONOMY OF MICHIGAN

By

Robert William Schott

A THESIS

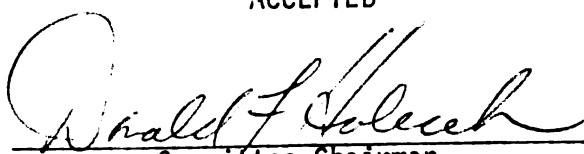
Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

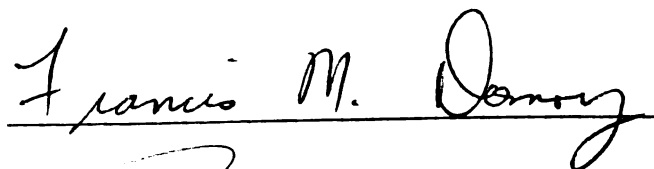
Department of Park and Recreation Resources

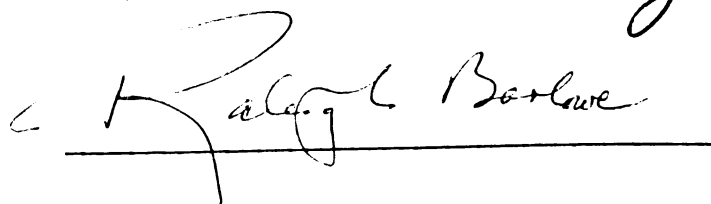
1975

ACCEPTED



Committee Chairman





ABSTRACT

THE IMPACT OF GREAT LAKES RECREATIONAL BOATING ON THE ECONOMY OF MICHIGAN

By

Robert William Schott

The goal of this study was to estimate the impact of Great Lakes recreational boating on the economy of Michigan. This impact was measured and reported in three different ways: (1) dollar flow into the economy of Michigan, (2) dollar flow into individual industries within the economy, and (3) the number of jobs created in these industries. No attempt was made to estimate the value of recreational boating to the participants themselves.

The dollar values produced in this report are only estimates based on the best currently available data. Attempts were made throughout the study to take a conservative approach in interpreting obviously weak data rather than risk inflating the final estimates.

Two study regions for data collection and analysis were designated: SW Michigan, NW Illinois, and NE Indiana (Region One), and the entire State of Michigan (Region Two).

Expenditure data for Great Lakes boaters were obtained from two surveys conducted by the Department of Park and Recreation Resources at Michigan State University. One of these studies focused on estimating average boater expenditure, and the other on estimating

the proportion of the total boating population who boat primarily on the Great Lakes. The expenditure data were collected from Lake Michigan boaters. Analysis of Study Region One also focused on Lake Michigan. Study Region Two analysis concentrated on the entire State of Michigan and the surrounding Great Lakes. Selected boating-related data prepared by public and private sources were also collected and used in the analysis.

For this analysis, craft were placed into categories by length, and main source of power. The minimum length examined was 20 feet because it was assumed smaller craft could not consistently use the Great Lakes. All craft 20' and larger were aggregated into length categories of 20'-30', 30'-45', or 45' plus. Furthermore, craft were classified into motor or sail categories.

This analysis suggests that 5,657 registered boaters who reside in Study Region One access Lake Michigan from Michigan. Ninety-three percent of these boaters reside in southwest Michigan. It also indicates that 23,189 Michigan residents use Lake Michigan or other Great Lakes gaining access from Michigan shores. The 20'-30' motor boat category is the most frequently encountered craft in both Study Regions One and Two.

Direct expenditures by Great Lakes boaters in the southwest Michigan geographical area are estimated to total 29 million dollars of which \$7,000,000 is spent on new craft, \$12,000,000 on other craft-related items and services, \$6,000,000 on personal items and services, and the remaining \$4,000,000 is spent on related auto travel.

Direct expenditures are not the only impact on an economy. The effect of the direct dollars when respent by recipients also produces an indirect impact. This indirect impact can be estimated by using economic multipliers obtained from an input-output study. Since no specific multiplier for Michigan could be obtained, it was necessary to use multipliers derived from three different input-output studies for this analysis. Two of these studies were conducted nationally (one by the U.S. Department of Commerce and one by Fortune magazine), and the other had a regional focus (Door County, Wisconsin). The effect of applying multipliers to the direct expenditures in southwest Michigan produced a range of \$48.5 million to \$53.5 million as the net income effect to the economy of local communities within SW Michigan. The net income to each selected industry in SW Michigan was also determined and these figures were used to obtain the total number of jobs created in SW Michigan by Great Lakes recreation boating (2073).

SW Michigan data were extrapolated and adjusted to produce an estimate of \$125 million in direct Great Lakes boaters expenditures in the entire State of Michigan. This amount includes: \$31 million for new craft, \$53 million for craft related, and \$40.5 million for personal and trip expenses combined. A range of \$209 million to \$230 million was estimated as the direct and indirect income accruing to the economy of Michigan following multiplier analysis. Finally, an estimate of 8931 jobs created in Michigan was derived.

The final estimated impact figures have been objectively derived, but limitations on their reliability and usefulness do exist.

Specifically, these limitations concern: (1) the extrapolation of SW Michigan data to the entire state, (2) the use of multipliers from areas located outside of Michigan, and (3) inadequate information on new craft sales and prices.

THE IMPACT OF GREAT LAKES RECREATIONAL
BOATING ON THE ECONOMY OF MICHIGAN

By

Robert William Schott

A THESIS

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

MASTER OF SCIENCE

Department of Park and Recreation Resources

1975

DEDICATION

I would like to dedicate this literary effort to my parents, Jill and George, who throughout my life have educated me in the ways of the world, not only by their words, but by their actions as well. I would like to say thank you through this dedication. The written word is only one way among many, in which I can express my gratitude for all their sacrifices and assistance, both material and intangible, during my academic career.

ACKNOWLEDGMENTS

I wish to acknowledge the assistance of the individuals who contributed their time and interests to this study.

Assistance was provided by Mr. James E. Oakwood of the Waterways Division research staff. His contribution included useful information for a number of areas within the study.

I would also like to thank Mr. Thomas Warner and Mr. Chien Han of the department of Park and Recreation Resources, Michigan State University, for their invaluable assistance throughout the project.

I am especially indebted to Dr. Donald F. Holecek, principal investigator, who also served in the important capacity of major advisor during this project, and throughout my entire Masters program. I would also like to thank Dr. Raleigh Barlowe of the department of Resource Development and Dr. Francis Domoy of the department of Park and Recreation Resources, who served on my Masters Degree Committee.

Acknowledgment is also due the Michigan Waterways Division, who provided funding for the grant which made this impact study possible.

Last, but certainly not least, I would like to give recognition to the secretaries of the Park and Recreation Resources department for their help in this and other projects we have been associated with during my tenure at Michigan State University.

TABLE OF CONTENTS

	Page
LIST OF TABLES	vi
LIST OF FIGURES	ix
 Chapter	
I. INTRODUCTION	1
Importance of Recreation to the Michigan Economy . . .	3
The Problem Area	6
Problem Statement	6
Objectives	9
Assumptions, Delimitations, and Definitions	10
II. REVIEW OF THE LITERATURE	12
General Overview of the Literature	12
Input-Output Methodology and Analysis	14
Expenditure Data	27
III. RESEARCH METHODOLOGY	30
Study Parameters	30
Study Procedures	35
IV. GENERAL RESEARCH FINDINGS	41
Average Boater Expenditures	42
Regional and State Registered Boat-Own- ing Populations	58
Direct Expenditures in Southwest Michigan	76
Economic Multipliers	82
Total Income Effect on the Economy of Southwest Michigan	90
Net Income Effect to Industries in Southwest Michigan	94
Dollars Needed to Create One New Job in the State of Michigan	100
Number of Jobs Created in Southwest Michigan	100
Direct Expenditures in Michigan	104

Chapter	Page
Total Income Effect on the Economy of Michigan	107
Net Income Effect to Industries in Michigan	112
Number of Jobs Created in Michigan	112
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	116
APPENDICES	126
A. DISCUSSION OF THE PROCEDURE USED TO ADJUST THE REGISTERED BOAT POPULATION FIGURES FOR THE STATE OF ILLINOIS	127
B. A DISCUSSION OF THE PROCESS USED TO DETERMINE THE NET INCOME EFFECT TO INDUSTRIES FROM GREAT LAKES RECREATIONAL BOATING EXPENDITURES	130
BIBLIOGRAPHY	135

LIST OF TABLES

Table	Page
2-1. A Simplified Input-Output Table	15
2-2. A Simplified Table of Industry Multipliers	16
2-3. Hypothetical Transactions Table	18
2-4. Input Coefficient Table	20
2-5. Direct and Indirect Requirements Per Dollar of Final Demand	21
4-1. Annual Average Craft-Related Expenditures by Craft Type and Length (Dollars)	44
4-2. Annual Average Personal and Trip-Related Expenditures by Craft Type and Length (Dollars)	45
4-3. Total Annual Average Craft-Related Expenditures by State in Which Boat Owners Reside, and by Length and Type of Craft Owned (Dollars)	51
4-4. Average Cost of Boating-Related Auto Travel During the Boating Season	55
4-5. Total Annual Average Personal- and Trip-Related Expenditures by State in Which Boat Owners Reside, and by Length and Type of Craft Owned (Dollars)	56
4-6. Total Annual Average Expenditures by State in Which Boat Owners Reside, and by Length and Type of Craft Owned (Dollars)	56
4-7. Average New Craft Price Estimates for 1974 (Dollars) . .	57
4-8. Total Registered Boat Population by State in Study Region One	59
4-9. Total Sample of Regional Boaters Using Lake Michigan Compared to Total Regional Sample	62

Table	Page
4-10. Total Percentage of Sampled Boaters Using Lake Michigan in Study Region One	62
4-11. Estimated Number of Boaters Using Lake Michigan in Study Region One	64
4-12. Summary of Totals and Percentages of Registered Boats in Study Region One Moored in SW Michigan Counties Using Lake Michigan	65
4-13. Original and Adjusted Michigan Registered Boat Population (1974)	67
4-14. Total Sample of Michigan Boaters Using Great Lakes Compared to Total State Sample	69
4-15. Total Percentage of Sampled Boaters Using the Great Lakes in Michigan (Study Region Two)	69
4-16. Estimated Number of Boaters Using the Great Lakes in Michigan (Study Region Two)	70
4-17. Michigan Original and Adjusted Registered Boat Population (1974)	73
4-18. Michigan Original and Adjusted Registered Boat Population (1971)	73
4-19. Change in Registered Michigan Boat Population, 1974-1971	74
4-20. SW Michigan Boaters Using Lake Michigan Compared to Total State Boaters	75
4-21. Percentage of SW Michigan Boaters Using Lake Michigan Compared to State Totals	75
4-22. Estimated Number of New Craft Registered in SW Michigan and Used on Lake Michigan	75
4-23. Estimated Number of New Craft Registered in Michigan and Used on the Great Lakes	76
4-24. Estimated Direct Expenditures for New Craft Purchased in SW Michigan	77
4-25. Summary of Estimated Total Annual Direct Craft-, Personal-, and Trip-Related Expenditures in SW Michigan	78

Table	Page
4-26. SW Michigan (Study Region One) Estimated Total Annual Direct Craft-Related Expenditures by Craft Type and Length (Dollars)	80
4-27. SW Michigan (Study Region One) Estimated Total Annual Direct Personal- and Trip-Related Expenditures by Craft Type and Length (Dollars)	81
4-28. Table of Economic Multipliers by Industry Sector	89
4-29. SW Michigan Net Income Effect on the Economy After Application of Multipliers (Dollars)	91
4-30. Direct and Indirect Effect to Southwest Michigan Industries From Lake Michigan Boater Expenditures (Thousands of Dollars)	96
4-31. Dollars Needed to Create One New Job in the State of Michigan	101
4-32. Number of Jobs Created in Southwest Michigan by Lake Michigan Boater Expenditures	102
4-33. Estimated Annual Direct Expenditures for New Craft Purchased in Michigan	106
4-34. Summary of Estimated Total Annual Direct Craft-, Personal-, and Trip-Related Expenditures in Michigan	107
4-35. Michigan (Study Region Two) Estimated Total Annual Direct Craft-Related Expenditures by Craft Type and Length (Dollars)	108
4-36. Michigan (Study Region Two) Estimated Total Annual Direct Personal- and Trip-Related Expenditures by Craft Type and Length (Dollars)	109
4-37. Michigan Net Income Effect on the Economy After Application of Multipliers (Dollars)	110
4-38. Direct and Indirect Effect to Michigan Industries From Great Lakes Boater Expenditures (Thousands of Dollars)	113
4-39. Number of Jobs Created in Michigan by Great Lakes Boater Expenditures	115

LIST OF FIGURES

Figure	Page
3-1. Study Region One--Southwestern Michigan, Northwestern Indiana, and Northeastern Illinois	33
3-2. Study Region Two--The State of Michigan	36
3-3. Project Flow Chart	37

CHAPTER I

INTRODUCTION

The economic impact of recreation has become the topic of much discussion in recent years. No longer considered a minor segment of the United States economic picture, many national and local businesses realize the virtual dependency they have on consumers' leisure-time expenditures. "Tourism and recreation development are often regarded as particularly attractive investments for a region because of the export characteristics of the business, goods and services being marketed, in large part to non-resident consumers."¹ Many supplementary services such as ski lodges and specialized equipment markets are specifically built to accommodate new recreation development. Existing local establishments such as gas stations, restaurants, and lodging places also benefit from recreation development in the region and might not otherwise stay in business or operate as successfully without this added income generated by tourists.

These gross dollar flows in communities which are stimulated by visitors vary from area to area, depending on the attractiveness and availability of recreation activity and supplemental services.

¹Marion Clawson and Jack Knetsch, Economics of Outdoor Recreation (Baltimore: The Johns Hopkins Press, 1966), p. 231.

Although the business of recreation is prospering in many areas, investors have lost money on some projects. What is the reason for this? Recreation investment, like any other business, involves risk of some sort. But unlike many businesses, recreation has many unique characteristics which make investment decisions difficult. The measurement of value is one of these. The value of a recreation product, i.e., a boat to the consumer, is relatively easy to measure, but the value of the recreation activity, i.e., boating on Lake Michigan, is often difficult to gauge. Consequently, these values need not always be tangible as in most businesses, but may take other forms. There is a tangible dollar value of a factory worker buying a fishing rod; but how do we measure the value this harried factory worker obtains by sitting quietly at his favorite fishing hole? The latter activity produces personal satisfaction and someone has yet to invent a technique or device to accurately measure this intangible benefit. Because this satisfaction is difficult to measure, should we ignore it? This satisfaction does exist and has direct bearing on the purchase of a tangible product. It would appear more advantageous to manufacture fishing rods and let someone else provide the fishing hole; but what good is it to produce fishing rods if fishing sites are not available? Many people do make a living by stocking fishing ponds and this shows that some aspects of intangible benefits are measurable.

The measurement of value in recreation investment is difficult because of the major role of intangibles which is usually not as pronounced in other industries.²

It should be remembered that both tangible and intangible benefits result from recreation-related investments and it is highly desirable to know as much as possible about each before an investment decision is made.

Importance of Recreation to the Michigan Economy

To most people the word "recreation" connotes thoughts of leisure time, vacation, and relaxation. The definitions are applicable to the vast majority of Michigan residents, but there are some people to whom the word "recreation" means precisely the opposite. To these people the word stands for employment and work. Often, people forget a good portion of Michigan's workers depend on recreation to provide service- or product-oriented job opportunities. The Department of Natural Resource ranger, the canoe livery owners, and the ushers at Detroit's Tiger Stadium are but a few who have recreation-related occupations. Recreation is vital to the Michigan economy.

Economics "is the way society chooses to employ its limited resources, which have alternative uses, to produce goods and services for present and future consumption."³ The field of allocating limited resources for leisure activity is called recreation economics.

²This brief discourse on intangible benefits will be followed by a discussion of tangible benefits in the next section.

³Milton H. Spencer, Contemporary Economics (New York: Worth Publishers, 1971), p. 687.

Recreation economics has lagged behind other subfields of economics and is just beginning to come into its own as a viable and useful tool for achieving specific economic objectives. It is now possible, through judicious use of established economic principles, to analyze pertinent information so as to establish a solid basis for intelligent decision making and planning.

A most useful measure to incorporate in the public decision-making process is that of economic impact. Marion Clawson and Jack Knetsch describe this as the second of two tangible benefits of recreation investment. Specifically, they state: "this class of benefits includes the gains in the area where the expenditures are made. What is expense to the recreationist is income to the supplier of his goods and services."⁴ The first class of benefits is directly related to the recreationist himself and is largely expressed as the willingness to pay on the part of consumers of recreation service. The first class of benefits is beyond the scope of this work and will not be brought to the fore. It is the second class of benefits that will be dealt with here. This class of benefits is of interest to local decision makers, since it directly affects the impact of the economy in their area.

Knowledge of the economic impact that a particular activity has in a region provides decision makers with some measure of the contribution that activity makes to that region's economic well being. This information is important in allocating public monies among

⁴Clawson and Knetsch, p. 231.

investment alternatives to maximize the benefits to society from such public investments.

For example, public investments to develop marinas and other boating-related facilities on the Great Lakes have been characterized by some as being public subsidies to the rich since participation in Great Lakes boating is primarily limited to individuals with sufficient incomes to participate in this expensive recreation activity.⁵ If one considers only the benefits which accrue to Great Lakes boaters, the above characterization appears to have considerable merit. However, if one takes a broader view of the impact investments in Great Lakes boating have on the residents of Michigan, it may be possible to arrive at a different conclusion. Boaters spend substantial sums of money on commodities and services in Michigan each year. These expenditures ultimately translate into jobs and income for less affluent citizens of Michigan.

In addition to providing information for improved allocations of public monies, the importance of an activity to the economy of a region is often valuable in making other decisions. The decreased consumption of energy will be of concern to planners for many years. This situation has produced pleas from many diverse interest groups to reduce and even prohibit recreation activities which they feel divert energy from more important uses. Knowledge of the impact of the recreation dollar on a region may produce evidence which actually encourages these activities in favor of other uses.

⁵For further discussion, see Daniel E. Chappelle, "The 'Need' for Outdoor Recreation: An Economic Conundrum," Journal of Leisure Research 5 (Fall 1973): 47-53.

The Problem Area

The economic impact of recreation on different industries is information which is difficult but not impossible to obtain. It is the goal of this project to collect and analyze such information so that it will be available to decision makers. The impact of all forms of recreation spending on the economy of Michigan is too huge to explore in a study of this size. It will therefore dwell on only one facet of the Michigan outdoor recreation scene and try to determine its importance to Michigan's economy. This facet is Great Lakes recreational boating.

Problem Statement

TO ASCERTAIN THE TANGIBLE DOLLAR BENEFITS WHICH ACCRUE TO A REGION BECAUSE OF THE EXISTENCE OF RECREATIONAL BOATING ON THE GREAT LAKES.

This project does not purport to measure the total benefits, tangible and intangible, of this activity. For example, no attempt will be made to estimate the value of boating to the participants themselves.

A truly definitive study to ascertain the impact of Great Lakes boating on Michigan's economy would require a very costly research effort. Because of the complexity and the interdependencies which exist in Michigan's economy, an accurate assessment of economic impact requires a systems approach such as that offered by the input-output (I/O) regional modeling technique.⁶ The construction of such

⁶Daniel W. Bromley, "An Alternative to Input-Output Models: A Methodological Hypothesis," Land Economics 48 (May 1972): 125, describes an Input-Output Model as revealing the flow of goods and services

a model is economically justifiable only when its output is to be put to a multitude of uses. Construction of the costly input-output technique from primary sources to determine the economic impact of only Great Lakes boating, therefore, does not appear reasonable.⁷ Relevant information found in existing national and regional input-output models does have applicability to the study area in some instances. A detailed examination of I/O technique is therefore necessitated in future chapters.

If one is willing to accept a less accurate estimate of economic impact, such as applying information from existing input-output tables to the study area, it is often feasible to derive an estimate of economic impact at modest cost especially if some necessary

through a given economy. Assuming sectors are defined in an ideal fashion, the economic structure of that economy is revealed through the implementation of an input-output study. The transaction matrix depicts the flow of goods and services within the economy, as well as exports, investments, government purchases, and inventory changes. Charles B. Garriren, "The Impact of New Industry: An Application of the Economic Base Multiplier to Small Rural Areas," Land Economics 48 (November 1972): 329, states I/O models need to be divided into basic and nonbasic sectors, where the basic (exogenous) sector produces goods and services for export from the region and the nonbasic (endogenous) sector produces goods and services for local consumption. Bromley further states, from the processing portion (endogenous sectors) of the matrix, technical coefficients are derived. Another item of interest is the matrix of direct and indirect coefficients; these indicate how a change in the final demand of one sector affects the level of output of its supplier after all the intermediate adjustments have been made. It is from this matrix that traditional multipliers are derived.

⁷ Ronald Boster and William Martin, "The Value of Primary Versus Secondary Data in Interindustry Analysis," Arizona Agricultural Experiment Station, Journal Article No. 1900, reveal the cost of an I/O study in Colorado completed in 1968 using primary data sources totaled over \$600,000. Most regional studies of this scope and type are of comparable cost.

information is already available. Input-output studies are one of the best methods of ascertaining local economic impact, but various other techniques have been successfully developed.⁸ Such estimates are often criticized because they frequently are based on very little solid data and they often involve obviously inflated information.⁹

It should be noted economic impact can be viewed from a number of perspectives. No one method or combination of techniques for estimating economic impact can provide totally accurate data which will be universally acceptable to everyone. The information is just an estimate. Any economy is in such a constant state of change no data can pinpoint and describe this system at any one, past, current, or future moment. It will, therefore, be necessary to accept a general estimate substantiated with as much pertinent information as possible. Furthermore, the estimates of economic impacts provided in this report represent approximations that were derived from a combination of available economic data given budget, time, and manpower constraints. It will be emphasized throughout the report that an increase in any one of the aforementioned limitations will improve the accuracy of the estimations.

The topic covered by this research has not been previously studied at this precise level; consequently no specific information is

⁸See Bromley, pp. 125-33; Garrison, pp. 329-37; and Floyd Harmston, "Use of an Intersectional Model in Developing Regional Multipliers," The Annals of Regional Science 3 (June 1969): 1-7.

⁹See Ernst W. Swanson, Travel and the National Parks (National Park Service, U.S. Department of the Interior, 1969), and B. G. Beardsley, "Comments on 'Travel in the National Parks,'" Journal of Leisure Research 2 (Winter 1970): 78-84.

available on this subject matter. Any data yielded by the research on this subject will serve to inform interested parties, e.g., Waterways decision makers and the boaters themselves. In addition, the research analysis presented in the report should serve as a foundation for more specific and extensive study in the future.

For several years, the Department of Park and Recreation Resources at Michigan State University, primarily as a result of research funded by the Waterways Division of the Michigan Department of Natural Resources, has been gathering a substantial amount of information concerning boating in Michigan. Given these data and a review of other data sources (Chapter II), sufficient information was deemed readily available to develop an estimate of the economic impact associated with recreational boating on the Great Lakes.

Objectives

The bulk of the relevant data on file which will be used in this study was collected in southwest Michigan. This study will begin by determining the following:

1. Direct annual expenditures made by Lake Michigan boaters in the region.
2. Additional expenditures stimulated by influx of these dollars into the local economy of the communities in the region.
3. Income-producing effect of these expenditures on specific industries in the region.
4. The number of jobs created by this contribution to the economy of the local communities in the region.

Once these values have been obtained for southwest Michigan, similar estimates will be developed for the entire State of Michigan.

Assumptions, Delimitations, and Definitions

Assumptions

1. The data and method to be followed in deriving the above-mentioned estimates are basically sound and will be documented. In addition, the resulting estimates are expected to be conservative for a number of reasons, which will be fully explained in following pages but not so conservative as to grossly underestimate the true value.

Delimitations

1. Some extrapolation will be necessary to arrive at the statewide estimates. These will be documented, thus allowing others to validate and/or modify the estimates derived if they so desire.

2. This study will explore only the tangible economic benefits which accrue to an area due to recreation-related expenditures. It will not delve into the benefits derived by the recreationists themselves.

3. The project is not concerned with commercial enterprises that charter or rent craft for Great Lakes recreational boating and/or fishing. Only privately owned, registered, pleasure craft will be pertinent to the research. Relevant information concerning commercial, public, and private marinas which rent slip space to private boat owners is, however, included in the study.

Definitions

Slip--A ship's berth between two piers or along a pier.

Season--The boating season, i.e., from the time boats are normally taken out of winter storage and placed in the water to the time they are taken out of the water and placed in storage.

Transient slip--A slip provided for boats on a day-to-day basis, or for another short, specified time period.

Economic impact--This term is defined in this report as the income- and job-producing effect of the dollars spent by Great Lakes recreational boaters on the economy of a specific geographic region.

Basic income--That income derived from the exogenous (basic) sector which produces goods and services for export from a defined economy.

Nonbasic income--That income derived from the endogenous (nonbasic) sector which produces goods and services for local consumption within any defined economy.

Direct (technical) coefficients--Coefficients which show the direct purchases that will be made by a given industry from all other industries within the processing sector of an input-output table.

Direct and indirect coefficients--Coefficients found in an input-output table which indicate how a change in the final demand of one sector affects the level of output of its supplier after all the intermediate adjustments have been made.

CHAPTER II

REVIEW OF THE LITERATURE

General Overview of the Literature

Before accepting the project assignment, a review of pertinent literature transpired. Sufficient information was found to warrant an immediate commencement of the study. Additional knowledge of the study topic was quickly acquired, which opened new avenues to germane data. The pursuit of applicable information was an ongoing process throughout the research. The U.S. economy was showing a downward trend at the time research was being conducted, and a constant watch was maintained for data which might in some way alter the final estimate of economic impact. Information on new craft expenditures was very difficult to obtain, but this study was finally able to use some of the data provided by manufacturers in estimating sales of new equipment for 1974.

The acquisition of specific Michigan regional economic multipliers was also difficult. These multipliers were needed to estimate the net effect of boater expenditures on the Michigan economy. The regional multipliers were one of two sets of multipliers used for comparison and analysis. National multipliers comprised the second set.

In general, most of the information collected was very current. The boating expenditure data used in the study were compiled by the Park and Recreation Resources Department, of Michigan State

University, within the last two years. National input-output information was obtained from the most current studies (1966-1967). Specific regional input-output data which had relevance to the topic area were difficult to obtain. Most studies were conducted in the late 1950's and early 1960's and appeared too dated to be directly applicable to this study being conducted in 1975. This literature did, however, provide a useful theoretical framework for the regional I/O studies used in the actual project analysis.

Most recreation economic impact studies conducted in Michigan¹ and other states² have usually produced gross, general, dollar estimates, e.g., one total sum applied to one regional multiplier. This study hopes to generate much more specific estimates through the use of individual industry multipliers and specific expenditure categories. These estimates will not be as accurate as those yielded by a complete input-output study, but will represent a significant improvement in detail over most past recreation economic impact reports.

This brief overview serves as a general introduction to the specific areas of literature which follow.

The majority of literature reviewed in this chapter is concerned with input-output methodology. An I/O table was not constructed for this project, but extensive application of existing input-output

¹See Wilbur Smith and Associates, Environmental and Economic Impact of the Sleeping Bear Dunes National Lakeshore, prepared for Benzie County (Mich.) Planning Commission and Leelanau County Planning Commission (August 1973).

²See Charles B. Garrison, "A Case Study of the Local Economic Impact of Reservoir Recreation," Journal of Leisure Research 6 (Winter 1974): 7-19.

data in this analysis makes it imperative that some general facts about this useful economic tool be presented. The first major section of this chapter concerns itself entirely with input-output. The I/O section is divided into four subsections: (1) General Input-Output Methodology, (2) Regional Input-Output Studies and Reports, (3) Economic Multiplier Studies, and (4) Alternatives to Input-Output. The last major section in this chapter is entitled Expenditure Studies.

Input-Output Methodology and Analysis

Input-output methodology is a large area of study within the field of economics. To most lay people and some economists, this topic has traditionally been one which has produced confusion as well as useful knowledge. In order to clarify the use of input-output in this work, a highly simplified input-output table is presented in Table 2-1. This table and the accompanying explanation are abstracted from William Strang's report entitled Recreation and the Local Economy.³ In this writer's opinion, it is one of the most clearly written and easily understandable input-output reports ever published.

Input-output analysis requires the construction of a matrix of industries represented in an economy, together with sectors representing demand from outside the community (exports) and inputs brought into the community from outside (imports).

In Table 2-1 and most I/O tables, industry sales (output) are read across the rows and industry purchases (inputs) are read down the

³William A. Strang, Recreation and the Local Economy, The University of Wisconsin Sea Grant Program, Technical Report Number 4 (October 1970).

columns. Thus, agriculture in this case sold 50 to other agricultural units, 10 to retailers, none to local households, and 130 in exports. Similarly, reading down the column, agriculture purchased 50 from other agricultural units, 30 from retailers, and 80 from households (wages, rents, salaries), and 30 from units outside the community. Note that total inputs for each industry equal total outputs for that industry. The section of the table within the darkened lines is the community inter-industry transactions matrix. The rest of the table represents dealing with units outside the community. Construction of this table, the transactions table, represents the first step in input-output analysis.

Table 2-1.--A simplified input-output table.

		Sales			Exports	Total Demand
		1	2	3		
1. Agriculture	P U	50	10	--	130	190
2. Retailing	R C	30	--	100	10	140
3. Households	H A	80	40	40	--	130
Imports	S E S	30	90	20	XXX	140
Total Inputs		190	140	130	140	

From the transactions table, a matrix of direct input coefficients is developed. The input coefficients of agriculture in this example are .26 (50/190) for agriculture, .15 (30/190) for retailing,

and .42 (80/190) for households. These simply state that for every dollar of agricultural sales, 26¢ of inputs is purchased from other agricultural units, 15¢ from retailers, and 42¢ from local households.

An inverse matrix is then computed from the direct input coefficient table (this generally requires the use of an electronic computer), yielding a series of multipliers indicating the direct and indirect effect upon the industry heading the row by income received by the industry heading the column.

An example of a table of multipliers developed with input-output analysis is presented in Table 2-2. Reading the table we see that for every \$1.00 of direct agricultural sales, agriculture receives an additional 75¢ due to economic turnover in the community. Similarly, \$1.00 of agricultural sales will result in 40¢ to retailers and 65¢ to households due to the turnover (multiplier effect). The total multiplier for agriculture is \$2.80, indicating that the community gains \$2.80 for each \$1.00 in direct sales to agriculture. The total multipliers for retailing and household in this example are \$1.55 and \$2.00, respectively.

Table 2-2.--A simplified table of industry multipliers.

	1	2	3
1. Agriculture	\$1.75	\$.30	\$.05
2. Retailing	.40	1.05	.55
3. Households	.65	.20	1.40
Total multiplier	2.80	1.55	2.00

This brief presentation of the series of tables used in input-output analysis has been made to provide the nontechnical reader with a basic understanding of procedures and to enable him to read an actual input-output table. A complete table derived for a community is more complex, involving a larger matrix, but the essential principles are the same.

General Methodology

Although the economic concept of general equilibrium was discussed by Quesnay as far back as 1758,⁴ most economists credit its present-day application directly to the input-output model presented by Wassily Leontief in August, 1936.⁵ Leontief was concerned with the structure of economic systems and the way the individual segments mesh together and influence one another. The basic concepts, although modified, are still used today.

The Table

The basis of Leontief's analytical system is the input-output table. This table shows how the output of each industry is distributed among other industries and sectors of the economy. At the same time it shows the inputs to each industry from other industries and sectors. A hypothetical input-output or transactions table is

⁴Almarin Phillips, "The Tableau Economique as a Simple Leontief Model," Quarterly Journal of Economics 69 (February 1955): 137-44.

⁵Wassily Leontief, "Quantitative Input-Output Relations in the Economic System of the United States," The Review of Economics and Statistics 17 (August 1936): 105-25.

presented in Table 2-3 by William H. Miernyk in The Elements of Input-Output Analysis.⁶

Table 2-3.--Hypothetical transactions table.

Industry Purchasing

		Processing Sector						Final Demand					
	↑ ↓ Outputs¹ Inputs²	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		A	B	C	D	E	F	Gross inventory accumulation (+)	Exports to foreign countries	Government purchases	Gross private capital formation	Households	Total Gross Output
Industry, Producing Sector	(1) Industry A	10	15	1	2	5	6	2	5	1	3	14	64
	(2) Industry B	5	4	7	1	3	8	1	6	3	4	17	59
	(3) Industry C	7	2	8	1	5	3	2	3	1	3	5	40
	(4) Industry D	11	1	2	8	6	4	0	0	1	2	4	39
	(5) Industry E	4	0	1	14	3	2	1	2	1	3	9	40
	(6) Industry F	2	6	7	6	2	6	2	4	2	1	8	46
	(7) Gross inventory depletion (—)	1	2	1	0	2	1	0	1	0	0	0	8
	(8) Imports	2	1	3	0	3	2	0	0	0	0	2	13
	(9) Payments to government	2	3	2	2	1	2	3	2	1	2	12	32
	(10) Depreciation allowances	1	2	1	0	1	0	0	0	0	0	0	5
	(11) Households	19	23	7	5	9	12	1	0	8	0	1	85
	(12) Total Gross Outlays	64	59	40	39	40	46	12	23	18	18	72	431

¹Sales to industries and sectors along the top of the table from the industry listed in each row at the left of the table

²Purchases from industries and sectors at the left of the table by the industry listed at the top of each column.

This is a more complex table than Table 2-1, yet it still represents a very simple I/O table of six aggregated industries. Actual national tables may consist of approximately 70-90 aggregated sectors, and regional and state tables 40-50.

Aggregation is helpful since it combines industries of a similar nature and thus reduces the size of the table. Sometimes information of a very specific nature is desired, in which case it is

⁶William Miernyk, The Elements of Input-Output Analysis (New York: Random House, 1965), p. 9.

more advantageous to have sectors disaggregated. National tables may have as many as 400 disaggregated industries before they are aggregated to 70-90.⁷

One may read Table 2-3 and other I/O tables as follows:⁸

1. To find the amount of purchases from one industry to another, locate the purchasing industry at the top of the table, then read down the column until you come to the producing industry.

2. To find the amount of sales from one industry to another, locate the selling industry along the left side of the table, then read across the row until you come to the buying industry.

Purchases and Technical Coefficients

After an input-output table has been constructed for a given year, a table of input or technical coefficients can be developed from it. A technical coefficient is the amount of inputs required of other industries to produce one dollar's worth of the output in the given industry (Table 2-4).⁹

Table 2-4 shows the direct purchases that will be made by a given industry from all other industries within the processing sector for each dollar's worth of current output. But this does not represent the total addition to output resulting from the additional sales to the final demand sector.

⁷For more information see Walter O. Fisher, "Criteria for Aggregation in Input-Output Analysis," The Review of Economics and Statistics 40 (August 1958): 250-60.

⁸Miernyk, p. 11.

⁹Ibid., p. 22.

Table 2-4.--Input coefficient table (direct purchases per dollar of output).

		Industries Purchasing					
		A	B	C	D	E	F
Industries Producing	A	16¢	26¢	3¢	5¢	13¢	13¢
	B	8¢	7¢	18¢	3¢	8¢	18¢
	C	11¢	4¢	21¢	3¢	13¢	7¢
	D	17¢	2¢	5¢	21¢	16¢	9¢
	E	6¢	0	3¢	36¢	8¢	4¢
	F	3¢	11¢	18¢	15¢	5¢	13¢

Table 2.5 represents the direct and indirect requirements. Each row of Table 2-5 shows the output directly and indirectly required from each sector at the top of the table to support the delivery of \$1.00 to final demand by the sector at the left of each row. Each column shows the output required for a single sector (directly and indirectly) to support \$1.00 of delivery to final demand by each of the processing sectors.¹⁰

Table 2-5 is a general solution of the hypothetical input-output system. It illustrates the principle of economic interdependence. The table can be used to show how a change in demand for the output of one sector stimulates production in other sectors. It shows the end result after all the "feedback effects" have worked themselves out.¹¹

¹⁰Ibid., pp. 19-28.

¹¹Ibid., p. 28.

Table 2-5.--Direct and indirect requirements per dollar of final demand.

	A	B	C	D	E	F
A	\$1.38	.25	.28	.41	.27	.23
B	.45	1.21	.16	.19	.12	.24
C	.27	.38	1.38	.23	.17	.39
D	.35	.25	.25	1.53	.65	.41
E	.35	.26	.31	.39	1.28	.25
F	.38	.35	.22	.30	.21	1.32

Other writers such as Richardsen and Leontief¹² have published works which delve in greater depth, than is possible here, into the more technical aspects of input-output technique. The reader who wishes to examine this topic further is encouraged to consult the texts footnoted below.

National Tables

National input-output tables have been published by the U.S. Department of Commerce, Interindustry Economics Division, since 1947. There have been four such benchmark tables, published in 1947, 1958, 1963, and the last, 1967. There is a considerable time lag between computation and publication of reports. The 1967 tables were offered

¹²Harry W. Richardsen, Input-Output and Regional Economics (London: Wiedenfeld and Nicolsen, 1972); and W. W. Leontief, The Structure of the American Economy, 1919-1939: An Empirical Application of Equilibrium Analysis (New York: Oxford University Press, 1951).

for distribution in February of 1974.¹³ Still, these 1967 tables represent the most current data on interindustry relationships for the nation. Each succeeding table since 1947 has offered considerably greater industrial detail; i.e., each study has used a larger number of disaggregated industries.¹⁴

Fortune's Marketing Service¹⁵ has also produced a national input-output table of 100 aggregated industrial categories. This ambitious undertaking was developed using 1966 data.

Both tables provide a staggering amount of raw national data, some of which was used for analysis in this project.

Regional Input-Output Studies and Reports

National economic studies are of importance in many circumstances, yet are not applicable in all. This is the case in regional studies.

The various regions of the United States are often diverse as to their economic makeup. One region may be strong in agriculture, while another in industry. National input-output tables attempt to show a composite or "average" which represents industrial sectors in all regions. These data have validity, but researchers usually must

¹³U.S. Department of Commerce, Input-Output Structure of the U.S. Economy: 1967 (Washington, D.C.: U.S. Government Printing Office, 1974).

¹⁴The 1967 tables offer categories for 367 industries (aggregated to 82).

¹⁵Fortune's Input/Output Portfolio, Fortune Marketing Service (U.S.A.: Time Inc., 1972).

conduct a separate regional or state study to incorporate pertinent data otherwise excluded in national projects. National studies can't capture the uniqueness of the region as well as research conducted within the area.

The need for this specific information has given rise to the science of regional economics. The reader who is unfamiliar with this topic will find the book by Walter Isard, entitled: Methods of Regional Analysis: An Introduction to Regional Science,¹⁶ and Hugh Nourse's Regional Economics: A Study of the Economic Structure, Stability and Growth of Regions,¹⁷ excellent texts to consult for additional information on the topic.

Frederick Moore and James Peterson point out that ". . . no single definition [of a region] is relevant for all purposes. The region may be defined on economic, political, sociological, or other grounds."¹⁸ The parameters of the region used for this study will be presented in a following chapter.

The basic (exporting) sales and services of an economy are said to be more important to a region than nonbasic (sales to local consumers) sales and services (with the understanding that both must exist). This is because basic sales bring new dollars into an economy.

¹⁶Walter Isard, Methods of Regional Analysis: An Introduction to Regional Science (New York: John Wiley and Sons, Inc., 1960).

¹⁷Hugh O. Nourse, Regional Economics: A Study of the Economic Structure, Stability, and Growth of Regions (New York: McGraw-Hill, 1968).

¹⁸Frederick T. Moore and James W. Peterson, "Regional Analysis: An Interindustry Model of Utah," The Review of Economics and Statistics 37 (November 1955): 368.

Money is always leaking out of one economy into another. The more new money brought into the system, the more interaction of industries within the system before the inevitable leaking takes place.

The recreation industry often greatly contributes to this basic income. Even though the activity takes place locally, it is still considered basic; because visitors bring new dollars into a community. This is the same as producing a product which is sold outside of the community to capture new dollars. Boaters, therefore, contribute to the economy of local communities when they spend their money, and introduce new dollars into the local system.

Regional input-output studies assist in the understanding of this basic and nonbasic flow of dollars within an economy and to and from other economies. It is through the use of these studies that industries within a defined economy can trace the effect of sales and purchases to each other, and to the community in which they are located.

General literature on regional input-output studies is listed by most libraries under interindustry economics. Further information may also be obtained by consulting the listings for specific regional, state, and local geographic boundaries.

The primary source of theoretical input-output methodology used for this study was obtained from regional and state I/O studies and reports. These reports also contained empirical data, but, with the exception of a few, were judged to be either outdated or unapplicable for numerous reasons. One reason for this rejection was different regional makeup. The input-output study produced by Phillip

Bourque¹⁹ for the State of Washington was excellent for that region, but unapplicable for Michigan. Darr and Fight²⁰ produced an I/O study for Oregon, but it, too, was rejected on the same basis. Yet these and others²¹ provided excellent models and examples of I/O techniques, which proved helpful when using the most applicable study for Michigan.

The regional study which is considered the most relevant to this research was conducted by William A. Strang in Wisconsin, published in 1970.²² A specific I/O table for the State of Michigan or adjacent region would have been far superior, but none existed at the time research for this project was undertaken.

¹⁹Phillip Bourque et al., The Washington Economy: An Input-Output Study (Washington: The Graduate School of Business Administration, University of Washington and the Washington State Department of Commerce and Economic Development, 1967).

²⁰David R. Darr and Roger D. Fight, Douglas County Oregon: Potential Economic Impacts of a Changing Timber Resource Base, U.S.D.A. Forest Service Research Paper PNW-179, 1974.

²¹Charles M. Tiebout, The Community Economic Base Study, Supplementary Paper No. 16, (New York: Committee for Economic Development, December, 1962); Teddy T. Su, The South Carolina Economy: An Input-Output Study, (University of South Carolina, Bureau of Business and Economic Research, January, 1970); Floyd K. Harmston, An Intersectoral Analysis of the Missouri Economy, 1963, Report No. 12 (Research Center, School of Business and Public Administration, University of Missouri, 1968); and John M. Huie and Kenneth C. Clayton, Economic Impact of the Park County Covered Bridge Festival, No. EC432 (West Lafayette, Indiana: Cooperative Extension Service, Purdue University, 1972).

²²William A. Strang, Recreation and the Local Economy, The University of Wisconsin, Sea Grant Program, Technical Report Number 4 (October 1970).

Economic Multipliers

The value of using economic multipliers derived from national tables for regional and local analysis has come under negative criticism from a number of researchers.²³ Daniel Garnick states efforts to apply national coefficients to regional studies ". . . were, for the most part, distinctly wanting for the purposes of fine grained structural analysis."²⁴ Attempts have been made to modify national coefficients to become more applicable to a specific region's economy.²⁵ This, too, has not met with much success.

The different regions of the country are not all economically homogeneous; i.e., agriculture is more important in some regions than others, and modification of national coefficients would better serve the purpose of regional analysis. This modification is appropriate in some cases, but nothing is as comprehensive and germane as a complete input-output study for the desired region. As stated previously,

²³See Stanislaw Czamanski and Emil E. Malizia, "Applicability and Limitations in the Use of National Input-Output Tables for Regional Studies," Papers of the Regional Science Association 23 (1969): 65-82; and Ronald S. Boster and William E. Martin, "The Value of Primary Versus Secondary Data in Inter-Industry Analysis: A Study in the Economics of the Economic Models," Arizona Agricultural Experiment Station Journal Article 1900, n.d.

²⁴Daniel Granick, "Differential Regional Multiplier Models," Journal of Regional Science 10 (April 1970): 36.

²⁵See, for example, David Greytak, "Regional Input of Inter-regional Trade Input-Output Analysis," Papers of the Regional Science Association 25 (1970): 203-317; Floyd K. Harmston, "Use of an Inter-sectional Model in Developing Regional Multipliers," The Annals of Regional Science 3 (June 1969): 1-7; Charles M. Tiebout, "Input-Output Projection Model: The State of Washington 1980," Review of Economics and Statistics 51 (August 1969): 334-340; and Iver E. Bradley and James P. Gander, "Input-Output Multipliers: Some Theoretical Comments," Journal of Regional Science 9 (1969): 309-317.

an input-output study conducted regionally or statewide in Michigan would have greatly benefited this analysis.

Methods to modify national coefficients involve the collection of too much specific regional data given the resources available for this project.

Alternatives to Input-Output

Studies with a large budget or more manpower might make use of alternatives to direct survey input-output studies such as: From-To Models, Location Quotient, and Secondary Source I/O Studies.²⁶ The reader who wishes to investigate alternative methodology can use the literature footnoted below as a point of departure.

Expenditure Data

Boater expenditure data were obtained from a number of sources. The bulk of this information was obtained from previous research efforts completed at Michigan State University in the department of Park and Recreation Resources by Thomas Warner and Chien Han under the direction of Dr. Donald Holecek.

²⁶See Robert J. Kalter and William B. Lord, "Measurement of the Impact of Recreation Investments on a Local Economy," American Journal of Agricultural Economics 50 (May 1968): 243-255; Daniel W. Bromley, "An Alternative to Input-Output Models: A Methodological Hypothesis," Land Economics 48 (May 1972): 125-33; Francis McCamley, Dean Schreiner, and George Muncrief, "A Method for Estimating the Sampling Variances of Multipliers Derived from a From-To Model," The Annals of Regional Science 7 (December 1973): 81-89; William A. Schaffer and Kong Chu, "Nonsurvey Techniques for Constructing Regional Interindustry Models," Papers of the Regional Science Association 23 (1969): 83-100; and Irving Hoch, "A Comparison of Alternative Inter-industry Forecasts for the Chicago Region," Papers of the Regional Science Association 5 (1959): 217-35.

The Warner study was a primary survey data collection effort, which compiled sociological, psychological, and economic information on recreational boaters who use Lake Michigan.²⁷ The Han study was concerned with the origin and destination of boaters using the Great Lakes.²⁸

The information from these two research projects was combined with statistics from a number of other sources. Among the agencies providing data was the Market Research Department of International Marine Expositions (Marex), which published its Annual Market Research Notebook, The Marine Market 1973.²⁹ This notebook contains manufacturing and sales data, and was used in conjunction with other Marex publications.³⁰

The Michigan Economic Record³¹ was consulted to calculate the number of jobs created by an increase in industry sales. The Record is prepared by David Verway of the Division of Research, Graduate School of Business Administration, Michigan State University.

²⁷ Thomas Warner, "An Analysis of Recreational Boating Expenditures (A Study of Lake Michigan Boaters)" (Master's thesis, Michigan State University, 1974).

²⁸ Chien Han, "A Regional Recreational Boating Study: An Analysis of Lower Lake Michigan" (tentative) (Ph.D. dissertation, Michigan State University, forthcoming).

²⁹ Annual Market Research Notebook, The Marine Market 1973 (Chicago: Market Research Department, International Marine Expositions, Inc., April, 1974).

³⁰ Boating 1974 (Marketing Department of Marex and National Association of Engine and Boat Manufacturers, 1974).

³¹ Michigan State Economic Record, Division of Research, Graduate School of Business Administration, Michigan State University, Vol. 16 (March-April 1974).

Records of the Michigan Secretary of State were consulted to obtain the number of boats registered in the state and the amount collected from licenses of pleasure craft. Official records of other state government departments were also examined.

The literature in this last major section of this chapter was used to obtain individual dollar amounts in specific expenditure categories before the multipliers and other regional data found in the literature reviewed in the first major section of this chapter were applied, to yield a final estimate of the economic impact of Great Lakes boating on the State of Michigan.

CHAPTER III

RESEARCH METHODOLOGY

Study Parameters

Craft Type and Size

The craft types used in this analysis include only craft that use inboard and outboard motors as primary sources of power, and sail boats with auxiliary motors. The minimum size considered will be 20 feet in both the motor and sail categories. Differences in material used in construction, e.g., wood, steel, plastic, and aluminum, will not be distinguished.

These craft parameters were established for a number of reasons. First, this study is concerned only with Great Lakes boating and craft of minimum length is required to navigate these lakes with ease and relative safety. The Waterways Division of the Michigan Department of Natural Resources (DNR) has supported development of harbors of refuge on the Great Lakes. These marinas were specifically built to accommodate Great Lakes boaters by providing transient and seasonal¹ slips. Few launching facilities are provided, since these large boats are not frequently trailered during the boating season. Craft under this length might occasionally venture out onto the lakes in calm weather and quiet seas, but do

¹See Definitions, Chapter I.

not consistently cruise the lakes at will. All Great Lakes facilities provided by the Waterways Division in the future will be developed primarily for craft 20' and over. This length is used by the Waterways Division, and by others conducting studies in this area; and for this reason, 20 feet was used as the minimum size in this research project.

Official state registration lists were consulted to obtain the number of boats registered in Michigan. The State of Michigan only registers boats with motors; and until recently (1975) did not provide for the registration of sail craft unless equipped with an auxiliary motor. Traditionally, large sail boats are outfitted with motors for emergencies and most are, therefore, registered. These boats are, however, still categorized under their primary source of power, i.e., sail craft. It is for this reason that it was possible to obtain separate statistics for both sail and motorized craft.

Most states categorize motorized craft separately under inboard and outboard classifications. In this study both are combined into one category.

Distinguishing between type of material used in construction of boats which use the Great Lakes was not considered pertinent to the study.

The Study Region

This research project is concerned with two primary study regions. The first region (Study Region One) is the tri-state area

comprised of southwestern Michigan, northeastern Illinois, and northwestern Indiana. Although data were collected from boaters residing in this entire region, the analysis will focus on only boating-related activities that take place in southwestern Michigan. The second region (Study Region Two) is the entire State of Michigan, and information specific to southwestern Michigan will be extrapolated to the entire state.

The selection of regional boundaries in some instances had been predetermined by previous studies which were used as sources for this project.

The average expenditures of one Great Lake (Lake Michigan) boating population were obtained from a study conducted by Thomas Warner.² A survey was conducted by Warner through various Lake Michigan harbors located in southwest Michigan, south of Muskegon County and north of Berrien County (Fig. 3-1). The Warner study provided expenditure data on Lake Michigan boaters from the tri-state area who moored their boats in the five Michigan counties of Muskegon, Ottawa, Allegan, Van Buren, or Berrien.

Along with knowledge of average expenditures, information on the number of boaters mooring their craft in these five Michigan counties was needed. These data were obtained from a study conducted by Chien Han,³ which explored many facets of Lake Michigan boating patterns. The tri-state area examined by Han, which

²Warner, "An Analysis."

³Han, "A Regional."

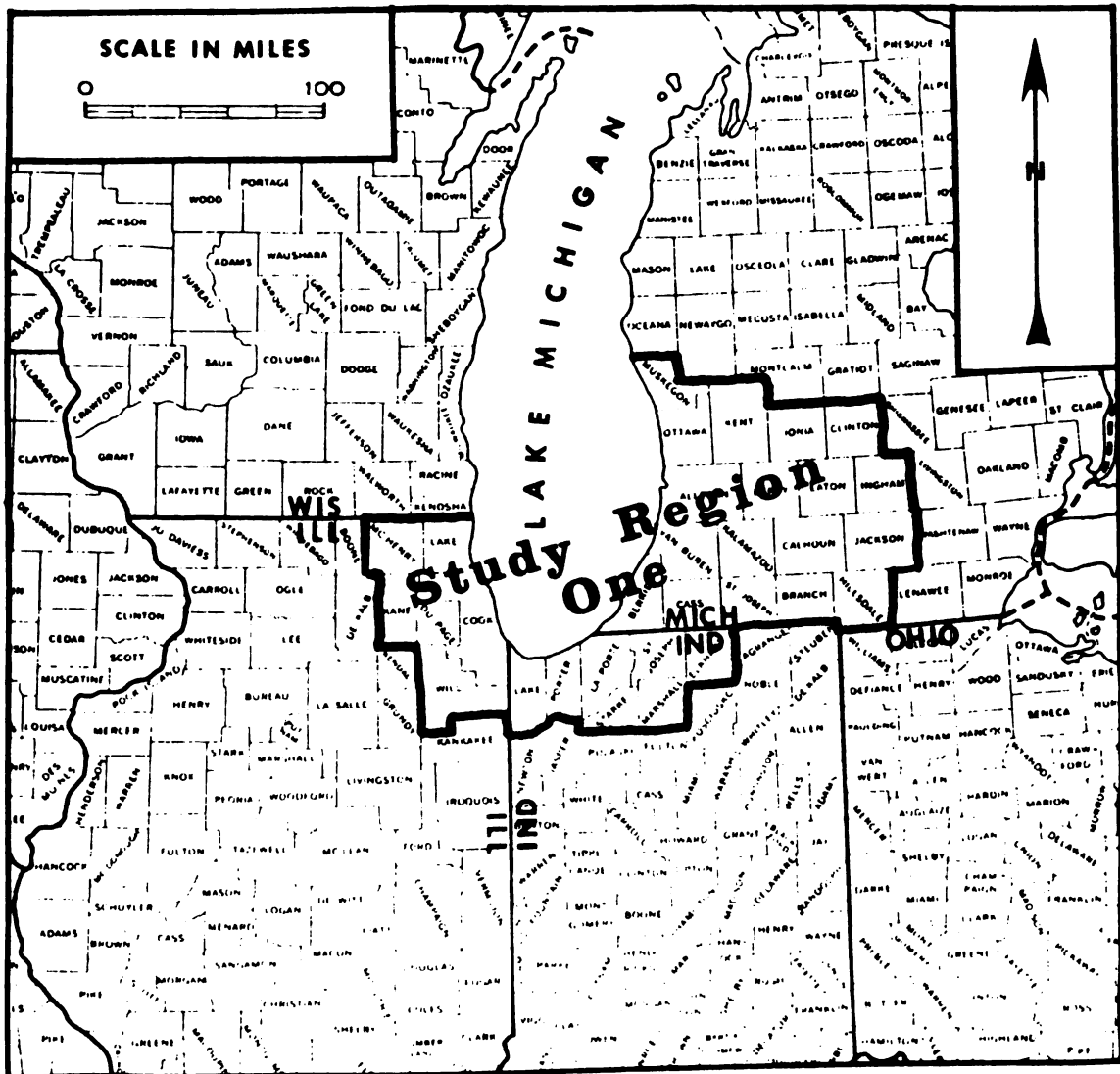


Fig. 3-1.--Study Region One--Southwestern Michigan, northwestern Indiana, and northeastern Illinois.

represents Study Region One in this study, is northeastern Illinois, northwestern Indiana, and southwestern Michigan. Specifically, the Illinois counties included: Cook, DuPage, Kane, Lake, McHenry, and Will; the Indiana counties included: Elkhart, Kosciusko, Lake, La Porte, Marshall, Porter, St. Joseph, and Starke; and the Michigan counties included: Allegan, Barry, Berrien, Branch, Calhoun, Cass, Clinton, Eaton, Hillsdale, Ingham, Ionia, Jackson, Kalamazoo, Kent, Muskegon, Ottawa, St. Joseph, and Van Buren (Fig. 3-1).

Han determined the study region based on empirical information which showed that the region included boat owners most likely to drive from all three states to marinas located on Lake Michigan. The information used to determine the study region included the analysis of the occupancy lists from a number of sampled marinas along the shoreline and various literature on recreational boating in the area.

This tri-state region includes the north-central megalopolis created by the cities of Chicago, East Chicago, Hammond, and Gary to the west; and South Bend, Kalamazoo, Grand Rapids, and Lansing to the east.

In order to utilize the average expenditure data developed by Warner, an estimate must be developed of the number of boaters from these three states (Study Region One) who moor their boats in the five Michigan counties bounding Lake Michigan. Although the boaters included in this estimate reside in three different states, they boat in the five counties in one state, Michigan, specifically southwestern Michigan. The vast majority of their dollars are spent

at the marinas and stores adjacent to the marinas. Since these boaters must pass through southwestern Michigan on their way to their destinations, they also contribute to the local economy of communities along their routes, i.e., southwestern Michigan. These travel patterns will be explored in the next chapter. The travelers from out of state incur some minor expenses for clothing, and auto fuel and repair in their state, but the bulk of the money spent for Lake Michigan recreational boating is spent in southwest Michigan. The economic impact to the southwestern part of Michigan attributed to Study Region One will be presented in the following chapter.

The economic impact of Great Lakes boating to the local economy of communities in the entire State of Michigan will also be presented in the following chapter. The average expenditure data will be assumed to remain the same, but the population data will be expanded to include the entire State of Michigan. All the counties of Michigan will comprise Study Region Two of this study (Fig. 3-2), and all Great Lakes boaters (not just Lake Michigan) will be included.

Study Procedure

The step-by-step procedure undertaken in this study is summarized below and in the flow chart presented in Fig. 3-3:

Fig. 3-2.--Study Region Two--The State of Michigan.

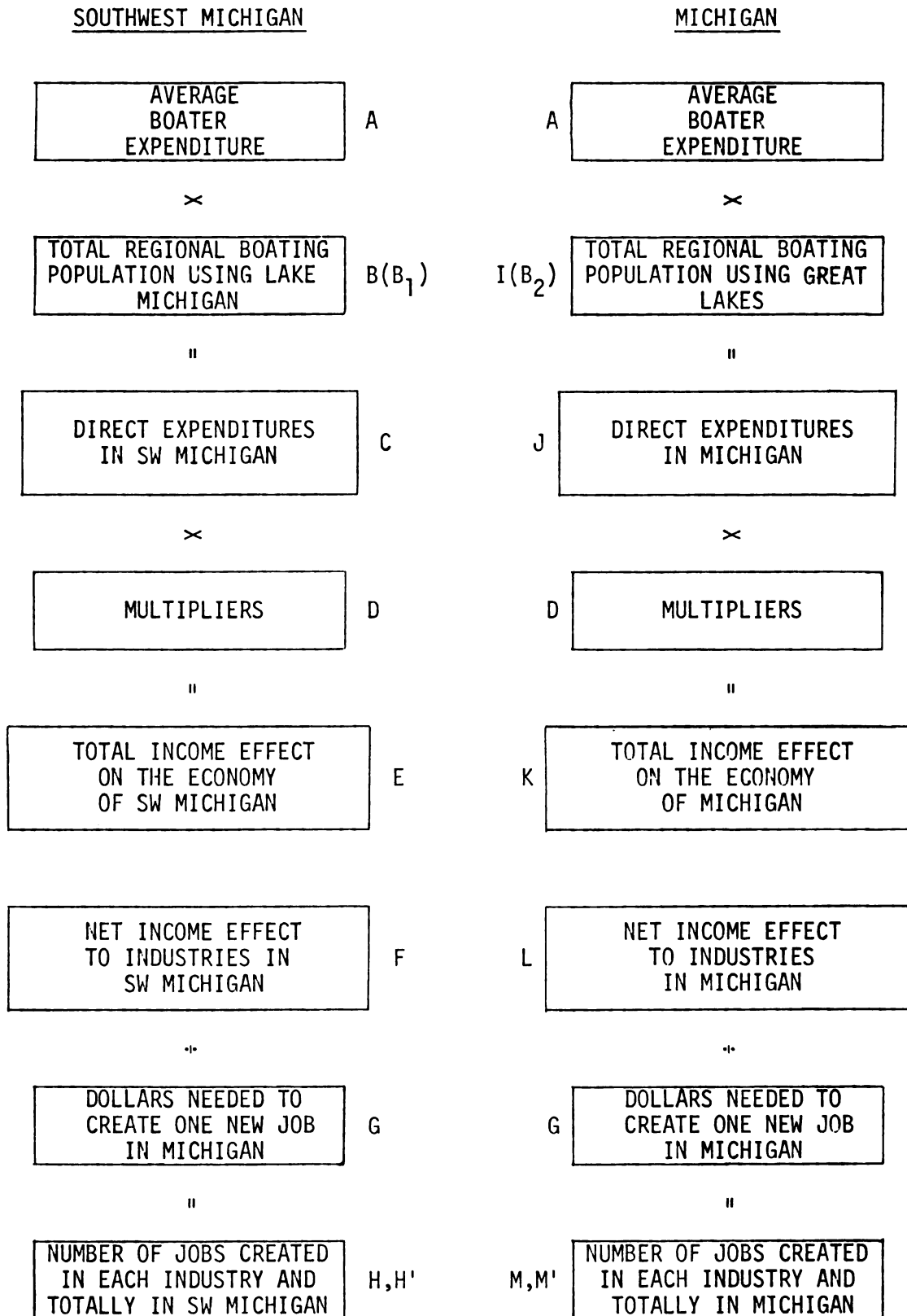


Fig. 3-3.--Project flow chart.

Steps

A. Find the average expenditure of Great Lakes recreational boaters in Study Region One.

1. Individual categories

a. craft related

b. personal and trip related

2. Average totals for each state by craft type and size

3. Average cost for new craft in Michigan by type and size

B. Determine the total boating population relevant to the study, i.e., registered boaters likely to access the Great Lakes from Michigan.

1. Totals for Study Region One (B_1)

2. Totals for Study Region Two (B_2)

Study Region One = SW MICHIGAN + NE ILLINOIS + NW INDIANA = B_1

Study Region Two = STATE OF MICHIGAN = B_2

C. Determine the direct amount spent in southwest Michigan.

1. Expenditures by state of boater residence and by craft type and size

2. Expenditures for new craft (in Michigan only)

3. Regional totals

$$\text{Equation (1)} \quad A \times B = C$$

D. Determine appropriate economic multipliers.

E. Calculate the total income effect to the economy of southwest Michigan.

$$(2) \quad C \times D = E$$

- F. Calculate the net income effect (F_i) to industries in southwest Michigan where: F_i = the income effect to industry i .
- G. Calculate the amount of income required to create one new job in Michigan by industry sector (G_i) where G_i = the amount of earnings required to produce one job in industry sector i .
- H. Determine the number of jobs created in each industry in southwest Michigan by Lake Michigan recreational boating expenditures (H_i).

$$(3) F_i \div G_i = H_i$$

- H'. Sum the number of jobs created by each industry sector to obtain the total number of jobs created in southwest Michigan (T_{sw}).

$$(4) \sum H_i = T_{sw}$$

- I. Find similarities or discrepancies among boaters in the State of Michigan not found in Study Region One and obtain applicable state population ($B_2 = I$).
- J. Determine the direct amount spent in Michigan.

$$(5) A \times I = J$$

- K. Obtain the total income effect on the economy of Michigan.

$$(6) J \times D = K$$

- L. Calculate the net income effect (L_i) to industries in Michigan where L_i = the income effect to industry i .
- M. Find the number of jobs created in each industry in Michigan by Great Lakes recreational boating expenditures (M_i)

$$(7) L_i \div G_i = M_i$$

M'. Sum the number of jobs created by each industry sector to obtain the total number of jobs created in Michigan (T_m).

$$(8) \sum M_i = T_m$$

CHAPTER IV

GENERAL RESEARCH FINDINGS

Much information for this research effort has been gathered from other related studies. As will be noted in detail later in this chapter, it was necessary to adjust and modify data from some sources in order to obtain consistent and cohesive data categories throughout this analysis. Data from each different source were normally available in the same categories. This made the tabulation quite manageable for analysis. However, some problems were encountered with information which was reported in similar but overlapping classifications. In these instances, the data were adjusted to conform and fit into the classifications used throughout this report. The methodology adopted in order to make these adjustments will be outlined as this discussion evolves. All conversions were made using the best sources of information currently available.

The accuracy of the estimates presented in this report can only improve should better alternate sources of information be acquired and applied.

The primary classifications used in this report relating to type and size of craft are as follows: Size--Three size categories: 20'-30', 30'-45', and 45' and over (henceforth these will be shortened to 20'-30', 30'-45', and 45'+). Type--Two types of craft will be listed: motor craft and sail craft.

These represent the categories in which much of the boating information was presented and analyzed in related studies.

Average Boater Expenditures (A)¹

The data for this section were primarily procured from the Warner study.² The number of usable responses in the sample was 311 (62 percent). In the motor craft classification for the 20'-30' length class, 102 responses were obtained; in the 30'-45' class, 89; and 9 in the 45' and over class. In the sail craft classification the 20'-30' length class had 79; 30'-45' had 32; with no usable responses in the 45' and over class. Since no response was received for the largest sail craft category, figures for the nearest length category (30'-45') were used in this analysis. Undoubtedly, there are much greater expenditures in the largest category compared to the medium size category, but just how much more is unknown. Instead of "taking a shot in the dark" at estimating expenditures for this length class, it was decided to choose the smaller estimates. This decision will result in a lower total impact but it is in keeping with our procedure of choosing a conservative approach when an educated estimate could not be substantiated. In any case, the error introduced by this procedure is minor because the number of craft in this category is small compared to the total number of craft registered in the study regions.

¹ Letters in parentheses correspond to those on the flow chart in Fig. 3-3.

² Warner, "An Analysis."

The data for the Warner study were obtained in late 1973. In order to obtain a more reliable estimate of current economic impact in 1975, the Warner expenditure data were inflated by the 1974 inflation rate of 11 percent.³

The Warner study's average expenditures for the boating season are annual averages and can be broken down into three major categories: craft-related, personal-related, and trip-related expenditures. Tables 4-1 and 4-2 summarize these expenditures. The following are more detailed descriptions of each expenditure category.

Craft-Related Expenditures

This major category concerns the direct expenditures boat owners must make for the craft itself. It includes general subcategories of: maintenance, storage, fees, and other craft expenses. Specifically, the subcategories include: (1) fuel and oil, (2) annual insurance costs, (3) pre-launch maintenance costs, (4) craft launching fee, (5) seasonal slip rental fees, (6) in-season maintenance costs, (7) craft haul-out, (8) storage preparation costs, (9) off-season boat storage, (10) effluent pump-out, (11) purchases of boating equipment, and (12) annual registration.

The following is a detailed description of each subcategory.

³U.S. Office of Management and Budget, information reprinted in The New York Times, February 4, 1975, p. 1.

Table 4-1.--Annual average craft-related expenditures by craft type and length (dollars).

Expenditure Category ^a	Average Expenditures					
	Motor Craft			Sail Craft		
	20-30'	30-45'	45'+	20-30'	30-45'	45'+ ^b
(1) Fuel and oil	241.87	474.65	801.98	27.65	84.82	84.82
(2) Annual insurance costs	174.95	302.93	666.00	135.32	319.81	319.81
(3) Pre-launch maint./total	220.40	357.85	754.31	122.36	279.83	279.83
(3) Launching fee	50.04	64.86	88.80	37.64	93.34	93.34
(3) Slip rental fee	229.81	315.56	554.76	202.50	274.45	274.45
(3) In-season maint. costs	121.48	354.88	946.28	37.26	108.01	108.01
(3) Craft haul-out	61.46	69.97	88.80	40.12	85.40	85.40
(3) Storage prep. costs	115.25	85.26	105.45	271.62	160.42	160.42
(3) Off-season boat storage	191.65	294.01	505.03	114.62	275.40	275.40
(3) Effluent pump-out	54.02	51.80	128.02	76.42	30.56	30.56
(4) Boating equipment./total	587.81	596.29	1009.46	456.07	1072.47	1072.47
TOTAL	2048.02	2968.06	5648.89	1521.58	2784.51	2784.51
(5) Annual Mi. registration	20.00	35.00	65.00	20.00	35.00	65.00
TOTAL MICHIGAN	2068.02	3003.06	5713.89	1541.58	2819.51	2849.51

^aNumbers in parentheses are expenditure groupings and will be explained in a subsequent section.

^bInsufficient data were collected to ascertain expenditures for this length category, so expenditure data from the 30-45' sail category were used for the 45+ sail category.

Table 4-2.--Annual average personal and trip-related expenditures by craft type and length (dollars).

Expenditure Category ^a	Average Expenditures					
	Motor Craft			Sail Craft		
	20-30'	30-45'	45'+	20-30'	30-45'	45'+b
<u>a. Personal Expenditures</u>						
(4) Rec. equip./boating related	172.54	169.20	251.14	113.40	123.71	123.71
(4) Rec. expend./nonboating	163.91	104.71	253.40	76.29	185.37	185.37
(4) Boating clothes	107.24	147.16	274.31	80.32	176.99	176.99
(6) Off-craft lodging	29.89	18.08	0.00	50.78	0.00	0.00
(7) Food expend./groceries	224.54	405.88	573.79	180.97	334.24	334.24
(7) Food expend./alcohol	138.65	173.88	144.06	86.76	172.58	172.58
(8) Food expend./prepared meals	168.46	233.35	234.49	118.47	267.72	267.72
Food and beverage SUBTOTALS	531.65	813.11	952.34	386.20	774.54	774.54
(9) Laundry costs	37.59	33.02	44.41	13.22	30.39	30.39
PERSONAL TOTAL	1042.82	1285.28	1775.60	720.21	1291.00	1291.00

Table 4-2.--Continued.

Expenditure Category ^a	Average Expenditures					
	Motor Craft			Sail Craft		
	20-30'	30-45'	45'+	20-30'	30-45'	45'+b
<u>b. (10) Trip Expenditures</u>						
Michigan	685.61	685.61	685.61	685.61	685.61	685.61
Illinois	1184.23	1184.23	1184.23	1184.23	1184.23	1184.23
Indiana	766.06	766.06	766.06	766.06	766.06	766.06
<u>c. Personal and Trip Combined</u>						
Michigan	1728.43	1970.61	2461.21	1405.82	1976.61	1976.61
Illinois	2227.05	2469.51	2959.83	1904.44	2475.23	2475.23
Indiana	1808.88	2051.34	2541.66	1486.27	2057.06	2057.06

^aNumbers in parentheses are expenditure groupings and will be explained in a subsequent section.

^bSee footnote b, Table 4-1.

Fuel and Oil

This subcategory shows the average amount spent on marine fuel and oil. As is expected, the larger the craft the more expended. It must be remembered most sail craft over 20' have auxiliary motors and hence consume fuel and oil.

Annual Insurance Costs

The need for marine insurance is apparent when looking at the investment the craft owners have made in purchasing their craft.

Pre-Launch Maintenance Costs

Prior to the start of each boating season and while the craft is still in dry-land storage, there are certain maintenance tasks that are usually performed. Maintenance activities prior to launching could cover activities ranging from repainting the hull and polishing the chrome fixtures to overhauling the engine or testing radio equipment. The total average for 14 pre-launch subcategories is given.

Craft Launching Fee

The tabulated figures for launching craft do not reflect standardized launching rates found at most marinas. The figures for this subcategory are derived from three different marina types (commercial, municipal, and private). Thus, only averages for each craft type and length can be given.

Seasonal Slip Rental Fees

One of the most costly items for construction and maintenance at a marina is the building and upkeep of docks. The slip rental

fees charged by the marina reflect the amount of costs per length of craft in relation to length of slip needed for the craft.

In-Season Maintenance Costs

Expenditures made by the boater to maintain the operating condition of his craft. In-season maintenance would relate generally to any type of maintenance activity covered during pre-launch preparation except work done on the hull.

Craft Haul-Out

This subcategory lists average figures for craft haul-out at the end of the season.

Storage preparation costs

One expenditure the craft owner incurs at the end of the boating season is the cost to prepare the craft for winter storage. The cold temperatures and extreme weather conditions of Michigan winters create the need for winter dry-land storage.

Off-Season Boat Storage

The average figures for all length categories reflect expenditures made for the rental of storage space both inside and outside storage structures.

Effluent Pump-Out

These figures represent the cost for pump-out of water and bilge during the boating season.

Purchases of Boating Equipment

This subcategory is the total amount of money spent annually for boating equipment. The subcategory is further broken down to include the geographical location where these expenditures are made. These subcategories are: (1) expenditures at the slip rental site, (2) home and enroute, and (3) other (i.e., through catalogs, etc.).

Total Out-of-State and Michigan

The values in the expenditure categories presented thus far represent annual average total expenditures by craft type and length category for boaters residing in the entire study region (Lake Michigan boat owners who moor their boats in southwest Michigan). Although slight differences may exist in expenditure patterns for boaters residing in different regions, it was assumed that these would be minor and could, therefore, be ignored. However, some boater expenditures are likely to vary by residence of the boat owner, and the treatment of these is discussed in the following sections.

Annual Michigan Registration

Water craft in all states are registered with one department of state government (it varies as to which, from state to state). A fee is usually involved for the registration or license. This study is concerned with the economic impact on Michigan, and registration fees are a part of that concern. Only Michigan registration fees are relevant to this study, since fees collected in other states go directly to the government of that state and do not directly enter the Michigan economy.

A new fee structure for the State of Michigan was inaugurated on January 1, 1975.⁴ This new rate structure was used to determine the annual Michigan registration fees to correspond with the 1975 expenditures obtained by inflating the 1973 expenditures by the 1974 inflation rate.

The new rate structure does not conform to the classification system used in this study, and was adjusted as follows:

<u>MICHIGAN REGISTRATION FEE STRUCTURE</u>	<u>ADJUSTED RATE</u>
(1) Motorboats over 20 feet but not over 28 ft.... \$20.00	(1) Motor and sailboats over 20' but not more than 30 ft....\$20.00
(2) Motorboats over 28 feet but not over 35 ft.... \$30.00	(2) Motor and sailboats 30 feet but not over 45 ft.....\$35.00
Motorboats over 35 feet but not over 42 ft.... \$40.00	
(3) Motorboats over 42 feet but not over 50 ft.... \$50.00	(3) Motor and sailboats over 45'\$65.00
Motorboats over 50 feet \$80.00	
(4) Sailboats all sizes unless with motors.... \$ 1.50	(4) Motor and sailboats were combined since most large sail craft have auxiliary motors. ⁵

Total Average Craft-
Related Expenditures

Table 4-3 shows the average expenditures of each state's boat owners by craft type and length for craft-related expenditures. As

⁴Michigan, Act No. 356, Public Acts of 1974, Approved by Governor December 21, 1974.

⁵See page 31 for a more detailed explanation of why this procedure was followed.

noted above, Illinois, Indiana, and Michigan boat owners are assumed to have the same craft-related expenditures. The average annual expenditures for Michigan boaters are slightly higher than those for Indiana and Illinois boaters because of the inclusion of the boat registration fee.

Table 4-3.--Total annual average craft-related expenditures by state in which boat owners reside, and by length and type of craft owned (dollars).

	20'-30'	30'-45'	45'+
<u>Motor</u>			
Michigan	2068.02	3003.06	5713.89
Illinois	2048.02	2968.06	5648.89
Indiana	2048.02	2968.06	5648.89
<u>Sail</u>			
Michigan	1541.58	2819.51	2849.51
Illinois	1521.58	2784.51	2784.51
Indiana	1521.58	2784.51	2784.51

It can be seen in the above table that as the size of the craft increases the cost to operate it also increases.

Personal-Related Expenditure

This major category describes the expenditures a boat owner makes for items that personally concern him while making use of his craft. The general subcategories include food, clothing, off-craft

lodging, and entertainment. The specific subcategories are:

(1) recreation equipment/boating related, (2) nonboating recreational expenditures at slip rental site, (3) boating-related seasonal clothing expenditures, (4) off-craft lodging, (5) seasonal food expenditures, and (6) laundry costs.

The following subcategories are described in more detail:

Recreation Equipment/ Boating Related

This subcategory includes the purchases of recreational equipment that would be utilized during or related to the boating activity, and was broken down into three other subcategories: fishing equipment, water skiing equipment, and skin/SCUBA diving equipment, with two "other purchases" subcategories left open. The figures represented on Table 4-2 indicate the total for expenditures of recreational boating-related equipment.

Nonboating Recreational Expenditures at Slip Rental Site

This classification covered seasonal spending patterns for boat owners participating in other forms of recreation while at the slip rental site. Often times, the craft is considered a mobile cabin or summer home to be used as a base of operations. The classification was designed to see how much money was spent by the craft owner for such recreational activities as golfing, tennis, bowling, movies, spectator sports, and "other activities."

Boating-Related Seasonal Clothing Expenditures

All types of clothing worn while boating were included in this subcategory.

Seasonal Expenditures for Off-Craft Lodging

This subcategory was included for those boaters who occasionally did not sleep on board, and for expenses incurred by boat owners when the number of overnight visitors outnumber available sleeping berths on board.

Seasonal Food Expenditures

Under this heading, the spending patterns on grocery purchases, alcoholic beverage purchases, and meals ordered in restaurants are individually presented.

Seasonal Laundry Costs

This subcategory includes laundry costs at the slip rental site.

Total Personal

Adding the entries in the columns in Table 4-2 a and b yields the personal category totals found in Table 4-2 c. It can be seen that motor boat owners spend much more than their sail boat counterparts, and expenditures in each craft category increase with size.

Annual Car and Travel Expenditures

Parts of three states are included in Study Region One. It is obvious the different distances traveled in cars by boaters result in varying costs.

Three types of data were needed to compute the average travel costs for boaters accessing Lake Michigan from southwest Michigan: average number of trips made from home to the slip site per season, average distance of the trip, and the average cost per mile to operate an automobile.

It was found from the Han data that Michigan boat owners boating on Lake Michigan made 44 trips to the lake per season, Illinois boaters made 28 trips, and Indiana boaters made 33 trips. The average miles one way from home to the marina were: Michigan 49 miles, Illinois 133 miles, and Indiana 73 miles. Multiplying each figure by 2 gives the number of miles per round trip: 98 miles, 266 miles, and 144 miles, respectively. Next, the average cost per mile to operate a car in the United States was obtained.⁶ It was decided to use the standard size automobile cost of 15.9¢ per mile for this study because it was assumed that the boat owner's family would accompany him on most outings. This boating party and its baggage could be transported in more comfort in a standard-sized car than in a smaller vehicle. Furthermore, the average income of boat owners is such that the probability of standard-size car ownership was high.

⁶U.S. Department of Transportation, Federal Highway Administration, Cost of Operating an Automobile (Washington, D.C.: U.S. Government Printing Office, April 1974).

Table 4-4 represents the compilation of this travel information.

Table 4-4.--Average cost of boating-related auto travel during the boating season.

	Avg. Trips		Avg. Miles Per Round Trip		Cost/Mile		Total Cost
Michigan	44	x	98	x	15.9¢	=	\$ 685.61
Illinois	28	x	266	x	15.9¢	=	\$1,184.23
Indiana	33	x	146	x	15.9¢	=	\$ 766.06

Total Annual Average Personal- and Trip-Related Expenditures

The total annual average personal- and trip-related expenditures for the boating season were obtained by adding the average personal costs to the average car/travel costs; the results are presented in Table 4-5.

Total Annual Average Expenditures

By adding the average craft-related (Table 4-3) and average personal- and trip-related expenditures (Table 4-5) together, we obtain the total average expenditures, shown in Table 4-6.

Average Cost for New Craft

This last expenditure heading was the most difficult for which to obtain accurate information. Only annual retail sales volume for boats sold in Michigan was desired, since sales in other states do not

Table 4-5.--Total annual average personal- and trip-related expenditures by state in which boat owners reside, and by length and type of craft owned (dollars).

	20'-30'	30'-45'	45'+
	<u>Motor</u>		
Michigan	1728.43	1970.89	2461.21
Illinois	2227.05	2469.51	2959.83
Indiana	1808.88	2051.34	2541.66
	<u>Sail</u>		
Michigan	1405.82	1976.61	1976.61
Illinois	1904.44	2475.23	2475.23
Indiana	1486.27	2057.06	2057.06

Table 4-6.--Total annual average expenditures by state in which boat owners reside, and by length and type of craft owned (dollars).

	20'-30'	30'-45'	45'+
	<u>Motor</u>		
Michigan	3796.45	4973.95	8175.10
Illinois	4275.07	5437.57	8608.72
Indiana	3856.90	5019.40	8190.55
	<u>Sail</u>		
Michigan	2947.40	4796.12	4826.12
Illinois	3426.02	5259.74	5259.74
Indiana	3007.85	4841.57	4841.57

directly contribute to the Michigan economy.⁷ A number of sources were consulted--with little success. No government bureau in the State of

⁷It was recognized that boats manufactured in Michigan and sold in other states would have a positive impact on the Michigan economy. However, the data necessary to ascertain this impact were not available. Hence this possible contribution could not be included in the final estimate.

Michigan could provide retail sales data. The departments consulted were: Department of Natural Resources, Secretary of State, and the Department of Commerce. The U.S. Boating Industry Association, located in Chicago, kept total figures for the entire United States, but these statistics were not in a form which could be categorized by state and were, therefore, considered unusable. Individual manufacturers were queried and found to keep figures for their own companies, but not for the boating industry as a whole. The Michigan Marine and Snowmobile Dealers Association had no records of retail trade sales on hand. The U.S. and Michigan Statistical Abstracts did not have the information either.

Because this information was deemed critical to the research, an effort had to be made to estimate the average costs for new water craft in the required type and length categories. In the absence of a reliable data source, the only alternative was to estimate average craft sales prices based on individual companies' retail sales data. This procedure is admittedly crude. A number of Michigan Department of Natural Resources, Waterways Division officials; boating catalogs; and boat manufacturers were consulted and the resulting data aggregated to obtain the estimates of new craft cost shown in Table 4-7.

Table 4-7.--Average new craft price estimates for 1974 (dollars).

	20'-30'	30-45'	45'+
Motor	15,000.00	40,000.00	175,000.00
Sail	8,000.00	28,000.00	78,000.00

As anyone who has purchased a boat or is at all familiar with water craft knows, boats can be bought in any length and for almost any price. The above figures take into account only the basic boat with standard motor in the motor craft categories and a small auxiliary motor on the sail craft. No optional items were added to these prices, and since most boats are purchased with at least some optional equipment (e.g., radios and deck equipment), these estimates are most likely conservative.

Because of this crude method of estimating average new craft costs, it was decided to subsequently separate these data in the report from the much more accurate and reliable information presented previously in this chapter.

Regional and State Registered Boat-Owning Populations

Boating population information was secured from the data collected by Chein Han, and statistics from various offices of the three state governments.

Registered Regional Boat Population (B₁)

Table 4-8 describes in the classification system used in this study the total boat-owning populations registered in the Illinois, Indiana, and Michigan counties included in Study Region One.

The Illinois data were recorded in length categories of 26'-40' and 40' plus; and a further breakdown was impossible to obtain. It was decided to adjust these data to fit the standard length classifications of 20'-30', 30'-45' and 45'+ in order to facilitate analysis.

Table 4-8.--Total registered boat population by state in Study Region One.

	20'-30'	30'-45'	45'+	Total
a. <u>SW Michigan</u> ^a				
Motor	8,843	804	69	9,716
Sail	602	123	3	728
Total	9,445	927	72	10,444
b. <u>Illinois</u> ^b				
Motor	956	1,044	125	2,125
Sail	52	84	4	140
Total	1,008	1,128	129	2,265
c. <u>Indiana</u> ^c				
Motor	1,746	30	4	1,780
Sail	991	107	8	1,106
Total	2,737	137	12	2,886

^aState of Michigan, Secretary of State, Watercraft Record Information, "Size and Type of Registered Boats in Michigan Counties" (Unpublished data, Lansing, Michigan, 1974).

^bState of Illinois, Department of Local Government Affairs, "County Boat Registration Listing for Year of 1972" (Unpublished data, Springfield, Illinois, August 1972).

^cState of Indiana, Department of Natural Resources, Division of Enforcement, "Motorboat Registration (Owner by County) for 1973" (Unpublished data, Indianapolis, Indiana, January 1974).

The figures were adjusted by using the sample data to determine total population groupings. (See Appendix A for further discussion and rationale for this procedure.) This method probably introduces a source of error into the analysis, but was necessary in this case.

Further reading of this report will show the total Illinois boaters actually using Lake Michigan and moored in SW Michigan to be almost inconsequential. Thus, this adjustment will have little effect on the final estimates derived in the subsequent analysis.

The original Illinois totals were:

	<u>26'-40'</u>	<u>40'+</u>	<u>Total</u>
Motor	1992	133	2125
Sail	136	4	140
Total	2128	137	2265

The Illinois sample percentages were:

	<u>20'-30'</u>	<u>30'-45'</u>	<u>45'+</u>
Motor	45%	49%	6%
Sail	37%	60%	3%

Estimates of the total registered boat population by state in Study Region One are printed in Table 4-8 b. The data for Michigan and Indiana were available in the length classes established for this study, and are reported in Table 4-8 a and b.

It is apparent that motor craft in the 20'-30' length categories dominate the total boating population in both Michigan and Indiana. The Illinois population was adjusted according to a sample distribution (see Appendix A) and does not show the same dominance in the 20'-30' lengths, but does show similarities when comparing total motor craft to total sail craft for all states. Table 4-8 shows the total boating population in Study Region One to be 15,595.

The next step was to sample this total registered boat-owning population and obtain characteristics of this total through a sample

population (Table 4-9). The Han study produced 334 usable surveys from Michigan, 158 from Illinois, and 182 usable questionnaires from Indiana (53 percent total response rate). Information relevant to this study focused on the destination of these boat owners in the sample. The study sought to ascertain the number of boaters using Lake Michigan and permanently mooring their craft during the season in the five Michigan counties of: Muskegon, Ottawa, Allegan, Van Buren, or Berrien. Once this information was obtained, it could be applied to the boater expenditure data found for the same counties in the Warner study. Each cell in Table 4-9 in each type and length category is represented by two numbers in fractional form. The numerator is the number of boaters in the sample who moor their craft in one of the five specified Michigan counties. The denominator is the total number of boaters in that type and length category. For example, in the State of Michigan, there were 133 sample boat owners who own a motor craft in the 20-30 foot length category, of which 58 are moored in one of the five specified Michigan counties.

The figures in Table 4-10 suggest that few boaters travel from Illinois and Indiana into Michigan to use Lake Michigan. The statistics for Michigan, on the other hand, show a large portion of the possible Lake Michigan boaters actually recreate on this body of water.

Boaters from Illinois and Indiana do not represent a large portion of Lake Michigan boaters who moor their craft in SW Michigan. Apparently, the 30 foot and under boat length class owners are content to use large inland lakes, trailer their craft to Lake Michigan, or

Table 4-9.--Total sample of regional boaters using Lake Michigan compared to total regional sample.

	20'-30'	30'-45'	45'+
a. <u>Michigan</u>			
Motor	58/133	69/78	18/21
Sail	50/64	33/37	1/1
b. <u>Illinois</u>			
Motor	1/54	2/58	0/5
Sail	0/15	0/24	0/2
c. <u>Indiana</u>			
Motor	10/114	3/47	0/0
Sail	3/14	0/7	0/0

Table 4.10.--Total percentage of sampled boaters using Lake Michigan in Study Region One.

	20'-30'	30'-45'	45'+
a. <u>Michigan</u>			
Motor	44%	88%	86%
Sail	78%	89%	100%
b. <u>Illinois</u>			
Motor	2%	3%	0
Sail	0	0	0
c. <u>Indiana</u>			
Motor	9%	6%	0
Sail	21%	0	0

simply use sites within their state to access Lake Michigan. Owners of large craft (30' +) who use Lake Michigan are content to moor their craft in their own state (or possibly in Wisconsin for Illinois residents) as opposed to mooring their craft in Michigan and driving long distances by car. There are some boaters from Illinois and Indiana who do moor their craft in Michigan. However, this number is very small compared to that for Michigan boat owners in Study Region One.

The percentages in Table 4-10 (Total Percentage of Sampled Boaters Using Lake Michigan in Study Region One) were then multiplied by the totals in Table 4-8 (Total Registered Boating Population) to arrive at an estimated number of boat owners using Lake Michigan who reside in Study Region One and moor their craft in one of the five selected Michigan counties bordering Lake Michigan. These figures are reproduced in Table 4-11. Table 4-12 presents a summary of totals and percentages of boat owners residing in Study Region One who moor their craft in southwestern Michigan and who use Lake Michigan.

We see that 5,240 of the projected 5,657 relevant boats in Study Region One are registered in Michigan (96.2 percent); a distant second is Indiana (6.5 percent), and third and last is Illinois (.9 percent). Motor craft represent 86 percent of this total and sail craft 14 percent. The combined data from Illinois and Indiana represent only 7.4 percent of the total relevant boat owner population.

Although the out-of-state numbers are much smaller than Michigan's, they do represent boat owners who spend money in the State of Michigan and will be included in the estimate of economic impact.

Table 4-11.--Estimated number of boaters using Lake Michigan in Study Region One.

	20'-30'	30'-45'	45'+	Total
a. <u>Michigan</u>				
Motor	3,891	708	59	4,658
Sail	<u>470</u>	<u>109</u>	<u>3</u>	<u>582</u>
Total	4,361	817	62	5,240
b. <u>Illinois</u>				
Motor	19	31	0	50
Sail	<u>0</u>	<u>0</u>	<u>0</u>	<u>50</u>
Total	19	31	0	100
c. <u>Indiana</u>				
Motor	157	2	0	159
Sail	<u>208</u>	<u>0</u>	<u>0</u>	<u>208</u>
Total	365	2	0	367
d. <u>Illinois, Indiana, and Michigan Combined</u>				
Motor	4,067	741	59	4,867
Sail	<u>678</u>	<u>109</u>	<u>3</u>	<u>790</u>
Total	4,745	850	62	5,657

Table 4-12.--Summary of totals and percentages of registered boats in Study Region One moored in SW Michigan counties using Lake Michigan.^a

	Michigan	Illinois	Indiana
<u>a. By State</u>			
Total sample moored	229	3	16
Total usable sample	334	158	182
Estimated registered boat owners using Lake Michigan	5,240	50	367
Total registered boat owner population	10,444	2,265	2,886
Estimated % of boat owner popu- lation who access Lake Michigan from the five SW Michigan counties bordering the lake	50%	2%	13%

<u>b. Michigan, Illinois, and Indiana Combined</u>			
Total sample moored	248		
Total usable sample	674		
Estimated registered boat owners using Lake Michigan	5,657		
Total registered boat owner population	15,595		
Estimated % of Study Region One boat owner population who access Lake Michigan from the five SW Michigan counties bordering the lake	36%		

^aData derived from the Han study.

State Boating Population (B₂)

Data for Study Region One represent information drawn specifically from a sample in that region. No comparable survey was conducted entirely in the State of Michigan, so this research project, after making some assumptions, used the sample of southwest Michigan boaters and applied these results to the entire state. At first glance this process may not seem valid, but, hopefully, it will after one reads the following discussion.

Sample information collected from southwest Michigan boat owners which dealt exclusively with Lake Michigan was expanded to include all the Great Lakes. Also, it is common knowledge the vast majority of Michigan residents live in the lower half of the Lower Peninsula--the very region originally sampled. This research project makes the assumption that the sample results obtained in SW Michigan are representative of the entire state. Of course discrepancies may exist, but, because of budgetary limitations, it was necessary to extrapolate the Warner study to the entire state rather than collect additional information.

Population figures from the Warner and Han data were drawn from 1973 information and broken down into boat type categories, i.e., motor and sail; and 20'-30', 30'-45', and 45'+ length categories. Population data for the state were drawn from 1974 figures and broken down into the same boat type categories and into 20'-30', 30'-40', and 40'+ length categories. Thus, the 1974 data had to be adjusted to be consistent with the categories used by Warner and Han.

The 20'-30' length category was the same in both cases and represented 84 percent of the entire state total. In order to conform to the classifications adapted for this project, the 30'-40' category needed to be increased by 5'. This adjustment was made based on the 1973 SW Michigan regional breakdown (Table 4-11 a). The procedure used to obtain the SW Michigan estimates was reliable and the figures are, therefore, as accurate as possible. The assumption was made that the breakdown for Michigan and SW Michigan was proportionately consistent, since the regional statistics were originally obtained from the entire state totals. These 30'-45' and 45'+ categories only represented 16 percent of the state total and this modification was deemed necessary to achieve classification parity. Table 4-13 shows the original totals and the adjusted totals.

Table 4-13.--Original and adjusted Michigan registered boat population (1974).

a.	<u>Original Michigan Registered Boat Population (1974)</u>	20'-30'	30'-40'	40'+	Total
	Motor	30,440	4,618	851	35,909
	Sail	3,626	647	89	4,362
	Total	34,066	5,265	940	40,271
b.	<u>Adjusted Michigan Registered Boat Population (1974)</u>	20'-30'	30'-45'	45'+	Total
	Motor	30,440	5,031	438	35,909
	Sail	3,626	721	15	4,362
	Total	34,066	5,752	453	40,271

The adjusted figures were determined in the following way:

1. The 30'-40' and 40'+ length categories were added together in each craft category for the state data (Table 4-13 a) and the 30'-45' and 45'+ length categories were added together in each craft category for the SW Michigan data (Table 4-11 a).

2. Proportions for the SW Michigan data were developed in the 30'-45' and 45'+ length categories in relation to the totals obtained in step one. In this case, 30'-45' in the motor class represented 92 percent of the total motor craft 30'+; and 45'+ motor represented 8 percent of the total motor 30'+. Sail craft in the 30'-45' class represented 97 percent of the total sail craft; and the 45'+ class represented 3 percent of the total sail craft.

3. The proportions in step two were applied to the original state totals in each respective category of Table 4-13 a to obtain the adjusted figures in Table 4-13 b. For example in the 30'-45' motor class in Table 4-13 b, 5,031 represents 92 percent and 438 represents 8 percent of the original state total of 5,469. The 20'-30' length class still represented 84 percent and the 30'+ still represented 16 percent, but the numbers in each of the 30'+ cells shifted slightly.

The Han data were expanded to include boaters who use all the Great Lakes. Table 4-14 provides the relationships of a sample of registered SW Michigan boaters who use the Great Lakes as compared to a sample of the total registered boats in the state. Table 4-15 gives the percentage of sampled Michigan boaters using the Great Lakes obtained from Table 4-14. Tables 4-14 and 4-15 may be read

exactly like their Study Region One counterparts, Tables 4-9 and 4-10.

Table 4-14.--Total sample of Michigan boaters using Great Lakes compared to total state sample.^a

	20'-30'	30'-45'	45'+
Motor	61/133	75/78	20/21
Sail	57/64	36/37	1/1

^aData derived from Han study.

Table 4-15.--Total percentage of sampled boaters using the Great Lakes in Michigan (Study Region Two).

	20'-30'	30'-45'	45'+
Motor	46%	96%	95%
Sail	89%	97%	100%

Multiplying Table 4-13 b (adjusted state registered boaters) by 4-15 as we did for Study Region One, an estimate is obtained of the number of boats registered in Michigan which are used primarily on the Great Lakes (Table 4-16).

Change in the Michigan Boating Population

The average cost for new craft was discussed in the section under "Average Boater Expenditures." To determine the total

dollars spent in Michigan on new craft, it is necessary to know how many boaters purchased new craft in a specified time period.

Table 4-16.--Estimated number of boaters using the Great Lakes in Michigan (Study Region Two).

	20'-30'	30'-45'	45'+	Total
Motor	14,002	4,830	416	19,248
Sail	3,227	699	15	3,941
Total	17,229	5,529	431	23,189

Boater registration in the State of Michigan takes place for a specified three-year period, i.e., 1972-1974, 1975-1977. Boat owners registering craft the first year, i.e., 1972, must register their boats for the entire period, i.e., 1972-1974. To register a boat during the second year, i.e., 1973, one must pay for the remaining two. Finally, to register a boat during the third year, i.e., 1974, a fee for that one year is paid. The vast majority of boats are registered during the first year of the three-year period, with only a limited number of craft being registered during the remaining two years.

The Michigan Secretary of State usually only reports boater information at the end of the three-year period, and then only in summarized form for the three years combined. The three-year period, 1972-1974, was the most current interval for which registration data were available at the time this study was undertaken. Although a

complete listing of registrations could have been obtained on magnetic computer tape from the Secretary of State, it was decided to use the somewhat general 1972-1974 summary report rather than incur the additional costs associated with analyzing the volume of specific raw data stored by the Secretary of State's office for 1975. Information for 1975 was a questionable improvement, in any case, since the data were not completely on magnetic tape at the time this study was being completed. Thus, the data for one year were obtained from a general summary of three-year data.

Although it would have been desirable to ascertain the increase in boat registrations from 1974 to 1975, this was not possible for reasons discussed above. However, a process was developed which yields a reasonable estimate of the year-to-year increases in boat registration for the period 1972-1974. This process is as follows:

1. Determine by craft type and length category the total change for the three-year period.
2. Divide this change by 3 to obtain the average one-year change in boat registrations.

It was assumed that any increase during the three-year period was attributable to new craft registrations. The Secretary of State's office immediately subtracts from the total a boat which changes ownership, and adds it to the registration only if the new owner registers it in Michigan. Thus, a simple transfer of ownership between Michigan residents does not add additional craft to the registration total. The only way an increase can occur is if the craft is brought into Michigan from another state or is newly purchased in Michigan.

Since this study's focus is large water craft, it was assumed craft are purchased primarily in the vicinity where the purchaser resides or near where he plans to boat, because craft of this size are not easily transported. Furthermore, no one specific retail outlet was found in the Great Lakes Region which offers low enough discounts to corner the Great Lakes large boat market; i.e., low priced discounts are not available which would entice people to travel great distances to buy this type of craft. In summary, it was assumed that increases in the number of boats that are registered in Michigan represent only new boats that were purchased in Michigan.

The last three-year period before 1974 was 1971. The 1974 figures minus the 1971 statistics give the net change during that period. Tables 4-17 and 4-18 give the total state boating population for 1974 and 1971, respectively. Again, these figures had to be adjusted, in accordance with the method discussed on page 68, to fit the classification system used in this study. Table 4-17 gives both the original and adjusted figures for 1974, Table 4-18 for 1971.

Table 4-19 shows the change in registrations from the 1969-1971 period to the 1972-1974 period, which were calculated by subtracting the corresponding figures in Table 4-17 b from Table 4-18 b. Table 4-19 a shows the three-year change and the figures in Table 4-19 b were obtained by dividing each cell in Table 4-19 a by 3. The numbers in all the cells represent increases from the 1971 data.

Table 4-17.--Michigan original and adjusted registered boat population (1974).

a. <u>Michigan Original Registered Boat Population--1974</u>	20'-30'	30'-40'	40'	Total
Motor	30,440	4,618	851	35,909
Sail	3,626	647	89	4,362
Total	34,066	5,265	940	40,271
b. <u>Michigan Adjusted Registered Boat Population--1974a</u>	20'-30'	30'-45'	45'+	Total
Motor	30,440	5,031	438	35,909
Sail	3,626	721	15	4,362
Total	34,066	5,754	453	40,271

^aTable 4-17 a and b is the same as Table 4-13 a and b. The procedure for adjusting Table 4-17 b is the same used to adjust Table 4-13 b.

Table 4-18.--Michigan original and adjusted registered boat population (1971).

a. <u>Michigan Original Registered Boat Population--1971</u>	20'-30'	30'-40'	40'	Total
Motor	23,569	4,233	717	28,519
Sail	1,721	360	56	2,137
Total	25,290	4,593	773	30,656
b. <u>Michigan Adjusted Registered Boat Population--1971</u>	20'-30'	30'-45'	45'+	Total
Motor	23,569	4,554	396	28,519
Sail	1,721	408	8	2,137
Total	25,290	4,962	404	30,656

Table 4-19.--Change in registered Michigan boat population, 1974-1971.

	20'-30'	30'-45'	45'+	Total
<u>a. Three-Year Change in State</u>				
Motor	6,871	477	42	7,390
Sail	1,905	313	7	2,225
Total	8,776	790	49	9,615
<u>b. Average One-Year Change in State</u>				
Motor	2,290	159	14	2,463
Sail	635	104	2	741
Total	2,925	263	16	3,204

The largest increase has taken place in the motor, 20'-30' category. The net three-year increase has been 9,615 and average one-year increase 3,204.

Table 4-20 offers a proportion of SW Michigan boaters using Lake Michigan (Table 4-11 a) compared with the total number of registered Michigan boats (Table 4-13 b). This procedure is necessary to arrive at the proportion of region to state boaters. This information can then be applied to estimate the number of new craft registered in SW Michigan.

From Table 4-20 we obtain percentage figures represented in Table 4-21 of SW Michigan registered boats using Lake Michigan compared to state totals.

Table 4-20.--SW Michigan boaters using Lake Michigan compared to total state boaters.

	20'-30'	30'-45'	45'+
Motor	3,891/30,440	708/5,031	59/438
Sail	470/3,626	109/721	3/15

Table 4-21.--Percentage of SW Michigan boaters using Lake Michigan compared to state totals.

	20'-30'	30'-45'	45'+
Motor	13%	14%	13%
Sail	13%	15%	20%

Table 4-22 shows the one-year increase of SW Michigan boaters using Lake Michigan (Table 4-19 b x Table 4-21).

Table 4-22.--Estimated number of new craft registered in SW Michigan and used on Lake Michigan.

	20'-30'	30'-45'	45'+	Total
Motor	298	22	2	322
Sail	83	16	0	99
Total	381	38	2	421

Table 4-23 describes the estimated one-year increase in state boaters using the Great Lakes. The information for this table was obtained by multiplying the percentage of Michigan boaters using the Great Lakes, found in Table 4-15, by the average one-year change in the state boating population, presented in Table 4-19 b.

Table 4-23.--Estimated number of new craft registered in Michigan and used on the Great Lakes.

	20'-30'	30'-45'	45'	Total
Sail	1,053	153	13	1,219
Motor	565	101	2	668
Total	1,618	254	15	1,887

Direct Expenditures in Southwest Michigan (C)

Now that sections on average boater expenditures and applicable population numbers have been completed, a fusion of this information is necessary to find the amount of direct expenditures made by Lake Michigan boaters in southwest Michigan.

It should be reiterated that the average expenditure data were obtained from a sample of 20' and over craft owners who moored their boats on Lake Michigan in one of the five counties of: Muskegon, Ottawa, Allegan, Van Buren, or Berrien. The population data were acquired from a tri-state area (Study Region One) encompassing selected counties in southwestern Michigan, northeastern Illinois, and northwestern Indiana who moored craft 20' and over in one of the five Specified Michigan counties and who used Lake Michigan.

Study Region One data were secured from a large geographic area, but the vast majority of expenditures occurred in southwest Michigan, either enroute, or at the marina sites in the region. Some expenditures were made by Illinois and Indiana boaters outside southwestern Michigan and to the extent possible these have been excluded in the analysis. Even if some minor error has occurred in estimating out-of-state expenditures for Illinois and Indiana boaters, the effect to the estimates will be slight, since Illinois and Indiana boaters combined account for only 7.4 percent of the total relevant boater population.

Table 4-24 represents the total expenditures for new craft in southwest Michigan. The figures in this table were calculated by multiplying the average cost for new craft in 1974, found in Table 4-7, by the one-year increase in the number of regional registered boats, found in Table 4-22.

Table 4-24.--Estimated direct expenditures for new craft purchased in SW Michigan.

	20'-30'	30'-45'	45'+	Total
Motor	4,470,000	880,000	350,000	5,700,000
Sail	664,000	448,000	0	1,112,000
Total	5,134,000	1,328,000	350,000	\$6,812,000

The table reveals that an estimated total of \$6,812.00 was spent by Lake Michigan boaters for new craft in 1974. This money is

assumed to flow directly into the economy of local communities in SW Michigan.

Table 4-25 shows a summary of the direct expenditures in southwestern Michigan resulting from craft-, personal-, and trip-related costs. The figures in this table were obtained by multiplying the two corresponding cells in Tables 4-6 and 4-11.

Table 4-25.--Summary of estimated total annual direct craft-, personal-, and trip-related expenditures in SW Michigan.

	20'-30'	30'-45'	45'+	Total
a. <u>Michigan</u>				
Motor	14,771,986.95	3,521,556.60	482,330.90	18,775,874.45
Sail	1,385,278.00	522,777.08	14,478.36	1,922,533.44
Total	16,157,264.95	4,044,343.68	496,809.26	20,698,407.89
b. <u>Illinois</u>				
Motor	81,226.33	168,564.67	0	249,791.00
Sail	0	0	0	0
Total	81,226.33	168,564.67	0	249,791.00
c. <u>Indiana</u>				
Motor	605,533.30	10,038.80	0	615,572.10
Sail	625,632.80	0	0	625,632.80
Total	1,231,166.10	10,038.80	0	1,241,204.90
Region Total			\$22,189,403.79	
New Craft (Michigan)			6,812,000.00	
Total Direct SW Michigan Expenditures			\$29,001,403.79	

Table 4-25 shows slightly more than 22 million dollars spent annually in SW Michigan by boaters residing in Study Region One on craft-, personal-, and trip-related commodities and services. Adding this to the new craft figures produces a total direct impact of approximately 29 million dollars.

Tables 4-26 and 4-27 show a detailed breakdown of each expenditure category on the list of craft-, personal-, and trip-related expenditures. The row totals of each expenditure category, which represent the total expenditures in Study Region One by all craft, were obtained by multiplying the average total in each expenditure category from Tables 4-1 and 4-2 by the estimated total number of registered boats incurring expense in these categories from Table 4-11, and summing these figures to obtain the "weighted total." For example, in Table 4-26, the average costs (Table 4-1) for motor craft owners in the 20'-30' length category were the same for all boaters residing in Study Region One for the expenditure categories: fuel and oil through boating equipment/total. Looking at Table 4-11 d it is seen that 4,067 boats are in this length and type category. Table 4-1 shows that the average cost in the fuel and oil category is \$241.87; multiplying these last two figures results in \$983,685.29 in direct expenditures. When it came to annual Michigan registration the study was only concerned with the Michigan population figure found in Table 4-11 a. Here, the number of registered boats in the motor craft, 20'-30' length category is 3,891. This value is multiplied by the appropriate average registration fee, in this case \$20.00, and Table 4-26 shows that \$77,820.00 results as the direct boater

Table 4-26.--SW Michigan (Study Region One) estimated total annual direct craft-related expenditures by craft type and length (dollars).

Expenditure Category	Direct Expenditures						Totals
	Motor Craft			Sail Craft			
	20'-30'	30'-45'	45'+	20'-30'	30'-45'	45'+	
(1) Fuel and oil	983,685.29	331,715.65	47,316.82	18,746.70	9,245.38	254.46	1,410,964.30
(2) Annual insurance costs	711,521.65	224,471.13	39,294.00	91,746.96	34,859.29	959.43	1,102,852.46
(3) Pre-launch maint./total	896,366.80	265,166.85	44,504.29	82,960.08	30,501.47	839.49	1,320,338.98
(3) Launching fee	203,512.68	48,061.26	5,239.20	25,519.92	10,174.06	280.02	292,787.14
(3) Slip rental fee	934,637.27	233,829.96	32,730.84	137,295.00	29,915.05	823.35	1,369,231.47
(3) In-season maint. costs	494,059.15	262,966.08	55,830.52	25,262.28	11,773.09	324.03	850,215.16
(3) Craft haul-out	249,957.82	51,847.77	5,239.20	27,201.36	9,308.60	256.20	343,810.95
(3) Storage prep. costs	468,721.75	63,177.66	6,221.55	184,158.36	17,485.78	481.26	740,246.36
(3) Off-season boat storage	779,440.55	217,861.41	29,796.77	77,712.36	30,018.60	826.20	1,135,655.89
(3) Effluent pump-out	219,699.34	38,383.80	7,553.18	51,812.76	3,331.04	91.68	320,871.80
(4) Boating equip./total	2,387,655.03	441,850.89	59,558.14	309,215.46	116,899.23	3,217.41	3,318,436.16
TOTAL	8,329,257.34	2,199,332.46	333,284.51	1,031,631.24	303,511.59	8,333.53	12,205,410.67
(5) Annual Mi. regist. fee	77,820.00	24,780.00	3,835.00	9,400.00	3,815.00	195.00	119,845.00
TOTAL (inc. Mi. reg. fee)	8,407,077.34	2,224,112.46	337,119.51	1,041,031.24	307,326.59	8,548.53	12,325,255.67

Table 4-27.--SW Michigan (Study Region One) estimated total annual direct personal- and trip-related expenditures by craft type and length (dollars).

Expenditure Category	Direct Expenditures						Totals
	Motor Craft			Sail Craft			
	20'-30'	30'-45'	45'+	20'-30'	30'-45'	45'+	
<u>a. Personal Expenditures</u>							
(4) Rec. equip./boating rel.	701,720.18	125,377.20	14,817.26	76,885.20	13,484.39	371.13	932,655.36
(4) Rec. exp./nonboating	666,621.97	77,590.11	14,950.60	51,724.62	20,205.33	556.11	831,648.74
(4) Boating clothing	436,145.08	109,045.56	16,184.29	54,456.96	19,291.91	530.97	635,654.77
(6) Off-craft lodging	121,562.63	13,397.28	0.00	34,428.84	0.00	0.00	169,388.75

(7) Food exp./groceries	913,204.18	300,757.08	33,853.61	122,697.66	36,432.16	1,002.72	1,407,947.41
(7) Food exp./alcohol	563,889.55	128,845.08	8,499.54	58,823.28	18,811.22	517.74	779,386.41
(8) Food exp./prep. meals	685,126.82	172,912.35	13,834.91	80,322.66	29,181.48	803.16	982,181.38
Food (7)+(8) subtotal	2,162,220.55	602,514.51	56,188.06	261,843.60	84,424.86	2,323.62	3,169,515.20
(9) Laundry costs	152,878.94	24,392.48	2,620.19	8,963.16	3,312.51	91.17	192,333.38
TOTAL PERSONAL	4,241,148.94	952,392.48	104,760.40	488,302.38	140,719.00	3,873.00	5,931,196.20
<u>b. Trip-Related Expenditures</u>							
Michigan	2,667,708.51	485,411.88	40,450.99	322,236.70	74,731.49	2,056.83	3,592,596.40
Illinois	22,500.37	36,711.13	0.00	0.00	0.00	0.00	59,211.50
Indiana	120,271.42	1,532.12	0.00	159,340.48	0.00	0.00	281,144.02
TOTAL TRIP	2,810,480.30	523,655.13	40,450.99	481,577.18	74,731.49	2,056.83	3,932,951.92

expenditure on this item. The same procedure was followed for each cell in each expenditure category and results added to obtain row totals.

The figure \$12,325,255.67 is obtained from the total direct craft expenditures (Table 4-26) and \$9,864,148.12 is calculated for total personal- and trip-related costs (Table 4-27). Adding these two figures to the new craft expenditure of \$6,812,000 found in Table 4-24, we obtain a total direct estimate of \$29,001,403.79 spent in southwest Michigan by Study Region One boaters.

Economic Multipliers (D)

As stated in previous chapters of this report, the measurement of direct expenditures alone does not account for their total income effect on an area. These direct expenditures stimulate additional expenditures, and information on measurements of these subsequent rounds of expenditures is needed to determine their net income effect on an area. It is the role of the economic multiplier to estimate the effect of this responding. These direct expenditures represent final demand or consumption by boaters, but the impact on the economy does not cease at this point. When applied to direct dollar expenditures, the multiplier determines the total direct and indirect flow of dollars through a given economy.

As also stated previously, multipliers are derived from input-output tables of selected industries within the confines of a specific geographic location. The State of Michigan has no input-output data and therefore no specific state or regional multipliers.

This study will draw multipliers from three input-output reports deemed relevant for this analysis. The three studies are: the 1967 U.S. Government National Input-Output Tables, the 1966 Fortune Magazine National Input-Output Tables, and the 1968 Door County, Wisconsin, Input-Output Study on Recreation.⁸

It should be noted again that any input-output data not drawn from a specific region will never be as useful in analysis as would data from a study conducted in that region. However, the lack of specific input-output studies for the geographical area included in this study and the lack of sufficient sources to complete an input-output study as a component of this endeavor required that existing studies be drawn upon to provide the needed multipliers. The reader should be apprised that adoption of these nonspecific multipliers places some limitations on the reliability of estimates subsequently derived and reported in the following pages of this report.

Each expenditure category total will be multiplied by a relevant economic multiplier from each of the three mentioned input-output studies and their products summed to yield three different net income impact figures. This procedure provides a range of values which likely contains the true value. Of course, if one of these tables could have been determined to be more accurate than the others, or a

⁸U.S. Department of Commerce, Input-Output Structure of the U.S. Economy (Washington, D.C.: U.S. Government Printing Office, 1974); Fortune's Input-Output Portfolio, Fortune Marketing Service (U.S.A.: Time, Inc., 1972); William A. Strang, Recreation and the Local Economy, The University of Wisconsin Sea Grant Program, Technical Report Number 4, October 1970.

Michigan I/O study would have been available, then only the one most applicable table would have been used. At this point it is not known which of the three I/O studies used in this report is most applicable to Michigan's economy, so the range produced by all will be presented for the reader's information and own evaluation.

The three I/O studies used in this report are briefly critiqued below:

1. U.S. Governmental National I/O Study--This document contains 1967 data and was released for public use early in 1974. The tables are broken down into 367 industries aggregated to 85. This large breakdown allows very specific industrial sector multipliers to be drawn out and applied for this analysis. While specific with respect to individual sectors, these multipliers do not only apply to Michigan, but the whole country. The U.S. Government I/O tables provide very specific industry multipliers but are of questionable relevance here because they encompass all regions of the U.S. (cells in each table are 367 x 367).

2. Fortune's National I/O Tables--This 1966 study also encompasses all regions of the United States, and the number of industrial sectors specified is 100. This table does not contain as accurate a disaggregation of industries as the U.S. Government I/O study, and again, cannot be applied for separate specific regions. It does cover 100 industries, making it second to the above study with respect to the breakdown of the number of distinct industries included (total cells in each table are 100 x 100).

3. Door County, Wisconsin. This 1968 report only contains 19 industry categories, but does have the advantage of focusing on a recreation/tourist-oriented county in the Great Lakes region. Door County is primarily provincial and not as industrialized as southwest Michigan. Yet the study attempts to account for the county's industry and agriculture in aggregated terms as well as specific recreation-related business (total cells in each table are 19 x 19).

Expenditure Groupings

Expenditure categories in Tables 4-1, 4-2; and 4-26, 4-27 were combined into like groups to facilitate the application of appropriate economic multipliers.

Standard Industrial Classifications (SIC)⁹ issued by the U.S. Government lists all major industries and aggregates all related subindustries under appropriate major headings. The I/O studies used in this report aggregate industries into sectors according to the SIC classifications. This source was helpful in grouping the boater expenditure categories under appropriate and descriptive (to help the reader) I/O industry sector titles. An appropriate multiplier is one that accurately describes the effect of secondary responding after it is applied to the direct expenditure figure; i.e., clothing sales would be much more accurately measured by a retail multiplier than a mining multiplier. Instead of using one general regional multiplier, the expenditure categories used in the Warner study were

⁹Executive Office of the President, Bureau of the Budget, Standard Industrial Classifications (Washington, D.C.: Office of Statistical Standards, 1972).

grouped together into ten expenditure groupings. These categories correspond to industrial sectors in I/O tables from which multipliers were drawn, and used to ascertain the net income effect of boater expenditures.

The study attempted to use an I/O sector which was as closely related as possible, since none was totally relevant for any one expenditure category. Input-output tables are designed for many uses and incorporate many industries. This is the reason for aggregation; it allows data to be more conventionally analyzed for like industries. Attempts were made to find the I/O industry aggregation which most closely corresponds to the specific expenditure categories used in this study.

The exact title of each boater expenditure grouping does not appear in exactly the same fashion on its corresponding I/O table category. These expenditure group titles represent a compromise. Input-output industry titles change from table to table, due to the different aggregations used in each table. For example, the U.S. Government I/O tables have one category for wholesale, and one for retail. The Fortune tables combine wholesale and retail sales together into one category.

The boater expenditure groupings used in this study correspond as closely as possible to industry groupings used in the three I/O tables. Industry titles are not always indicative of the I/O category contents. This is the reason the SIC classifications, which describe in detail the emphasis of subindustries found within major

industry classifications (as defined by the U.S. Government), were used to determine corresponding boater expenditure groupings.

The following are the expenditures which are contained in each group:

EXPENDITURE CATEGORIES ^a	AGGREGATED EXPENDITURE GROUP TITLE ^b	GROUP NO.
Fuel and oil	Marine gasoline	(1)
Annual insurance costs	Marine insurance	(2)
Pre-launch maint./total Launching fee Slip rental fee In-season maint. costs Craft haul-out Storage prep. costs Off-season boat storage Effluent pump-out	Water Transportation Industry	(3)
Boating equipment/total Rec. equip./boating related Rec. expend./nonboating Boating clothes New craft expenditure	Retail trade	(4)
Annual Michigan registration	State and local govt.	(5)
Off-craft lodging	Hotel and motel	(6)
Food expenditure/groceries Food expenditure/alcohol	Grocery stores	(7)
Food expenditure/ prepared meals	Eat and drink places	(8)
Laundry costs	Laundry and cleaning services	(9)
Car and travel costs	Auto repair and services	(10)

^aCategories in which boater expenditures were collected by Warner.

^bGroupings that will be used to aggregate the data collected by Warner to establish correspondence with the industrial sectors of the I/O tables from which multipliers were selected.

Table 4-28 presents the list of expenditure groupings with multipliers, and the categories in each respective I/O study which most closely apply to each assemblage.

The SIC numerical codes are included within parentheses under each aggregated expenditure category (e.g., 5541 under Marine Gasoline). Given this code number, one may determine the composition of the corresponding industry by consulting the Standard Industrial Classification Manual.¹⁰

The number given to the title of the industry which heads a column or row in its respective I/O table is also presented to facilitate location of the data used in this analysis in the I/O table from which they were extracted.

The "Total Requirements (Direct and Indirect) Per Dollar of Delivery to Final Demand" table for each of the three I/O studies was consulted to derive the multipliers used in this study. Numerical multipliers for the total inputs to industry were obtained by adding down the columns of processing sector selected as the most appropriate for use with a boater expenditure group.

Table 4-28 may be used in the following manner:

Category one (1) is entitled "Marine Gasoline" and includes "Fuel and Oil" from the Warner study. The closest SIC code is also "Marine Gasoline" and one may find this heading by looking up the number 5541. The closest National I/O category is "Retail Trade," which has a multiplier of 1.46091 and may be found in its table under

¹⁰ Executive Office of the President.

Table 4-28.--Table of economic multipliers by industry sector.

	(1) Aggregated Expenditure Group (SIC Code)	(2) 1967 Nat. I/O Tables	(3) 1966 Fortune I/O Tables	(4) 1968 Door County, Wis. I/O Tables
(1)	Marine Gasoline (5541)	Retail Trade ^a 1.46091 ^b (69.02) ^c	Wholesale & Retail ^a 1.53775 ^b (87) ^c	Auto Sales & Service ^a 1.8870 ^b (11) ^c
(2)	Marine Insurance (6333)	Insurance Carriers 1.98629 (70.04)	Finance & Insurance 1.83262 (88)	Finance & Insurance 2.9453 (8)
(3)	Water Trans- portation (44)	Water Trans- portation 2.03236 (65.04)	Transportation & Warehousing 1.71563 (81)	Transportation, Communications 2.3287 (4)
(4)	Retail Trade (52-59)	Retail Trade 1.46091 (69.02)	Wholesale & Retail 1.53775 (87)	General Merchan- dise Stores 1.7250 (9)
(5)	State & Local Gov't. (None)	State & Local Gov't. 1.93629 (79.02)	State & Local Gov't. 1.85182 (97)	Local Government 2.4704 (18)
(6)	Hotel & Motel (70)	Hotel & Motel 1.71693 (72.01)	Hotel & Per- sonal Services 1.85789 (90)	Lodging Places 2.3699 (16)
(7)	Grocery Stores (5411)	Retail Trade 1.46091 (69.02)	Wholesale & Retail 1.53775 (87)	Food Stores 1.4743 (10)
(8)	Eat & Drink Places (581)	Hotel & Motel 1.71693 (72.01)	Hotel & Per- sonal Services 1.85789 (90)	Eat & Drink Places 2.2705 (14)
(9)	Laundry & Cleaning (721)	Personal Serv. 1.86030 (72.02)	Hotel & Per- sonal Services 1.85789 (90)	Personal & Business Service 2.9453 (7)
(10)	Auto Repair & Services (75)	Auto Repair & Services 1.90550 (75)	Auto Repair & Services 2.06460 (93)	Auto Sales & Service 1.8870 (11)

^aIndustrial sector title.^bMultiplier for sector.^cNumeric code used in I/O study to identify sector.

number 69.02. The Fortune title is "Wholesale and Retail" (remember, Fortune's tables are not broken down into as many industries as the National I/O tables), with a multiplier of 1.53775 and may be found in its table under the number 87. The Door County category is Auto Sales and Services, has a 1.8870 multiplier and is found under category 11 in its table.

The categories may not have the same titles, but the industries covered appear similar enough, in this writer's opinion, to warrant their use in each instance.

The economic multipliers exhibit considerable diversity for the same or similar industrial sectors depending upon the I/O table from which they were obtained. The marine insurance multipliers range from 1.83262 for Fortune, to 2.9453 for Door County, while retail trade and grocery stores only range from 1.46091 to 1.53775 (see Expenditure categories 2, 4, and 7 in Table 4-28).

Total Income Effect on the Economy of Southwest Michigan (E)

To obtain the total impact on the economy of southwestern Michigan, it was necessary to apply the multipliers (Table 4-28) to the direct expenditure totals found in Tables 4-24, 4-26, and 4-27. Table 4-29 describes the SW Michigan net income effect after the application of the multipliers to estimated direct expenditures. The first column of Table 4-29 contains the title of the aggregated expenditure grouping. The second column contains the direct expenditures estimated for each grouping from Tables 4-24, new craft cost; 4-26, craft related; and 4-27, personal and trip related.

Table 4-29.--SW Michigan net income effect on the economy after application of multipliers (dollars).

(1) Expenditure Category	(2) Direct Expend. Total	(3) U.S. Gov't. I/O	(4) Fortune I/O	(5) Door County I/O
(1) Marine gasoline	1,410,964.30	2,061,291.86	2,169,710.35	2,662,489.63
(2) Annual craft insurance	1,102,852.00	2,190,584.81	2,021,109.48	3,248,231.35
(3) Pre-launch maint./total	1,320,338.98	2,683,668.20	2,265,213.16	3,074,673.38
Launching fee	292,787.14	595,107.43	502,314.40	681,813.41
Slip rental fee	1,369,231.47	2,783,045.12	2,349,094.59	3,188,529.32
In-season maint. cost	850,214.16	1,728,113.33	1,458,654.63	1,979,896.04
Craft haul-out	343,810.95	698,816.38	589,852.38	800,632.56
Storage prep. costs	740,246.36	1,504,595.14	1,269,988.86	1,723,811.70
Off-season storage	1,135,655.89	2,308,288.74	1,948,365.31	2,644,601.87
Effluent pump out	320,871.80	652,191.19	550,497.29	747,214.16
Water Trans. Subtotal	6,373,157.75	12,953,825.52	10,933,980.62	14,841,172.44
(4) Boating equip. total	3,318,436.16	4,847,936.57	5,102,925.21	5,724,302.38
Rec. equip./boating rel.	932,655.36	1,362,525.54	1,434,190.78	1,608,830.50
Rec. expend./nonboating	831,648.74	1,214,963.96	1,278,867.85	1,434,594.08
Boating clothes	635,654.77	928,634.41	977,478.12	1,096,504.48
New craft	6,812,000.00	9,951,718.92	10,475,153.00	11,750,700.00
Retail Trade Subtotal	12,530,395.03	18,305,779.40	19,268,614.96	21,614,931.44

Table 4-29.--Continued.

(1) Expenditure Category	(2) Direct Expend. Total	(3) U.S. Gov't. I/O	(4) Fortune I/O	(5) Door County I/O
(5) Registration	119,845.00	232,054.68	221,931.37	296,065.08
(6) Off-craft lodging	169,388.75	290,828.63	314,705.66	401,434.40
(7) Food expend./groceries	1,407,947.41	2,056,884.45	2,165,071.13	2,075,736.98
Food expend./alcohol	779,386.41	1,138,613.40	1,198,501.45	1,145,049.38
Grocery Subtotal	2,187,333.82	3,195,497.85	3,363,572.58	3,224,786.25
(8) Food expend./prepared meals	982,181.38	1,686,336.68	1,824,784.96	2,230,042.82
(9) Laundry costs	192,333.38	357,797.79	357,334.26	566,479.50
(10) Car & travel costs (gas included)	3,932,951.92	7,494,239.88	8,119,972.53	7,421,480.27
REGIONAL TOTALS	29,001,403.79	48,768,237.10	48,595,716.77	56,507,113.18

The last three columns show the total dollar impact for each expenditure category after application of each multiplier (Table 4-28).

Table 4-29 shows that the direct expenditure total of \$29,001,403.79 results in a total net impact which ranges from \$48,595,716.77 based upon Fortune multipliers to \$56,507,113.18 using Door County multipliers. The government multipliers produced an impact of \$48,768,237.10. These final figures are quite close, with a range of approximately \$8 million from lowest to highest. The most striking similarities occur between the U.S. Government's National Study and Fortune's National Study, where only \$172,520.33 separates the two net estimates. These results suggest that recreational boaters in Study Region One contribute approximately \$53 million to the economy of southwest Michigan.

Total regional multipliers were calculated by dividing the total direct expenditures into the totals obtained after application of the multipliers. The Government study produced a regional multiplier for Lake Michigan boater expenditures of 1.68158, the Fortune Study 1.67563, and Door County 1.9484. The reader may wish to compare these to his own estimate of what the appropriate multiplier should have been for this situation. By simply multiplying one's own regional multiplier by the Regional Direct Expenditure Category total (column 2) of Table 4-29, one can calculate his own version of net income effect.

Net Income Effect to Industries
in Southwest Michigan (F)

Before attempting to estimate the number of jobs created in southwest Michigan due to the expenditures made by Lake Michigan boaters, it was necessary to compile additional data.

The figures in Tables 4-26 and 4-27 show how many total dollars enter the region's economy from industries, but they do not show the net effect to each industry within the region. The value of the multiplier is that it shows the total effect of direct expenditures which are respent in the community. It does not, however, show the effect upon each industry in the community's economy; i.e., it tells how much is spent, but not where. The figures in Table 4-29 show the direct and indirect effect of expenditures made by boaters to the community, but not to which industries within the community.

It is now necessary to calculate the effect of the direct and indirect expenditures to specific industries in order to estimate the number of jobs created by each industry in SW Michigan.

By looking on Table 4-29, column 2, it is seen approximately \$1,410,000 is spent directly for marine gasoline, and the total effect produces over \$2 million. It is not known to which local industries this \$2 million accrues. It remains to be determined how the gasoline dealers respent their earnings. Once the total amount of money which actually accrues to each industry in SW Michigan is known, this figure can be divided by the "number of dollars needed to create one job" to determine the total jobs produced in the region, attributable to Lake Michigan recreational boating expenditures.

One of the many functions of an input-output table is to show to which industries sales are made. Up until this point, this study has been concerned with columns (purchases, inputs) of the input-output tables examined. Now the rows (sales, outputs) are germane. Multipliers in general are obtained by adding columns in the "direct and indirect activity" table. After these multipliers were applied to direct expenditures, they helped show the benefits received by the whole community from specific industries. By adding the rows of the "direct and indirect activity" table, the benefits to a specific industry heading the row may be obtained.

Due to the limitation of time and budget, it was decided to use the Door County I/O table exclusively, instead of using either the U.S. Government or Fortune tables. The Door County tables only contained 19 industries; thus the number of required mathematical calculations would be much smaller than if the larger I/O were adopted for these calculations. Due to the similarities of net income estimates calculated from the three I/O studies, it was assumed that the simpler approach (using the Door County tables) was justifiable. The Door County Direct and Indirect Activity Per Export Dollar table¹¹ was used.

Table 4-30 shows the direct and indirect effect to specific industries because of the expenditures of Lake Michigan recreational boaters (see Appendix B for a discussion of the procedures used). Column 1 of this table presents the title of the Door County industry,

¹¹Strang, Recreation, pp. 31-33.

Table 4-30.--Direct and indirect effect to southwest Michigan industries from Lake Michigan boater expenditures (thousands of dollars).

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Door County Industry	Boat Expenditure Category Number	Direct Earnings	Multiplier Induced Benefit	Total Industry Earnings Exclud- ing Households	Total/Direct	% of Household Earn- ings Accruing to Industry	Earnings from Households	Total Industry Earnings Including Households
Transp. & utilities	3	6,373	2,244	8,622	1.4	6%	780	9,402
Personal & bus. service	9	192	607	799	4.2	10%	1,300	2,099
Finance & insurance	2	1,103	923	2,026	1.8	10%	1,300	3,326
Gen. merch. stores	4	12,530	661	13,191	1.1	4%	520	13,711
Food stores	7	2,187	1,618	3,805	1.7	2%	260	4,065
Auto sales & service	1+10	5,344	2,074	7,418	1.4	3%	390	7,808
Eat & drink places	8	982	436	1,418	1.4	6%	780	2,198
Lodging places	6	169	72	241	1.4	6%	780	1,021
Local government	5	120	1,034	1,154	9.6	8%	1,040	2,194
Subtotals		29,000	9,674	38,674	---	--	7,150	45,824
Agriculture	--	--	109	109	---	9%	1,170	1,279
Construction	--	--	559	559	---	7%	910	1,469
Manufacturing	--	--	311	311	---	4%	520	831
Wholesalers	--	--	2,115	2,115	---	5%	650	2,765
Bldg. mat. & farm equip.	--	--	515	515	---	3%	390	905
Apparel stores	--	--	203	203	---	4%	520	723
Furn. and appliance stores	--	--	124	124	---	4%	520	644
Other retail	--	--	826	826	---	3%	390	1,216
Amusement places	--	--	49	49	---	6%	780	829
Local households	--	--	13,000	13,000	---	--	--	--
Totals		29,000	27,485	56,485	---	--	13,000	56,485

Note: Final figures may not correspond to those in Table 4-29 due to rounding.

- | | |
|---|---|
| (1) Title of Door County industries. | (5) Column 3 + column 4. |
| (2) Column 2 is the Boater Expenditure group no. found in column 1, Table 4-29. | (6) Column 5 ÷ column 3. |
| (3) The figures in column 3 are taken from column 2, Table 4-29. | (7) Total direct & indirect row coefficients ÷ each row cell coefficient in Table 7, Door County I/O study. |
| (4) Column 4 is the row multiplier effect derived from Table 7, Door County I/O study (Appendix B). | (8) Each cell in column 7 x the household total in column 5 (\$13 million). |
| | (9) Column 8 + column 5. |

and column 2 gives the corresponding boater expenditure grouping number. Column 3 reports the direct earnings of the expenditure grouping from column 2. The figures for column 3 are found in column 2 of Table 4-29. Column 4 shows the dollars received by an industry from direct expenditures after application of the row multipliers, i.e., the indirect induced effect. Column 5 shows the total direct and indirect earnings of each community industry.

An example may serve to illustrate the difference between the direct and indirect benefits to the community as presented in Table 4-29, and the direct and indirect benefit to each industry as presented in Table 4-30. We can see from Table 4-29, column 2, \$192,000 was spent directly for laundry costs (personal and business services sector) in the Door County study. The multiplier for Door County personal and business services is 2.9453 (Table 4-28, column 4) --a 2.9 to 1 ratio, which produces a net effect of \$566,000 (Table 4-29, column 5). By looking on Table 4-30, column 3, it can be seen the \$192,000.00 direct expenditure figure does not change, but after all the communities' industries have respent these initial direct earnings, \$607,000 accrues to the personal and business service sector. This multiplier induced effect to this industry takes place in the ratio of 4.2 to 1, as presented in column 6, Table 4-30. It can be seen that the benefits to the community are not always as directly proportional as the benefits to the industry.

Industries which receive no direct earnings from Lake Michigan boaters still receive indirect earnings from dollars respent by other industries. This is the reason the remaining industries, i.e.,

agriculture--households, in the Door County I/O table are provided below the industries previously mentioned and used in this study (Table 4-30). These remaining industries (agriculture to households) receive no direct earnings, yet receive dollars due to indirect spending. Dollars are generated for these industries and they also hire workers; so these industries which receive no direct earnings from boaters still contribute to the job-producing potential of the region.

The multiplier induced benefit in column 4 of Table 4-30 shows a sizable amount of dollars accruing to the household sector. In fact, \$13,000,000 represents 47 percent of the total amount of \$27,485,000, in column 4.

The objective of compiling the data in Table 4-30 was to obtain the amount of sales each industry in the processing sector of the economy receives, to determine the number of jobs it creates. Households are not usually considered part of the processing sector, but Strang chose to include them in the tables used for Door County. Since the number of jobs created because of household earnings was not available, this study incorporated the income accruing to households into the remaining 18 industries of the Door County tables. This decision was made because members of the household spend most of this money in the local economy. This inclusion gives a more accurate estimate of the total industry earnings and, hence, jobs created by industrial sector because of boater expenditures.

The multiplier induced benefits to households were calculated in the same fashion as the other 18 industries in the Door County I/O

tables. Column 7 of Table 4-30 shows the percentage of total household income which accrues to each of the other industries. These figures were calculated by dividing each individual cell of the Local Household row in the "direct and indirect" table (Table 7, Strang) into the sum of the household row. Column 8 of Table 4-30 shows the actual amount of the 13 million household dollars each industry receives. Column 9 shows the total earnings by each industry with households included.

A quick run-through of one row in Table 4-30 may help the reader's comprehension of this process.

Column 1, entitled Transportation and Utilities in the Door County study, and expenditure category 3 in Table 4-29, shows direct earnings of \$6,373,000 (column 2, Table 4-29). The multiplier induced benefit in Table 4-30 is \$2,249,000 (column 4), resulting in the total industry earnings, excluding households, of \$8,622,000 (column 5). This ratio of total to direct is 1.4 to 1 (column 6). Six percent (column 7) of the \$13,000,000 total local households earnings (\$780,000, column 8) accrues to the transportation and utilities industry, resulting in this industry's total earnings, including the contribution from the household sector, being \$9,402,000 (column 9).

The total multiplier induced benefit, as seen in Table 4-30, column 4, to all 19 industries resulting from the initial \$29,000,000 direct expenditure, was \$27,485,000.

The final regional total of direct and indirect expenditures from Tables 4-29, column 5, and 4-30, column 9, correspond (\$56.5 million). The former table shows the total direct and indirect impact

from the industries in the region, while the latter shows the total direct and indirect impact to each industry within the region, due to the expenditures of Lake Michigan boaters.

Dollars Needed to Create One New Job
in the State of Michigan (G)

The dollar estimates needed to create one new job in the State of Michigan were obtained from the U.S. Social Economic Statistics Administration and the Michigan State Economic Record.¹² The dollar amounts were devised by dividing the number of paid employees into the total sales of selected retail trade, service, manufacturing, and construction industries in Michigan. The industry which requires the most money to create one new job is food stores (\$64,116), where most capital is spent for commodities sold rather than labor. The industry that requires the least money to create one job is closely related among three service-oriented businesses: hotels and motels, \$13,883; eating and drinking places, \$14,535; and laundry and cleaning services, \$12,869 (Table 4-31).

Number of Jobs Created in Southwest
Michigan (H)

Table 4-32 presents an estimation of the number of jobs created in southwest Michigan due to the expenditures of Lake Michigan boaters. The figures for net income effect to industry in column 9, Table 4-30,

¹²Michigan State Economic Record, Division of Research, Graduate School of Business Administration, Michigan State University Vol. 16 (March-April 1974), p. 7.

were divided by the dollar amounts needed to produce one job in Michigan on column 4, Table 4-31.

Table 4-31.--Dollars needed to create one new job in the State of Michigan.

Kind of Business	Sales (\$1,000)	Paid Employees (Number)	Dollars Needed
Gasoline service stations	1,521,856	32,099	47,411
Business services, total	1,263,159	52,502	24,059
Services, total	3,534,212	170,472	20,732
Misc. retail stores, total	1,241,602	32,932	37,702
Hotels and motels	245,741	17,701	13,883
Food stores	4,497,731	70,150	64,116
Eating and drinking places	1,654,247	113,815	14,535
Laundry and cleaning	229,525	17,835	12,869
Agriculture	1,102,021	unavail. ^a	unavail. ^a
Construction ^b	4,232,336	125,853	33,629
Manufacturing	23,338,000	1,085,000	21,510
Wholesalers	26,545,771	1,370,370	19,371
Building materials	1,029,019	16,764	61,383
Apparel stores	1,066,823	31,374	34,033
Furn. and appliance stores	934,212	18,625	50,159
Amusement places	428,989	21,827	19,654

^aLabor figures for agriculture are unavailable because agricultural workers are listed for the specific industry to which the products are sold, and hence, not aggregated under agriculture.

^b1967 data.

Table 4-32.--Number of jobs created in southwest Michigan by Lake Michigan boater expenditures.

(1) Boater Expenditure Category	(2) Door County Industry	(3) Kind of Business	(4) Dollars Earned (\$1000)	(5) Dollars Needed to Create One Job	(6) Estimated # of Jobs Produced
(1) Marine gasoline	Auto sales & service	Gas. service station	7,808	47,411	165
(2) Annual craft insurance	Finance and insurance	Bus. service total	3,326	24,059	138
(3) Water transportation	Transportation & util.	Services total	9,402	20,732	453
(4) Retail trade	General merch. stores	Misc. retail stores	13,711	37,702	364
(5) State & local gov't.	Local government	Services total	2,194	20,732	106
(6) Hotel and motel	Lodging places	Hotels and motels	1,021	13,883	74
(7) Grocery stores	Food stores	Food stores	4,065	64,116	63
(8) Eat & drink places	Eat & drink places	Eat & drink places	2,198	14,535	151
(9) Laundry & clean. serv.	Personal & bus. serv.	Laundry & clean. serv.	2,099	12,869	163
(10) Auto repair & service	Auto sales & service	Gas. service station	-- ^a	47,411	-- ^a
--	Agriculture	Agriculture	1,279	27,298 ^b	47
--	Construction	Construction	1,469	33,629	44
--	Manufacturing	Manufacturing	831	21,510	39
--	Wholesalers	Wholesalers	2,765	19,371	143
--	Bldg. mat. & farmequip.	Bldg. materials	905	61,383	15
--	Apparel stores	Apparel stores	723	34,033	21
--	Furn. & appliance stores	Furn. & appliance stores	644	50,159	13
--	Other retail	Mis. retail stores	1,216	37,702	32
--	Amusement places	Amusement places	829	19,654	42
		Totals	56,485		2,073

^aCategories 1+10 are combined.^bThe average "dollars needed" for all industries was used (\$27,298).

Table 4-32 may be read as follows:

Column 1 shows the title of each boater expenditure category. Columns 2 and 3 represent the titles of the corresponding industries in the Door County Study; and industries in Table 4-31, column 1, respectively. As with the multipliers and expenditure groupings used in this study, titles may not be exactly alike; but the emphases of the industries selected are as similar as could be determined by the research. The figures in column 4 of Table 4-32 are obtained from column 9, Table 4-30 ("Total Dollars Earned"). Column 5 of Table 4-32 derives its figures from column 4, Table 4-31 ("Dollars Needed"). Each row cell in column 4 of Table 4-32 is then divided by the appropriate row cell in column 5, resulting in the estimate of jobs produced in column 6.

It can be seen from column 6, Table 4-32, that 2073 jobs appear to be created in southwest Michigan by the expenditures of Lake Michigan recreational boaters.

Each industry in SW Michigan contributes a fair number of jobs, with Water Transportation, i.e., Marina Operations, category 3; and Retail Trade, category 4, attributing the most, 453 and 364 jobs, respectively, to these boater expenditures. Surprisingly, Wholesalers contribute 143 jobs, and it must be remembered that Wholesalers do not derive any direct income from boaters. The jobs created in this sector are a result of indirect earnings from direct boater expenditures.

Direct Expenditures in Michigan (J)

Having secured the desired estimates for SW Michigan, the study proceeded to obtain similar estimates for the State of Michigan. To do this, several assumptions were made:

1. The average expenditures by SW Michigan, Lake Michigan boaters for this recreation activity is the same for all Michigan residents who boat on the Great Lakes.
2. The characteristics of SW Michigan boaters are representative of all the state boaters.
3. New craft expenditure data are reliable.

With no data other than those for SW Michigan, Lake Michigan average boater expenditures, the only course open, if research and analysis were to proceed, was to make the first assumption that average expenditures for SW Michigan boaters and Michigan boaters were comparable.

It is assumed the preference for Great Lakes boating is consistent among boat owners in Michigan. This is the reasoning behind assumption 2. Access to a Great Lake is easy from almost any location in Michigan's upper or lower peninsula. This close proximity to the Great Lakes makes boating on these lakes a common recreational activity throughout the state. It must also be remembered that most of the population in Michigan resides in the lower half of the lower peninsula. This was the very same region from which boaters were sampled by Han, so results should be fairly indicative of the Great Lakes boating population. This study has reliable boater population figures for the southwest region of Michigan, due to direct sampling

employed there, and must assume the southwest sample to be representative of the state.

New craft expenditure data are as reliable for the state as they are for the region, since the state data were used to generate the regional data (assumption 3). This is one instance where the state information is possibly more reliable than regional data.

The state boater population figures do not include out-of-state boaters who access the Great Lakes from Michigan. The SW Michigan estimates were obtained from selected out-of-state counties. These counties were relevant for SW Michigan Study Region One data, but the geographical area included was very limited. For instance, no boaters in Ohio were queried in the Han study. The exclusion of out-of-state data will lower the total impact estimates, but this conservative approach is warranted in this instance since the extrapolation of SW Michigan data to the state is unrefined. Extrapolation of the out-of-state data collected by Han in this writer's opinion would only serve to decrease the reliability of the Michigan estimates, because of the limited direct sampling which took place there.

In summary, the state expenditure estimates will not be as reliable as the regional figures. In order to obtain a state estimate, the assumption was made that the preference for Great Lakes boating and expenditure patterns of all Michigan boat owners corresponds with SW Michigan Lake Michigan boaters. Although boater use patterns may vary between SW Michigan and Michigan, this variability cannot be pinpointed at this time. We must stand by our assumption until more accurate information is produced, and hope the regional

differences will cancel each other when combined for the entire state.

The direct expenditures for new craft in the State of Michigan were obtained by multiplying the average cost for a new craft, found in Table 4-7, by the one-year increase in boats registered in Michigan and using the Great Lakes, found in Table 4-23. The results are reported in Table 4-33.

Table 4-33.--Estimated annual direct expenditures for new craft purchased in Michigan.

	20'-30'	30'-45'	45'+	Total
Motor	15,795,000	6,120,000	2,275,000	24,190,000
Sail	4,520,000	2,828,000	156,000	7,504,000
Total	20,315,000	8,948,000	2,431,000	31,694,000

Table 4-34 shows a summary of direct expenditures in Michigan resulting from craft-, personal-, and trip-related costs. The figures in this table were obtained by multiplying the average total costs found in Table 4-6 by the state boating population in Table 4-16.

Adding the totals from Tables 4-33 and 4-34 gives us the net direct expenditure estimates for Michigan of \$125,213,052.

Tables 4-35 and 4-36 show a detailed breakdown for each expenditure category on the list of: craft-, personal-, and trip-related expenditures. The values for the weighted totals were obtained from the Michigan Great Lakes boaters in Table 4-16.

The summation of Tables 4-33, 4-35, and 4-36 also yields the same estimate of \$125,213,052, found by adding Tables 4-33 and 4-34.

Table 4-34.--Summary of estimated total annual direct craft-, personal-, and trip-related expenditures in Michigan.

	20'-30'	30'-45'	45'+	Total
Motor	53,157,892.90	24,024,178.50	3,400,841.60	80,582,913.00
Sail	9,511,259.80	3,352,487.88	72,391.80	12,736,139.48
Total	62,669,152.70	27,376,666.38	3,473,233.40	93,519,052.48

Total Income Effect on the Economy
of Michigan (K)

The new direct expenditure data in Tables 4-33, 4-35, and 4-36 were applied to the same multipliers used for the southwest direct costs (Table 4-28), because the multipliers are assumed to be the same throughout the state. As discussed in detail earlier, this assumption is necessary because there is no region or state input-output information available. Table 4-37 reports the net income effect on the economy of Michigan, and may be read in the same manner as Table 4-29, its regional counterpart.

The figures show a range of \$209,212,177 using the Fortune study to \$243,783,792 using the Door County study multipliers. The Government study multipliers produced an estimate of \$210,067,560. The total impact to the economy of Michigan from Great Lakes recreational boating is estimated to be approximately \$225 million. The

Table 4-35.--Michigan (Study Region Two) estimated total annual direct craft-related expenditures by craft type and length (dollars).

Expenditure Category	Direct Expenditures						Totals
	Motor Craft			Sail Craft			
	20'-30'	30'-45'	45'+	20'-30'	30'-45'	45'+	
(1) Fuel and oil	3,386,663.74	2,292,559.50	333,623.68	89,226.55	59,289.10	1,272.30	6,162,634.95
(2) Annual insurance costs	2,449,649.90	1,463,151.90	277,056.00	436,677.64	223,547.19	4,797.15	4,854,879.78
(3) Pre-launch maint./total	3,086,040.80	1,728,415.50	313,792.96	394,855.72	195,601.17	4,197.45	5,722,903.60
(3) Launching fee	700,660.08	313,273.80	36,940.80	121,464.28	65,244.66	1,400.10	1,238,983.72
(3) Slip rental fee	3,217,799.62	1,524,154.80	230,780.16	653,467.50	191,840.55	4,116.75	5,822,159.38
(3) In-season maint. costs	1,700,962.96	1,714,070.40	393,652.48	120,238.02	75,498.99	1,620.15	4,006,043.00
(3) Craft haul-out	860,562.92	337,955.10	36,940.80	129,467.24	59,694.60	1,281.00	1,425,901.66
(3) Storage prep. costs	1,613,730.05	411,805.80	43,867.20	876,517.74	112,133.58	2,406.30	3,060,461.12
(3) Off-season boat storage	2,683,483.30	1,420,068.30	210,092.48	369,878.74	192,504.60	4,131.00	4,880,158.42
(3) Effluent pump-out	756,388.04	250,194.00	53,256.36	246,607.34	21,361.44	458.40	1,328,265.54
(4) Boating equip./total	8,220,434.18	2,880,080.70	419,935.36	1,471,737.89	749,656.53	16,087.05	13,757,931.71
TOTAL	28,676,376.04	14,335,729.80	2,349,938.24	4,910,138.66	1,946,372.49	41,767.65	52,260,322.88
(5) Annual Mi. registration	280,040.00	169,050.00	27,040.00	64,540.00	24,465.00	975.00	566,110.00
TOTAL INC. REGISTRATION	28,956,416.04	14,504,779.80	2,376,978.24	4,974,678.66	1,970,837.49	42,742.65	52,826,432.88

Table 4-36.--Michigan (Study Region Two) estimated total annual direct personal- and trip-related expenditures by craft type and length (dollars).

Expenditure Category	Direct Expenditures						Totals
	Motor Craft			Sail Craft			
	20'-30'	30'-45'	45'+	20'-30'	30'-45'	45'+	
(4) Rec. equip./boating rel.	2,415,905.08	817,236.00	104,474.24	365,941.80	86,473.29	1,855.65	3,791,886.06
(4) Rec. exp./nonboating	2,295,067.82	505,749.30	105,414.40	249,187.83	129,573.63	2,780.55	3,284,773.53
(4) Boating clothing	1,501,574.48	710,782.80	114,112.96	259,192.64	123,716.01	2,654.85	2,712,033.74
(6) Off-craft lodging	418,519.78	87,326.40	0.00	163,867.06	0.00	0.00	669,713.24

(7) Food exp./groceries	3,144,009.08	1,960,400.40	238,696.64	583,990.19	233,633.76	5,013.60	6,165,743.67
(7) Food exp./alcohol	1,941,377.30	839,840.40	59,928.96	279,974.52	120,633.42	2,588.70	3,244,343.30
(8) Food exp./prep. meals	2,358,776.92	1,127,080.50	97,547.84	382,302.69	187,136.28	4,015.80	4,156,860.03
Food (7)+(8) subtotal	7,444,163.30	3,927,321.30	396,173.44	1,246,267.40	541,403.46	11,618.10	13,566,947.00
(9) Laundry costs	526,335.18	159,486.60	18,474.56	42,660.94	21,242.61	455.85	768,655.74
(10) Car and travel costs	9,599,911.22	3,311,496.30	285,213.76	2,212,463.47	479,241.39	10,284.15	15,898,610.29
TOTAL	24,201,476.86	9,519,398.70	1,023,863.36	4,536,581.14	1,381,650.39	29,649.15	40,692,619.60

Table 4-37.--Michigan net income effect on the economy after application of multipliers (dollars).

(1) Category	(2) Direct Expend. Total (\$)	(3) U.S. Gov't. I/O	(4) Fortune I/O	(5) Door County I/O
(1) Marine gasoline	6,162,634.95	9,003,055.02	9,476,391.89	11,628,892.15
(2) Annual craft insurance	4,854,879.78	9,643,199.16	8,897,149.78	14,299,077.41
(3) Pre-launch maint./total	5,722,903.60	11,632,144.94	9,818,385.10	13,326,925.61
Launching fee	1,238,983.72	2,518,308.75	2,125,637.64	2,885,221.39
Slip rental fee	5,822,159.38	11,833,888.26	9,988,671.30	13,558,062.54
In-season maint. cost	4,006,043.00	8,142,522.76	6,872,887.66	9,328,872.33
Craft haul-out	1,425,901.66	2,898,230.68	2,446,319.66	3,320,497.20
Storage prep. costs	3,060,461.12	6,220,570.85	5,250,618.91	7,126,895.81
Off-season storage	4,880,158.42	9,919,214.80	8,372,546.19	11,364,424.91
Effluent pump out	1,328,265.54	2,699,779.41	2,278,812.21	3,093,313.96
Water trans. subtotal	27,484,876.44	55,864,660.45	47,153,878.56	64,004,031.75
(4) Boating equip. total	13,757,931.71	20,099,100.01	21,156,259.48	23,732,438.19
Rec. equip./boating related	3,791,886.06	5,539,604.26	5,830,972.79	6,541,003.45
Rec. expend./nonboating	3,284,773.53	4,798,758.50	5,051,160.50	5,666,234.34
Boating clothes	2,712,033.74	3,962,037.21	4,170,429.88	4,678,258.20
New craft	31,694,000.00	46,302,081.54	48,737,448.55	54,672,150.00
Retail trade subtotal	55,240,625.04	80,701,581.52	84,946,271.10	95,290,078.17

Table 4-37.--Continued.

(1) Category	(2) Direct Expend. Total (\$)	(3) U.S. Gov't. I/O	(4) Fortune I/O	(5) Door County I/O
(5) Registration	566,110.00	1,096,153.13	1,048,333.82	1,398,518.14
(6) Off-craft lodging	669,713.24	1,149,850.75	1,244,253.53	1,587,153.41
(7) Food expend./groceries	6,165,743.67	9,007,596.58	9,481,372.33	9,090,155.89
Food expend./alcohol	3,244,343.30	4,739,693.57	4,988,988.91	4,783,135.33
Grocery subtotal	9,410,086.97	13,747,290.15	14,470,361.24	13,873,291.22
(8) Food expend./prep. meals	4,156,860.03	7,137,037.69	7,722,988.68	9,438,150.70
(9) Laundry costs	768,655.74	1,429,930.27	1,428,077.81	2,263,921.75
(10) Car & travel costs (gas included)	15,898,610.29	30,294,801.90	32,824,270.80	30,000,677.61
REGIONAL TOTALS	125,213,052.48	210,067,560.04	209,212,177.26	243,783,792.31

total state multipliers are: 1.67768 derived from the U.S. Government I/O study, 1.67085 obtained from the Fortune study, and 1.9470 produced by the Door County study.

Net Income Effect to Industries
in Michigan (L)

The direct expenditures to Michigan were used to determine the total effect to each industry in Michigan and the results presented in Table 4-38 of this section. The direct earnings for industries in Michigan (column 3, Table 4-38) are taken from column 2, Table 4-37. Other than the inclusion of this new information in column 3 of Table 4-38, the procedure used to calculate this table is the same used for Table 4-30.

Table 4-38 shows \$118,463,000 to be the total multiplier induced benefit (column 4) resulting from \$125,214,000 in direct expenditures (column 3). The total industry earnings in Michigan, attributable to Great Lakes recreational boating, is estimated at \$243,674,000 (column 9).

The total income effect to the industries in Michigan (Table 4-38) is the same as the total income effect to the economy of Michigan (Table 4-37), approximately \$243.5 million. Again, the figures in the last two sections of this chapter show two different spending effects for the same total amount of money.

Number of Jobs Created in Michigan (M)

The figures for net income effect to each industry in Michigan in column 9, Table 4-38, were divided by the dollar amounts needed to

Table 4-38.--Direct and indirect effect to Michigan industries from Great Lakes boater expenditures (thousands of dollars).

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Door County Industry	Boat Expenditure Category Number	Direct Earnings	Multiplier Induced Benefit	Total Industry Earnings Exclud- ing Households	Total/Direct	% of Household Earn- ings Accruing to Industry	Earnings from Households	Total Industry Earnings Including Households
Transp. & utilities	3	27,485	9,435	36,920	1.3	6%	3,372	40,292
Personal & bus. service	9	769	2,613	3,382	4.4	10%	5,620	9,002
Finance & insurance	2	4,855	3,984	8,839	1.8	10%	5,620	14,459
Gen. merch. stores	4	55,241	2,860	58,101	1.1	4%	2,248	60,349
Food stores	7	9,410	6,993	16,403	1.7	2%	1,124	17,527
Auto sales & service	1+10	22,061	8,726	30,987	1.4	3%	1,686	32,673
Eat & drink places	8	4,157	1,885	6,042	1.5	6%	3,372	9,414
Lodging places	6	670	313	983	1.5	6%	3,372	4,355
Local government	5	566	4,467	5,033	8.9	8%	4,496	9,529
Subtotals		125,214	41,476	166,690			30,910	197,600
Agriculture	--	--	470	470	--	9%	5,058	5,528
Construction	--	--	2,419	2,419	--	7%	3,934	6,353
Manufacturing	--	--	1,327	1,327	--	4%	2,248	3,575
Wholesalers	--	--	8,916	8,916	--	5%	2,810	11,726
Bldg. mat. & farm equip.	--	--	2,229	2,229	--	3%	1,686	3,915
Apparel stores	--	--	881	881	--	4%	2,248	3,129
Furn. and appliance stores	--	--	599	599	--	4%	2,248	2,847
Other retail	--	--	3,729	3,729	--	3%	1,686	5,415
Amusement places	--	--	214	214	--	6%	3,372	3,586
Local households	--	--	56,203	56,203	--	--	--	--
Totals		125,214 ^a	118,463	243,677		100%	56,200	243,674 ^a

^aFinal figures may not correspond to those in Table 4-37 due to rounding.

- | | |
|--|---|
| (1) Title of Door County industries. | (5) Column 3 + column 4. |
| (2) Column 2 is the Boater Expenditure group no. found in column 1, Table 4-37. | (6) Column 5 ÷ column 3. |
| (3) The figures in column 3 are taken from column 2, Table 4-37. | (7) Total direct & indirect row coefficients ÷ each row cell coefficient in Table 7, Door County I/O study. |
| (4) Column 4 is the row multiplier effect derived from Table 7, Door County I/O study. | (8) Each cell in column 7 x the household total in column 5 (\$56.2 million). |
| | (9) Column 8 + column 5. |

produce one job in Michigan in column 4, Table 4-31, and Table 4-39 presents the estimated number of jobs created in Michigan due to the expenditures of Great Lakes recreational boaters.

Column 6 of Table 4-39 shows an estimated 8,931 jobs to be created in Michigan. Again, the Water Transportation and Retail Trade industries account for the largest number of jobs created from Great Lakes boater expenditures.

Table 4-39.--Number of jobs created in Michigan by Great Lakes boater expenditures.

(1) Boater Expenditure Category	(2) Door County Industry	(3) Kind of Business	(4) Dollars Earned (\$1000)	(5) Dollars Needed to Create One Job	(6) Estimated # of Jobs Produced
(1) Marine gasoline	Auto sales & service	Gas. service station	32,673	47,411	689
(2) Annual craft insurance	Finance & insurance	Bus. service total	14,459	24,059	601
(3) Water transportation	Transportation & util.	Services total	40,292	20,732	1,943
(4) Retail trade	General merch. stores	Misc. retail stores	60,349	37,702	1,601
(5) State & local gov't.	Local government	Services total	9,529	20,732	460
(6) Hotel & motel	Lodging places	Hotels and motels	4,355	13,883	314
(7) Grocery stores	Food stores	Food stores	17,527	64,116	273
(8) Eat & drink places	Eat & drink places	Eat & drink places	9,414	14,535	648
(9) Laundry & clean. serv.	Personal & bus. serv.	Laundry & clean. serv.	9,002	12,869	700
(10) Auto repair & service	Auto sales & service	Gas. service station	-- ^a	47,411	-- ^a
	Agriculture	Agriculture	5,528	27,298 ^b	203
	Construction	Construction	6,353	33,629	189
	Manufacturing	Manufacturing	3,575	21,510	166
	Wholesalers	Wholesalers	11,726	19,371	605
	Bldg. mat. & farmequip.	Bldg. mat. & farmequip.	3,915	61,383	64
	Apparel stores	Apparel stores	3,129	34,033	92
	Furn. & appliance stores	Furn. & appliance stores	2,847	50,159	57
	Other retail	Misc. retail stores	5,415	37,702	144
	Amusement places	Amusement places	3,586	19,654	182
		Totals	243,674		8,931

^aCategories 1+10 are combined.^bThe average "dollars needed" for all industries was used (\$27,298).

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The goal of this study was to estimate the impact of Great Lakes recreational boating on the economy of Michigan. This impact was measured and reported in three different ways: (1) dollar flow into the economy of Michigan, (2) dollar flow to individual industries within the economy, and (3) the number of jobs created in these industries because of the Great Lakes recreational boater expenditures. No attempt was made to estimate the value of recreational boating to the participants themselves. As with any project of this nature, objectively determined estimates are all that can be hoped for since it is not possible to actually "freeze" an economy for detailed examination. The dollar values produced in this report are only estimates, and efforts have been made to take a conservative approach in interpreting obviously weak data rather than risk inflating the final estimates. For example, because the new craft sales price estimates were arrived at indirectly (opinions of experts and sparse cost information derived from manufacturer's suggested retail price lists), no attempt to include optional new craft equipment expenditures, i.e., radios, desk chairs, etc., was included. This had the effect of lowering the overall estimate of new craft expenditures because it is known that most boat purchasers buy some optional equipment. If used to excess, a conservative approach can also have

the effect of grossly underestimating the true parameters. It is the belief of this writer that estimates produced in this report tend to be slightly conservative but, nonetheless, within the bounds of creditability.

The specific objective of the project was to determine the direct and indirect economic effect of Great Lakes recreational boaters to: (1) the economy of and (2) the industries in selected regions in Michigan. Two study regions for data collection and analysis were designated: SW Michigan, NW Illinois, and NE Indiana comprising Study Region One; and the entire State of Michigan comprising Study Region Two.

The monetary impact on the economy of communities within a region is measured in dollars. These dollars enter the system as a result of sales outside the region (basic income¹) and from sales to local consumers (nonbasic income). Great Lakes boaters from other regions contribute basic income to the local economy of communities which provide specific marina services, and/or communities along travel routes which provide auto services and other boater-related commodities.

Many recreation economic impact studies have been conducted which rely on simple regional multipliers with very little disaggregation of data or fine-grained analysis. Also, these multipliers have been frequently obtained from input-output studies conducted

¹Even though most recreation commodities and services are consumed on the site where they are produced, the recreationist, in this case boaters, do bring new dollars into the region.

in other geographic locations where the structure of that region's economy may differ significantly from that for which the economic impact estimate is being derived. For example, an economic impact study conducted at Sleeping Bear Dunes National Sea Shore in Michigan used economic multipliers derived for Mt. Rainier National Park in the State of Washington. In the estimation of those conducting the Sleeping Bear Study, Mt. Rainier multipliers were apparently considered germane for their study's needs. For this project, specific disaggregated expenditure categories and multipliers from specifically selected industries were obtained. The geographic locations from which multipliers were obtained were outside of Michigan. These multipliers, however, appear to closely fit Michigan conditions. However, multipliers specifically for Michigan would have been used had they been available.

A large portion of this report is devoted to analysis of input-output methodology and studies. Input-output is a useful economic tool which traces the flow of dollars through a given economy. Published I/O studies were drawn upon heavily for theoretical and practical knowledge and the analysis is reported herein.

For this analysis, craft were placed into categories by length and main source of power. The minimum length examined was 20 feet because it was assumed smaller craft could not consistently use the Great Lakes. All craft 20' and larger were aggregated into length categories of 20'-30', 30'-45', or 45' plus. Furthermore, craft were classified into motor or sail categories.

Great Lakes boater expenditure data were obtained from two surveys conducted by the Department of Park and Recreation Resources at Michigan State University. One of these studies focused on the average boater expenditures by expenditure categories. The second study provided needed information on patterns of use of recreational boaters, i.e., what percentage of regional and state boaters primarily use the Great Lakes.

The expenditure data collected in the Michigan State University studies focused primarily on Lake Michigan. Analysis of Study Region One also focused on the same lake. Study Region Two analysis concentrated on the entire State of Michigan and surrounding Great Lakes. Selected boating-related data prepared by public and private sources were also collected and used in the investigation.

This analysis suggests that 5,657 registered boaters who reside in Study Region One access Lake Michigan from Michigan. Ninety-three percent of these boaters reside in southwest Michigan. Research also indicates 23,189 Michigan residents use Lake Michigan or other Great Lakes accessing from Michigan shores. The 20'-30' motor boat category is the most frequently encountered craft in both Study Regions One and Two.

Direct expenditures by Great Lakes boaters in the southwest Michigan geographical area are estimated to be approximately \$7 million from new craft purchases, \$12 million from craft-related, \$6 million from personal-related, and \$4 million from trip-related expenditures. The summation of these figures produces a total estimate of \$29 million.

Direct expenditures are not the only impact on an economy. The effect of the direct dollars when respent by recipients also produces an indirect impact. This indirect impact can be estimated by using economic multipliers. These multipliers are derived from input-output tables which trace the flow of dollars through the industries within a given economy and can, therefore, show the total direct and indirect effect of monetary transactions within the entire system. Specific multipliers for an economy can only be obtained by an I/O study conducted within that economy. Michigan has no specific multipliers, and thus it was necessary to use multipliers derived from three different input-output studies for this analysis. Two of these studies were conducted nationally (one by the U.S. Government and one by Fortune Magazine) and the other had a regional focus (Door County, Wisconsin, by William Strang). The use of multipliers derived in studies other than one conducted in Michigan places limitations on the final indirect figures developed and reported in preceding pages. However, total net income estimates produced, using multipliers from the above three sources, were quite close. It was necessary to aggregate direct boater expenditure categories into ten groups to facilitate the application of multipliers from each of the three I/O studies used. The effect of this application of multipliers to direct expenditures produced a range of \$48.5 million to \$53.5 million accruing to the economy of local communities within SW Michigan. Specifically, the Fortune study produced an estimate of \$48,590,856, the U.S. Government study \$48,768,237, and the Door County Study \$56,507,113.

The above figures suggest that between 48 and 53 million dollars of direct and indirect income was introduced in the economy of communities in SW Michigan. The net income to each selected industry in SW Michigan, which accrues because of these boater expenditures in the region, was determined in order to develop an estimate of employment created by these expenditures. Due to time, money, and manpower constraints, only the smaller Door County I/O study was used to allocate total net community income to the specific industry sectors. This I/O study contained the smallest number of industry sectors. The total estimates of all three studies were so close that the researchers decided to use the Door County study to conserve time and minimize costs. Using the Door County study, an estimate of the amount of income each industry received from Lake Michigan boaters was determined. This figure was then divided by the dollar amount needed to create one job in Michigan and resulted in an estimate of the total number of jobs created in each industry because of these expenditures. The total number of jobs believed created in SW Michigan by a combination of all selected industries is 2073.

Once the estimates for SW Michigan were completed, the data were extrapolated and adjusted to produce figures for the entire State of Michigan. No new direct survey data were collected for the state. The assumption was made that the original SW Michigan sample data were representative of boaters throughout the state since sufficient funds were not available to collect new statewide data. This assumption will probably result in less reliable state estimates (Study Region Two) than those estimates derived for the southwest

region (Study Region One). However, the state results are believed to be reasonably reliable. Out-of-state boaters were not included in the calculation of final state-wide estimates because extrapolation of Study Region One out-of-state data was considered too unreliable. The exclusion of out-of-state boater expenditures for Study Region Two suggests that the final Michigan estimates are likely to be conservative.

The methodology for developing estimates for Study Region Two (all of Michigan) is basically the same as that reported above for Study Region One. An estimate of 125 million dollars in direct expenditures for Study Region Two was produced. This amount included: \$31.5 million for new craft, \$53 million for craft-related purchases, and \$40.5 million for a combination of personal and trip expenditures. A range of \$209 million to \$230 million was produced as the direct and indirect income flowing into the economy of Michigan following multiplier analysis. The exact estimates derived from each study were: \$209,192,753 based upon Fortune multipliers, \$210,067,560 based upon the U.S. Government multipliers; and \$243,783,792 based upon Door County multipliers. Once this net income was distributed to each industry, an estimate of 8931 jobs created in Michigan due to Great Lakes recreational boating was obtained.

The reader should be aware that while the final estimated impact figures have been objectively derived, limitations on their reliability and usefulness do exist. These limitations are noted in the appropriate sections of this report and summarized below so that anyone making use of the information included in this report will

know the exact derivations and possible limitations placed upon these estimates. Along with these limitations, suggestions are included for improving the reliability of these estimates:

1. Estimates of direct expenditure are less accurate for the State of Michigan than for southwest Michigan. Data for southwest Michigan were obtained as a result of a direct survey, while no directly obtained information of this nature exists for the entire state. Boater numbers and average expenditures were extrapolated from the southwest region sample and are believed to be representative of the state. This places limitations on the state data. A sample of all Great Lakes recreational boaters is necessary in the future to improve state economic impact estimates.

2. The reliability of the net income estimates both for the regions considered and for specific industries is also limited. No Michigan multipliers exist, and thus, the use of Wisconsin and national multipliers places restrictions on reliability of the data produced for Michigan. The formulation, acquisition and application of specific Michigan multipliers will hopefully produce more reliable indirect impact estimates. These multipliers would have more relevance to industries located in Michigan.

3. The average cost for new craft and the number of new craft registered in Michigan were arrived at in an unrefined manner, i.e., opinions of experts and manufacturer's suggested retail price lists. Specific information on the number of new boats and value of these craft sold in Michigan per year would help strengthen the final results. This information might be collected by the manufacturers

and retailers themselves, the national or local government, or an independent boating affiliated organization or club.

Following this brief discussion of the limitations found in the study, an examination of the strengths seems appropriate.

1. The direct expenditure estimates should be fairly close to their true parameters because:

a. The Warner direct survey response for average boater expenditures was good, and representation of this sample in relation to the entire population is believed to be reliable.

b. The Han direct survey response for percentages of registered recreational boaters who use the Great Lakes was also good, and representation of this sample in relation to the entire population is believed to be reliable.

c. State boater registration lists (used to draw the sample size in the two studies mentioned above) are presumably accurate.

2. The number of dollars needed to create one new job in Michigan was obtained from specific federal government data and may be used until new statistics are reported again for 1977.

3. The economic multipliers used in this report are not specifically for Michigan, but it is known that some indirect expenditures result from direct income. Therefore, some estimation of the total dollar effect probably should be made. The multipliers for industry sectors selected are the most comparable with those industries in Michigan. The resulting impact estimations are the best possible based upon current data.

4. Whereas no specific data on the impact of Great Lakes recreational boater expenditures existed prior to this research effort, there now exists a reasonably reliable body of information for decision makers to base future allocations of their resources, i.e., time, manpower, and money. The major contribution of this research has been to fill a void in the decision-making process with reasonably reliable data.

In closing, it must be said that the figures of economic impact provided by the project are only estimates based on the best and most current data available. Hopefully, more reliable data for certain areas within the study, i.e., Michigan multipliers, will be obtained in the future. This report has been presented in a form which can assimilate new data. For example, if Michigan multipliers are obtained, they can be applied to the direct expenditures found in Tables 4-29 and 4-37. If a survey were conducted using all Great Lakes boaters, the state estimates could also be improved. It is hoped that more precise data collected by future researchers will improve the validity of the estimated impact figures of Great Lakes recreational boating presented in this report. Finally, though this concludes the report of this research effort, it is probably only a beginning for better understanding the economic importance of recreation and tourism in Michigan.

APPENDICES

APPENDIX A

DISCUSSION OF THE PROCEDURE USED TO ADJUST THE REGISTERED BOAT POPULATION FIGURES FOR THE STATE OF ILLINOIS

APPENDIX A

DISCUSSION OF THE PROCEDURE USED TO ADJUST
THE REGISTERED BOAT POPULATION FIGURES
FOR THE STATE OF ILLINOIS

The estimation of the number of registered boaters residing in the selected counties of SW Michigan, NE Illinois, and NW Indiana, and accessing Lake Michigan from Michigan, was derived from the data collected in the Han study. Adjusting the total Illinois registered boating population was necessary to obtain length categories corresponding to those in Michigan and Indiana.

The States of Michigan and Indiana register water craft in one-foot increments and this facilitated the acquisition of data for boaters who owned craft of 20' and over (minimum length category used in this study). The State of Illinois only keeps records of length groups, i.e., 16'-26', 26'-40', and 40'+. Han decided to sample only those registered boat owners who own craft greater than 26' in length, thereby obtaining a conservative estimate of the number of Illinois boaters entering Michigan to boat. This procedure was undertaken rather than selecting a sample from the 16'-26' class, which would have required many more surveys. The length category of 16'-26' was very populous and included a very high proportion of craft 16' to 19'11" in length, which were not germane to the study because they are too small to use Lake Michigan consistently.

The following steps were used to adjust the data:

1. The total number of motor craft registered in Illinois by "Illinoisians" residing in Study Region One was 2125 (p. 60). This total was multiplied by the percentages obtained by Han from the Illinois sample of boaters who use Lake Michigan in the motor craft length category of: 20'-30' (45%), 30'-45' (49%), and 45' plus (6%).

2. The total number of sail craft registered in Illinois and residing in Study Region One was 140 (p. 60). This was multiplied by the percentages obtained in the Illinois sample of boaters who use Lake Michigan in the sail craft length category of: 20'-30' (37%), 30'-45' (60%), and 45' plus (3%).

3. The resulting figures are reported in Table 4-8 b.

The total Illinois population figures in Table 4-8 b were adjusted according to the Han sample which was weighted toward larger craft, since 20'-25'11" boaters were eliminated, as the reader can see on Table 4-8, by comparing the Michigan and Illinois total population figures in the 20'-30' category. This probably accounts for the reason Michigan and Indiana show a higher proportion of motor craft in the 20'-30' length category than Illinois. While in Michigan and Indiana the 20'-30' length categories for sail and motor craft actually are over the 20'-30' length range, the same category for Illinois only contains 26'-30' craft. Since the Illinois sample did not contain boats 20'-25'11" in length, the final estimates of Illinois boaters accessing Lake Michigan from SW Michigan found in Table 4-11 b are deflated.

APPENDIX B

A DISCUSSION OF THE PROCESS USED TO DETERMINE THE
NET INCOME EFFECT TO INDUSTRIES FROM GREAT
LAKES RECREATIONAL BOATING EXPENDITURES

APPENDIX B

A DISCUSSION OF THE PROCESS USED TO DETERMINE THE NET INCOME EFFECT TO INDUSTRIES FROM GREAT LAKES RECREATIONAL BOATING EXPENDITURES

In order to determine the net income effect to all industries in each of the two study regions, the direct income from boating expenditures accruing to selected industries was multiplied by the applicable cells for each industry row in the "Direct and Indirect Activity per Export Dollar in the Door County Economy, 1968" (Table 7, Strang). Reading across a row in this table, one can determine the direct and indirect earnings that are received from the various industries included in the economy (the column headings) because of the receipt of an additional one dollar of earnings. It was assumed, for the reason cited in Chapter IV, that the Door County "Direct and Indirect" table is reasonably representative of the situation which exists in the two study regions. Thus the coefficients in Table 7 remained the same and were applied to Great Lakes direct expenditures for each study region.

An explanation of the determination of the net income to each of 19 industries in Michigan would be time consuming. Therefore, the hypothetical "Direct and Indirect" table on the following page, including only four industries, will be used to help trace the procedure used for the 19-sector Door County table.

HYPOTHETICAL DIRECT AND INDIRECT ACTIVITY
TABLE FOR COMMUNITY X

	A	B	C	D	
A'	1.25	.80	.37	.18	A--Direct income \$250
B'	.75	1.32	.67	.19	
C'	.80	.17	1.08	.24	D--Direct income \$400
D'	.15	.28	.82	1.42	
Community Multipliers	2.95	2.57	2.94	2.03	

In this example let industries A and D be the industries that receive direct expenditures from boaters. It should be remembered that not all industries in the Door County I/O table received direct expenditures made by Great Lakes recreational boaters.

Let \$250 be the direct income from Great Lakes recreational boating accruing to industry A, and \$400 the direct income for industry D.

The procedure used to obtain the net income effect to the community was to add the coefficients in column A to obtain A industry's multiplier, and to add the coefficients in column D to obtain D industry's multiplier.

$$A \text{ multiplier} = 2.95$$

$$B \text{ multiplier} = 2.03$$

Apply each multiplier to each respective direct earning figure and sum the two (A + D) to obtain the net income to the community.

$$A - \$250 \times 2.95 = 737.50$$

$$D - \$400 \times 2.03 = \underline{812.00}$$

$$\$1549.50$$

The figure \$1549.50 represents the total direct and indirect income to community X from direct income received by industries A and D.

The row values of all industries (A,B,C, & D) will be used to determine the direct and indirect effect to the various industries contained in community X. Industries B and C are included because, while they receive no direct income from boater expenditures, they receive indirect income. This indirect income is derived by B and C from their sales to all industries in community X. In this hypothetical case, B and C receive part of A and D's direct earnings when they sell to A and D.

It is now time to trace the amount each industry in community X receives because of sales to industries A and D. This process may be demonstrated by reproducing the hypothetical I/O table once again in a different form.

	\$250 A	B	C	\$400 D	
A'	312.50			72.	\$384.50
B'	187.50			76.	263.50
C'	200.00			96.	296.00
D'	37.50			568.	605.50
					<u>\$1549.50</u>

Multiplying the \$250 direct earnings of industry A times the row cell coefficient for A'A industry (1.25) produces a value of \$312.50, i.e.,

the direct and indirect earnings received by industry A' because of the \$250 spent by boaters in industry A. The \$400 (direct income for D) times A'D row cell coefficient (.18) produces the value of \$72. Adding across the row gives a figure of \$384.50. This figure represents the value of industry A' sales to A and D.

$$\$250 \times 1.25 \text{ (A'A)} = 312.50$$

$$\$400 \times .18 \text{ (A'D)} = \underline{72.00}$$

$$\$384.50$$

The \$250 direct income of A and the \$400 direct income of D is applied to the remaining industries (rows B'-D'). Summing down the column of all row total values produces a net income effect to all industries in community X of \$1549.50.

The reader will note the net value of \$1549.50 for both community and industry estimates. Thus the two methods yield identical income estimates, and had the development of this estimate been the only goal of this project only one method (the multiplier analysis is usually simpler) could have been adopted. However, another goal of this project was to estimate the number of jobs created by boater expenditures, and this goal required that the amount of income received by each industry be estimated.

BIBLIOGRAPHY

BIBLIOGRAPHY

BOOKS

- Almon, Clopper, et al. 1985: Interindustry Forecasts of the American Economy. Lexington, Mass.: Lexington Books, 1974.
- Barlowe, Raleigh. Land Resource Economics. 2nd ed. Englewood Cliffs, N.J.: Prentice-Hall Inc., 1972.
- Clawson, Marion and Jack L. Knetsch. Economics of Outdoor Recreation. Baltimore: The Johns Hopkins Press, 1966.
- Executive Office of the President, Office of Management and Budget. Standard Industrial Classification Manual. Washington, D.C.: U.S. Government Printing Office, 1972.
- Harris, Curtis C. The Urban Economies, 1985. Lexington, Massachusetts: Lexington Books, 1973.
- Isard, Walter. Methods of Regional Analysis: An Introduction to Regional Science. New York: John Wiley and Sons, Inc., and the Massachusetts Institute of Technology, 1960.
- Leontief, W.W. The Structure of American Economy, 1919-1939; An Empirical Application of Equilibrium Analysis. 3rd ed. New York: Oxford University Press, 1960.
- Miernyk, William H. The Elements of Input-Output Analysis. New York: Random House, 1965.
- Miernyk, William H. et al. Simulating Regional Economic Development: An Interindustry Analysis of the West Virginia Economy. Lexington, Massachusetts: Heath Lexington Books, 1970.
- Nourse, Hugh O. Regional Economics: A Study of the Economic Structure, Stability, and Growth of Regions. New York: McGraw-Hill, 1968.
- Pfouts, Ralph W., ed. The Techniques of Urban Economic Analysis. West Trenton, N.J.: Chandler-Davis Publishing Co., 1960.
- Richardson, Harry W. Input-Output and Regional Economics. London: Weidenfeld and Nicolson, 1972.
- Scheppach, Raymond C. State Projections of the Gross National Product, 1970, 1980. Lexington, Mass.: Lexington Books, 1972.
- Spencer, Milton H. Contemporary Economics. New York: Worth Publishers, 1971.

REPORTS

- Bourque, Philip, et al. The Washington Economy: An Input-Output Study. The Graduate School of Business Administration, University of Washington and the Washington State Department of Commerce and Economic Development, 1967.
- Darr, David R. and Roger D. Fight. Douglas County, Oregon: Potential Economic Impacts of a Changing Timber Resource Base. USDA Forest Service Research Paper PNW-179, 1974.
- Fortune's Input/Output Portfolio. Fortune Marketing Service, USA, Time Inc., 1972.
- Harmston, Floyd K. An Intersectoral Analysis of the Missouri Economy, 1963. Research Center, School of Business and Public Administration University of Missouri, Report No. 12, 1968.
- Huie, John M. and Kenneth C. Clayton. Economic Impact of the Park County Covered Bridge Festival. Cooperative Extension Service, Purdue University, West Lafayette, Indiana, No. EC 432, 1972.
- Smith, Wilbur, and Associates. Environmental and Economic Impact of the Sleeping Bear Dunes National Lakeshore. Prepared for Benzie County (Mi), Planning Commission and Leelanau County Planning Commission, August, 1973.
- Strang, William A. Recreation and the Local Economy. The University of Wisconsin Sea Grant Program, Technical Report Number 4, October, 1970.
- Su, Teddy T. The South Carolina Economy: An Input-Output Study. Bureau of Business and Economic Research, University of South Carolina, January, 1970.
- Tiebout, Charles M. The Community Economic Base Study. Supplementary Paper No. 16, Committee for Economic Development, USA (N.Y.), December, 1962.
- U.S. Department of Commerce. Input-Output Structure of the U.S. Economy: 1963. Washington, D.C.: U.S. Government Printing Office, 1969.
- U.S. Department of Commerce. Input-Output Structure of the U.S. Economy: 1967. Washington, D.C.: U.S. Government Printing Office, 1974.

ARTICLES

- Beardsley, B.G. "Comments on 'Travel in the National Parks'," Journal of Leisure Research. Vol. 2, No. 1, Winter, 1970, pp. 78-84.
- Boster, Ronald S. and William E. Martin. "The Value of Primary Versus Secondary Data in Interindustry Analysis: A Study in the Economics of the Economic Models," Arizona Agricultural Experiment Station Journal Article 1900, N.D.
- Bradley, Iver and James P. Gander. "Input-Output Multipliers: Some Theoretical Comments," Journal of Regional Science. Vol. 9, No. 2, 1969, pp. 309-17.
- Bromley, Daniel W. "An Alternative to Input-Output Models: A Methodological Hypothesis," Land Economics. Vol. XLVIII, No. 2, May, 1972, pp. 125-33.
- Chappelle, Daniel E., "The 'Need' for Outdoor Recreation: An Economic Conundrum," Journal of Leisure Research, Vol. 5, No. 4, Fall, 1973, pp. 47-53.
- Czamanski, Stanislaw, and Emil E. Malizia. "Applicability and Limitations in the Use of National Input-Output Tables for Regional Studies," Papers of the Regional Science Association. Vol. XXIII, 1969, pp. 65-82.
- Dorfman, Robert. "The Nature and Significance of Input-Output," The Review of Economics and Statistics. Vol. XXXVI, No. 2, May, 1954, pp. 121-33.
- Fisher, Walter D. "Criteria for Aggregation in Input-Output Analysis," The Review of Economics and Statistics. Vol. XL, No. 3, August, 1958, pp. 250-60.
- Garnick, Daniel H. "Differential Regional Multiplier Models," Journal of Regional Science. Vol. 10, No. 1, April, 1970, pp. 35-47.
- Garrison, Charles B. "A Case Study of the Local Economic Impact of Reservoir Recreation," Journal of Leisure Research. Vol. 6, No. 1, Winter, 1974, pp. 7-19.
- Garrison, Charles B. "The Impact of New Industry: An Application of the Economic Base Multiplier to Small Rural Areas," Land Economics. Vol. XLVIII, No. 4, November, 1972, pp. 329-37.
- Greytak, David. "Regional Impact of Interregional Trade in Input-Output Analysis," Papers of the Regional Science Association. Vol. 25, 1970, pp. 203-17.

ARTICLES

- Harmston, Floyd K. "Use of an Intersectional Model in Developing Regional Multipliers," The Annals of Regional Science. Vol. III, No. 1, June, 1969, pp. 1-7.
- Heady, Earl O. and John A. Schnittker. "Application of Input-Output Models to Agriculture," American Journal of Agricultural Economics. Vol. 39, August, 1957, pp. 745-58.
- Hirsh, Werner Z. "Interindustry Relations of a Metropolitan Area," The Review of Economics and Statistics. Vol. XLI, November, 1959, pp. 360-69.
- Hoch, Irving. "A Comparison of Alternative Inter-Industry Forecasts for the Chicago Region," Papers of the Regional Science Association. Vol. 5, 1959, pp. 217-35.
- Humphrey, David Burras. "Regional Multipliers and Effective Protection: A Synthesis," Journal of Regional Science. Vol. 12, No. 1, April, 1974, pp. 45-55.
- Hurwicz, Leonid. "Input-Output Analysis and Economic Structure," The American Economic Review. Vol. 45, No. 4, September, 1955, pp. 626-36.
- Kalter, Robert J. and William B. Lord. "Measurement of the Impact of Recreation Investments on a Local Economy," American Journal of Agricultural Economics. Vol. 50, May, 1968, pp. 243-55.
- Leigh, Roger. "The Use of Location Quotients in Urban Economic Base Studies," Land Economics. Vol. XLVI, No. 2, May, 1970, pp. 202-205.
- Leontief, Wassily. "Quantitative Input-Output Relations in the Economic System of the United States," The Review of Economics and Statistics. Vol. XVII, August, 1936, pp. 105-25.
- McCamley, Francis, Dean Schreiner and George Muncrief. "A Method for Estimating the Sampling Variances of Multipliers Derived from a From-To Model," The Annals of Regional Science. Vol. VII, No. 2, December, 1973, pp. 81-89.
- Miller, Ronald E. "Interregional Feedbacks in Input-Output Models: Some Experimental Results," Western Economic Journal. Vol. VII, No. 1, March, 1969, pp. 41-50.
- Miller, Ronald E. "Interregional Feedback Effects in Input-Output Models: Some Preliminary Results," Papers of the Regional Science Association. Vol. 27, 1966, pp. 105-25.

ARTICLES

- Moore, Frederick T. "Regional Economic Reaction Paths," The American Economic Review. Vol. XLV, May, 1955, pp. 133-55.
- Moore, Frederick T. and James W. Petersen. "Regional Analysis: An Interindustry Model of Utah," The Review of Economics and Statistics. Vol. XXXVII, November, 1955, pp. 368-83.
- Moses, Leon N. "The Stability of Interregional Trading Patterns and Input-Output Analysis," The American Economic Review. Vol. XLV, December, 1955, pp. 803-32.
- Phillips, Almarin. "The Tableau Economique as a Simple Leontief Model," Quarterly Journal of Economics. Vol. 69, February, 1955, pp. 137-44.
- Schaffer, William A. and Kong Chu. "Nonsurvey Techniques for Constructing Regional Interindustry Models," Papers of the Regional Science Association. Vol. XXIII, 1969, pp. 83-100.
- Swanson, Ernst W. Travel and the National Parks. National Park Service, U.S. Department of the Interior, 1969.
- Tiebout, Charles M. "An Empirical Regional Input-Output Projection Model: The State of Washington 1980," Review of Economics and Statistics. Vol. LI, No. 3, August, 1969, pp. 334-40.
- Tiebout, Charles M. "Community Income Multipliers: A Population Growth Model," Journal of Regional Science. Vol. 2, No. 1, Spring, 1960, pp. 75-84.
- U.S. Department of Commerce. "Input-Output Structure of the U.S. Economy: 1963," Survey of Current Business. Vol. 49, No. 11, November, 1969, pp. 16-47.
- U.S. Department of Commerce. "Input-Output Structure of the U.S. Economy: 1967," Survey of Current Business. Vol. 54, No. 2, February, 1974, pp. 24-56.
- Williamson, Robert B. "Simple Input-Output Models for Area Economic Analysis," Land Economics. Vol. XLVI, No. 3, August, 1970, pp. 333-38.

STATISTICAL SOURCES

- Annual Market Research Notebook, the Marine Market 1973. Market Research Department, International Marine Expositions, Inc., Chicago, April, 1974.
- Boating 1974. Marketing Department of Marex and the National Association of Engine and Boat Manufacturers, 1974.
- Han, Chein. "A Regional Recreational Boating Study: An Analysis of Lower Lake Michigan," (Tentative), Ph.D. Dissertation, Michigan State University, Forthcoming.
- Michigan, Act No. 356, Public Acts of 1974, approved by Governor, December 21, 1974.
- Michigan State Economic Record. Division of Research, Graduate School of Business Administration, Michigan State University, Vol. 16, No. 2, March-April, 1974.
- State of Illinois, Department of Local Government Affairs. County Boat Registration Listing for Year of 1972. Unpublished Data, Springfield, Illinois, August, 1972.
- State of Indiana, Department of Natural Resources, Division of Enforcement. Motorboat Registration (Owner by County) for 1973. Unpublished Data, Indianapolis, Indiana, January, 1974.
- State of Michigan, Secretary of State, Watercraft Record Information. Size and Type of Registered Boats in Michigan Counties. Unpublished Data, Lansing, Michigan, 1974.
- U.S. Department of Transportation, Federal Highway Administration. Cost of Operating an Automobile. Washington, D.C.: U.S. Government Printing Office, April, 1974.
- Warner, Thomas. "An Analysis of Recreational Boating Expenditures (A Study of Lake Michigan Boaters)." Unpublished Masters Thesis, Michigan State University, 1974.