AN ANALYSIS OF RECREATIONAL BOATING EXPENDITURES (A STUDY OF LAKE MICHIGAN BOATERS)

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ABSTRACT

AN ANALYSIS OF RECREATIONAL BOATING EXPENDITURES
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By

Thomas Donald Warner

The primary objective of this study was to collect recreational boating expenditure data for use by Michigan State Waterways Division in planning an expanded marina complex. Specifically, information on expenditures was collected to determine what items and services are purchased, (where they are purchased,) and the amount expended for each. Information was not collected on purchase prices of craft, but the type of craft owned was recorded and expenditures reported by craft type categories.

Expenditure questionnaires were sent out to 500 randomly selected craft owners who rented seasonal slips at nine marinas (four commercial, three municipal, two private) in the designated study area along the southeastern shore of Lake Michigan. The study area from which boaters (seasonal slip renters) were drawn for the expenditure survey includes Muskegon, Michigan, as the northernmost marina selection site, and New Buffalo, Michigan, as the southernmost marina selection site.

The questionnaire covered "craft related information," such as the size of the craft and onboard craft accommodations and facilities. "Craft operations" information was sought on travel time to and from the slip rental site, number of days the craft was utilized during the boating season, and amounts of maintenance performed by the craft owner. The expenditure information is broken down into "craft" and "trip" related expenditures. The final information sought on the questionnaire was socio-economic status (SES) data on each of the craft owners.

The data collected was analyzed to determine (1) the extent to which socio-economic status characteristics affect recreational boating expenditure patterns, (2) whether craft type and size are factors in expenditures, and if so, to what degree, and (3) whether differences in craft utilization due to travel time, etc. affect spending for the recreational boating experience.

All in One

A total of 330 questionnaires (66% of sample population) were returned, of which 312 (62.4%) were usable for tabulation and data analysis. To test the various hypotheses presented by this study, regression analysis and non-parametric two-way analysis of variance techniques were utilized.

The results of the analysis of SES characteristics showed that increases in income, family size, and age of the craft owner had a positive impact on recreational

boating expenditures. As craft owners' levels of education increased, expenditures were found to decrease. This finding was contrary to what had been expected prior to analysis of the data.

Owners of motorized craft were found to spend more on boating related activities than owners of sail craft. It was also found that boating expenditures within these two craft types increase as boat length increases. Other significant findings from the study include the following: (1) the greater the distance and/or travel time between the boat owner's residence and the marina where the boat is docked, the greater the expenditures made by the boater; (2) the greater the number of days the craft is utilized, the greater the boater's expenditures; (3) the longer the craft is kept in the water during the boating season, the greater will be boating expenditures; and (4) as the amount of maintenance performed by the craft owner increases, boating expenditures decreased.

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Project funding came from the Michigan Waterways Division, and through this grant, this boating expenditure study was carried out.

PREFACE

The recreational boating expenditure study reported herein was initiated in February of 1973 with final analysis concluded in February, 1974. During this one year span of time and after the body of the thesis had been prepared, the "energy crisis" evolved in the United States. The impact this fuel shortage will have on future recreational boating is uncertain. The figures reported here for recreational boating expenditures were collected during a period of time when fuel and oil supplies were relatively plentiful and inexpensive. However, if the shortage of fuel and oil persists and/or the prices of these commodities remain high, it is possible that the level of recreational boating and related expenditures observed in this study may decline at least in the near future.

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CHAPTER I

INTRODUCTION

Recreational boating in the United States is becoming an ever increasing leisure time activity drawing participants from a large cross section of our nation's population. One of the reasons for increased boating popularity is the wide range of craft types (motorized, sailing, canoes, etc.) and sizes available in today's market. The availability of a wide mix of craft types and sizes at various prices broadens boating's appeal. Another reason for the observed high rate of participation in boating relates to the scope of activities the boater can engage in: each different boating activity from cruising the Great Lakes in a motor yacht to canoeing down some remote stretch of river offers a different and unique experience. This range of experiences related to boating activities has broadened the total population of boaters in this country.

The Bureau of Outdoor Recreation estimates that between 1965 and 1980 boating (as a recreational activity related to the number of visitor days) will increase 76 percent while the total population of the United States will increase by only 29 percent. Furthermore, between 1965

and the year 2000 boating will increase 215 percent while population increases are projected to increase by only 76 percent.[1] This increase in boating's popularity, as indicated by the above projected figures, may be related to a number of factors including availability of increased leisure time, greater incomes, and increased mobility. The Outdoor Recreation Resources Review Commission reports that by 1976 there will be an estimated 285 million "occasions of participation" by boaters annually (this figure does not include sailing craft or canoes), and by the year 2000 there will be 557 million occasions of participation annually.[2] In 1969 there were over 8,469,000 pleasure boats in use on United States waters, with annual retail expenditures on boating equipment, servicing and maintenance alone totaling 3.2 billion dollars.[3] The 1970 boating expenditure figures showed an increase over the previous year, but due to a general slowdown in economic growth in 1970, expenditures at this time were made primarily for used equipment and replacement of accessories.

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[1]The University of Wisconsin Sea Grant Program, The Future of Boating on Lake Michigan (Madison: The University of Wisconsin, 1971), p. 7.

[2]Outdoor Recreation Resources Review Commission, Action for Outdoor Recreation for America (Washington, D.C.: U.S. Government Printing Office, 1964), p. 11.

[3]University of Wisconsin Sea Grant Program, op. cit., p. 7.

The above figures illustrate the extent of participation in recreational boating in this country as well as providing some measure of the impact these millions of boaters have on the economy. Because of this growth in boating and its related activities, many states have concerned themselves with attempting to provide public access and facilities for the boater. Planning is being carried out to meet the needs of the growing number of boaters. This boating expenditure study was carried out to provide data inputs to assist those involved in developing these plans.

Recreational Boating in Michigan

When looking at the geographical setting of the state of Michigan, one realizes the vast water resources available to the recreational boater. Michigan has four of the five Great Lakes partially within its boundaries, totaling some 38,575 square miles or 41 percent of the total Great Lakes area. Michigan's Great Lakes shoreline extends over 2,274 miles and no point in the state is more than 85 miles from one of the four bordering lakes.[1] Michigan also possesses a large number of inland lakes. Given increased access to bodies of water, more and more people have chosen to use their leisure time and income to participate in recreational boating in the state of Michigan. Michigan ranks first among the fifty states in total number of

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[1]Michigan Water Resources Commission, Michigan and the Great Lakes (Lansing: The Commission, 1967), p. 1.

registered motor boats. The total number of registered motor boats in Michigan in 1973 was more than 520,000 craft.[1] This figure represents only powered craft, with non-powered craft accounting for an estimated additional 150,000 craft.[2]

Boating information gathered by the consulting firm, Recreation Resource Consultants, and reported in the 1971 Michigan Recreational Boating Study identified areas where Michigan craft owners recreate, reported the activities participated in by the boaters, and estimated the expected future boater participation patterns in the state of Michigan. There were two boat length categories utilized in the 1971 study: (1) less than 20 feet, and (2) greater than 20 feet. This study reports that 25.1 percent of the less than 20' craft and 66.3 percent of the 20' plus craft are used primarily on the Great Lakes with the remainder of use being on inland bodies of water.[3] These figures reflect to some extent the suitability of the various craft sizes for the two different bodies of water. A boater who wants to navigate the Great Lakes, because of wave size

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[1] "Number registered" is the total number of registered boats listed by the Secretary of State for its 1973 year-end tabulation.

[2] Ibid.

[3] Recreation Resource Consultants, 1971 Michigan Recreational Boating Study (East Lansing, Michigan: 1972), p. 77.

and limited protection from storms, would need a craft larger than those most commonly found on inland lakes.

The 1971 Michigan survey of boat owners previously discussed ranked boating related activities according to the total number of days of participation on both the Great Lakes and inland lakes. In Table 1, which was developed from this study, it can be seen that Great Lakes boaters ranked "cruising" as the number one activity with "other" fishing and salmon/trout fishing second and third. Water skiiing, "other" activities, and hunting were the final three activities most often participated in. Inland lake boaters ranked "other" fishing first, followed by cruising, water skiing, salmon/trout fishing, "other" activities, and hunting. Again, the activities that are carried out by the craft owner related in part to the body of water (Great Lakes or inland lakes) the boater uses.

Projected figures for "all boating" participation in Michigan by 1980 are set at 16,290,000 boat days annually.[1] This figure when compared to the 1971 participation total of 11,661,000 boat days shows an increase of over 4 million boat days annually in only nine years.

This section on the participation in recreational boating in Michigan attempts only to bring into focus the

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[1]Recreation Resource Consultants, 1971 Michigan Recreational Boating Study (East Lansing, Michigan: 1972), p. 98.

TABLE 1

ACTIVITIES UNDERTAKEN WHEN BOATING ON GREAT LAKES AND INLAND LAKES RANKED IN ORDER OF ESTIMATED NUMBER OF BOAT DAYS

Rank	Great Lakes Boating			Inland Lakes Boating		
	Activity	No. of Boat Days	%	Activity	No. of Boat Days	%
1	Cruising	1,421,000	38.0	"Other" fishing	4,554,800	47.9
2	"Other" fishing	1,097,700	29.4	Cruising	2,483,700	26.1
3	S/T fishing*	615,600	16.5	Water skiing	1,920,500	20.2
4	Water skiing	357,700	9.6	S/T fishing*	338,200	3.6
5	Other Act.	188,600	5.0	Other Act.	154,700	1.6
6	Hunting	56,100	1.5	Hunting	47,500	0.5
	Totals	3,736,700	100.0		9,499,400	100.0

Source: Reproduced from 1971 Michigan Recreational Boating Study (East Lansing: Recreation Resource Consultants, 1972), p. 71.

*Salmon/trout fishing.

upward trend in boating over the foreseeable future. Because of the projected increase in boater needs, plans must be prepared by responsible governmental agencies to accommodate the craft owners. The information contained herein should be of assistance to those charged with the responsibility of developing these plans.

CHAPTER II

STUDY ISSUES AND RESEARCH PROBLEM

The St. Joseph/Benton Harbor Marina Development Study

The Michigan State Waterways Division, in carrying out its assigned task of providing Harbors of Refuge, is evaluating the feasibility of an expanded marine development project along the southeastern shore of Lake Michigan at St. Joseph/Benton Harbor, Michigan. The existing municipal marine that serves these two cities provides for between 80 to 85 seasonal slips for craft ranging in size from 20-40 feet in length, and 20 transient (craft seeking limited time usage of the harbor and its facilities) accommodations.

Services and facilities available to the craft owners at this site include gasoline sales, water, electricity, rest rooms, a dock attendant, haul-out facilities and holding tank pump-out.[1] The parking areas provide an area for dry-land storage of craft for the winter months. The above listing of services and facilities is what is

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[1]Michigan State Waterways Commission, Michigan Harbors of Refuge/1973 (Lansing: The Commission, 1973), p. 22.

generally found at most of the existing Commission sponsored harbors.

It is important at this juncture to mention the position of the cities of St. Joseph and Benton Harbor in relation to the megalopolis created by the cities of Chicago, East Chicago, Hammond, Gary, and Michigan City to the west, which lie along the southern tip of Lake Michigan. Many thousands of recreational boats, both motorized and sail, visit the eastern shore of Lake Michigan from these Illinois and Indiana cities either for the purpose of cruising the lake or to fish for salmon and trout. With the exception of the private marina facilities at the city of New Buffalo, Michigan (which is not a Waterways Commission sponsored harbor), the first Michigan "Harbor of Refuge" is found at St. Joseph/Benton Harbor, Michigan.

With the sheer numbers of craft increasing along this shore, the Waterways Division has found it necessary to expand the number of available boating slips at the cities of St. Joseph and Benton Harbor. Having identified a site (approximately three miles up the St. Joseph River) for a new marina, the Waterways Division decided to study the possibilities of an extended marina development complex to help absorb the increasing flow of recreational boaters into the area.

In discussions with the Waterways Division Director and staff members, it was pointed out that this new site would be developed strictly for Great Lakes boaters (20' plus craft) who desire seasonal berthing since other marinas in the area already provide adequate facilities and services for the boat owner having a trailered craft.

The new site would be built to accommodate between 200 and 300 craft with a breakdown of proposed development as follows:

MARINA RELATED FACILITIES[1]

Waterways Division Development:

(1) Adequate harbor
    a. Protected entrance
    b. Sufficient depth and width (entrance and harbor)
(2) Access road (rough)
(3) Utilities (water and electric lines)

Private Development at the Marina Site (proposed):

(1) Slips (seasonal)
(2) Marina office building
    a. Administrative office
    b. Payment office
    c. Limited boating goods sales
(3) Holding tank pump-out
(4) Fuel and oil sales
(5) Rest rooms
(6) Shower facilities
(7) Haul-out facilities
(8) Boat storage facilities
(9) Boat sales and services (plus sporting goods)
(10) Parking facilities

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[1]List compiled from a meeting held with Waterways Division staff, February 28, 1973.

NON-BOATING PRIVATE FACILITIES DEVELOPMENT

Private Development at the Marina Site (proposed):

(1) Housing (condominiums)
(2) Restaurant facilities
    a. Restaurant and bar
    b. Snack shop
    c. Gift shop
    d. Clothing store
(3) Ice vending machines
(4) Parking facilities

The proposed marine complex property would remain state owned, with private individuals developing the facilities at the site. It was pointed out by the Waterways Division staff that this concept for marina development in the state of Michigan would not be implemented until adequate research was completed to judge the feasibility of such a venture.

The reason for the Waterways Division's concern for extended marina development of this type is derived from the authority and responsibility given to the Waterways Commission. It is responsible for acquiring, constructing, and maintaining harbors, channels, and facilities for vessels in navigable waters lying within the boundaries of the state of Michigan as well as granting concessions within the boundaries of harbors to furnish to the public fuel, oil, food, and other facilities. These two powers would allow for the Waterways Commission to develop a site by combining state funds and funds from the private sector of the economy.

The Department of Park and Recreation Resources at Michigan State University was commissioned by the state Waterways Division to examine the feasibility of such an enterprise for St. Joseph/Benton Harbor, Michigan. The research plan for this effort has been separated into three major phases. Phase number one, a boating expenditure study, is designed to determine boater expenditures by size and type of craft owned. The second phase's goal is to estimate "demand" for seasonal slips by boaters from the three state area around the southern tip of Lake Michigan. In the third phase of the study, data from phases one and two will be combined and analyzed in a linear programming model to determine the best possible makeup of services and facilities at the proposed marina site.

The Problem Statement

The research problem presented by this study is to estimate expenditures which recreational boaters make at home, en route to their craft at their marina or slip rental sites to identify variables which influence the total amounts of these recreational expenditures. A number of questions are addressed by this study including the total amount of expenditures made (by type and size of craft owned) and which goods and services are purchased. For example, what are the differences in average expenditures between powered craft and sailing

craft? Not only are the two craft types (motorized and sail) investigated, but different length categories are looked at as well. Other factors which affect a boater's expenditure patterns that were studied include: differences in hull material as they bear on maintenance and upkeep costs, number of engines, capacity of on-board overnight accommodations as it relates to expenditures on shore-based accommodations, and the effect a galley on board the craft has upon expenditures for prepared meals and grocery purchases.

The research attempts to look at the entire package of the boating activity to arrive at a reasonable estimate of the total expenditures made by participants in this activity. Will, for example, the distance between the owner's home and where his craft is docked account for differences in the amount of craft usage and, in turn, expenditures? Will the distance between the owner's home and marina site determine the extent of maintenance the owner performs both during the boating season and while the craft is in winter storage? Other needed information pertaining to craft operations gathered for this study was the length of time the craft is kept in the water during the boating season, and amount of usage by the owner, relatives, and friends.

Beyond craft and craft operation information, questions dealing with amounts of expenditures in the areas

of pre-launch maintenance costs, launching fees, slip rental fees, purchases of boating equipment, expenditures on fuel and oil and in-season maintenance costs were answered by boaters included in this survey. These boaters also provided the cost for craft haul-out, storage preparation costs, boat storage expenditures, effluent pump-out costs, and craft insurance expenditures. The answers to these questions will provide information on craft related costs.

Expenditures beyond those spent primarily for the operation of the craft that were collected include: travel costs to and from the slip rental site, food (both groceries and prepared meals), alcoholic beverages, off-craft lodging, recreational equipment related to recreational boating, and expenditures for non-boating recreational activities while at the slip rental site. The above mentioned trip related expenditures when combined with clothing expenditures, laundry costs, and craft related expenditures includes the vast majority of items and services purchased by the recreational boater.

In summary, as indicated in the opening of the problem statement, this study was designed to gather expenditure information covering all facets of boating. This information was then analyzed to determine the impact of craft use, SES characteristics, and craft type and size on expenditures. Additionally, this information is a vital input to the linear programming model for the

St. Joseph/Benton Harbor site. It is anticipated that the information will be of use to others interested in the recreational boating activity.

CHAPTER III

RESEARCH DESIGN

Review of the Literature

Before creating the research design for this study, a review of relevant literature covering the broad topic of consumer behavior was undertaken. Included in this topic are two subtopics particularly relevant to this study: (1) socio-economic status characteristics and how they relate to the expenditure patterns of individuals, and (2) psychological or personality characteristics related to spending patterns.

In addition, published research was reviewed to determine how differences in distances and travel time might affect the expenditures for a recreational activity. Literature found to be of particular relvance is discussed in the following sections of this document.

Consumer Behavior Literature

In studying the model of an individual in the role of a consumer, it is necessary to look at three scientific fields to understand, explain, and predict human action. These three fields are psychology, sociology, and economics, making the study of consumer behavior an interdisciplinary endeavor. In addition to the use of consumer behavior

studies by professionals in the field of marketing, other groups interested in consumer behavior research include governmental and social action agencies interested in establishing or in effecting public policy decisions relevant to consumer affairs.[1] This last statement relates directly to the main purpose for which this expenditure study was carried out. It is important that the Waterways Division determine what the consumer characteristics of the Great Lakes boater are, and how these characteristics will affect that market area. A decision can then be made by the Division on developing a site which will provide the desired goods and services.

The study of consumer behavior involves the application of concepts and variables from behavioral science disciplines to increase understanding of human behavior in the consumption role. When successful these studies can lead to the design of more efficient marketing or social action programs.[2] Consumer behavior relates to a freedom of choice which is dependent upon the affluence of consumers and the specific society to which the consumer belongs.[3] Of particular interest in this statement is how

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[1]Scott Ward, ed., Consumer Behavior: Theoretical Sources (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972), p. 8.

[2]Ibid., p. 9.

[3]Peter D. Bennett and Harold D. Dassarjiar, Consumer Behavior (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972), p. 1.

affluence of the consumer creates freedom of choice. Questions such as Will the individuals with the greatest amount of income have the greatest amount of recreational boating expenditures because of this greater degree of freedom in spending? are asked and, hopefully, answers provided.

Within the field of consumer behavior, the most completely refined bodies of theory are the economic theories relating to consumer behavior. The basis behind this body of theory of consumer behavior involves choice.[1] Most economic consumer behavior theories rest upon the following three assumptions:

1. Each consuming unit has a limited (finite) income.
2. Each consuming unit has unlimited (infinite) needs or wants.
3. Each good or service capable of satisfying a need or want carries a nonzero cost.[2]

The thought here is that since one is unable to purchase everything he wants, he must select those goods and services he can afford and desires the most. These theories suggest that both income and availability of the commodities will have an influence on how much income an individual may choose to allocate to boating. Here the assumption was made that whatever goods the Great Lakes recreational

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[1]Peter D. Bennett and Harold H. Kassarjiar, Consumer behavior (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972), p. 11.

[2]Ibid., p. 12.

boater wanted or needed could be obtained as long as sufficient funds were available. Related to 1973 observed spending patterns, there was no apparent lack of goods available to the boater but possibly a lack of services along the Great Lakes shoreline.

The reasoning behind consumer behavior in economic theory is that each consumer tends to seek the greatest satisfaction or utility from each purchase. The basic principle that explains the way consumers choose a certain mix of goods and services is called the "law of diminishing marginal utility," which is derived from the belief that an idividual's ability to enjoy the use of a good diminishes as he consumes more of that good.[1] The individual, according to the above theory, will allocate his finite income in such a way that the utility received from the last unit of expenditures is equal for each good. This is then the law of equal marginal utility per dollar. Another theoretical approach to utility maximization is the "indifferences approach" where scaled intervals to measure utility are replaced by an ordinal scale of preference. In graphing these points of utility, the income consumption curve is utilized.

One construct of "satisfaction" perceived by the consumer was defined by Spence, Hull, and Skiller:

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[1]Peter D. Bennett and Harold H. Kassarjiar, Consumer Behavior (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972), p. 12.

> If the actual outcomes (of the purchase) are adjudged by the buyer to be at least equal to those expected, the buyer will feel satisfied, that is, actual consequences are greater than or equal to expected consequences. If, on the other hand, he adjudges the actual outcomes to be less than what he expected, the buyer will feel dissatisfied, that is actual consequences are less than expected consequences. . . . If the brand proves more satisfactory than he expected, the buyer has a tendency to enhance the attractiveness of the brand. If it proves less satisfactory than he expected, he is likely to diminish its attractiveness.[1]

Another important area that affects an individual as a consumer is his own perception. In the context of this boating expenditure study, how does a boater perceive himself and others around him, and how will that perception affect his expenditures? Does the perception of the individual that he is socially equal to his fellow boater prompt him to purchase a larger craft or more expensive boating equipment when the boater in the slip next to him does? There are two major categories recognized as determinants of perception: (1) stimulus factors and (2) functional factors.[2] The former relate to physical stimuli, i.e., what the prospective buyer sees and likes he will be more willing to purchase. The impact of stimuli for the boating expenditure study would be extremely difficult to measure since large amounts of spending are predicted to

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[1]Peter D. Bennett and Harold H. Kassarjiar, Consumer Behavior (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972), p. 36.

[2]Ibid., p. 45.

fall in the categories of fuel and oil purchases as well as services pertaining to the maintenance of the craft.

The second category of perception, that being functional factors, also influences expenditure behavior. The underlying theory on functional factors proposes that on one hand, we screen out messages we do not want to perceive, while on the other hand we distort, modify, and often add elements so that very often we see what we want to see.[1] An example of this might relate to the distance between a boat owner's home and where his craft is kept during the boating season. The distance may be many miles, but because of limitations on where he can rent a seasonal slip, the boat owner will tend to ignore the length of travel time.

This brief overview of literature concerning general characteristics of consumer behavior only touches the main points of an expansive field of study. In the following section, which deals with socio-eceonomic status (SES) characteristics of individuals and how these characteristics affect spending, the focus is turned toward a more closely related research tool that is used directly in this study.

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[1]Peter D. Bennett and Harold H. Kassarjiar, Consumer Behavior (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972), p. 12.

Socio-Economic Status (SES) Characteristics and Expenditure Patterns

This literature review covers (under the broad heading of social-economic status) five major areas that are to be considered in the analysis of the recreational expenditures information obtained from the sample population of Lake Michigan boaters. The five categories are (1) education, (2) income, (3) age, (4) family size, and (5) occupation.

One of the objectives of this study was to determine to what degree the above selected SES characteristics affect the sum of recreational boating expendigures. The knowledge gained from the SES data analysis will hopefully aid in explaining expenditure behavior.

Education.--In Robert T. Michael's book, The Effect of Education on Efficiency in Consumption, the author describes education as part of an individual's "human capital," which is in fact an investment good. The view presented here is that people enhance their capabilities as producers and as consumers by investing in themselves.[1] The most important point assumed when looking at education affecting expenditure patterns is stated in the following quote:

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[1]Robert T. Michael, The Effects of Education on Efficiency in Consumption (New York: Columbia University Press, 1972), p. 3.

> By assuming Hicks-neutral productivity shifts, the effect of education on real income through nonmarket efficiency is examined, and it is suggested that changes in the level of education will lead to changes in the composition of the commodity basket. If education enhances nonmarket productivity, the consumption commodities--and the expenditure on market goods--should shift toward luxuries.[1]

If boating on the Great Lakes, which generally requires large and expensive boats, is considered to be a luxury, then Michael's theory would suggest the Great Lakes boaters encountered in this study would tend to show a high level of educational achievement. Questions pertaining to differences in craft size and even craft type when compared to education levels will have to be analyzed to test this hypothesis.

The working hypothesis pertaining to the direction of education's effect on nonmarket efficiency proposes that education raises nonmarket productivity, thereby increasing the household's real income.[2] The following two paragraphs indicate the reasons for increased productivity through increased education.

> There are at least two reasons for expecting the effect of efficiency to be positive. First, there is the well-documented positive correlation between levels of schooling and wages. From marginal productivity theory we infer a positive relationship between one's education and the productivity of his time in the labor market. Since

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[1] Robert T. Michael, The Effect of Education on Efficiency in Consumption (New York: Columbia University Press, 1972), p. 5.

[2] Ibid., p. 17.

> education is embedded in the individual, if it affects the productivity of his time favorably in productive activities in the labor market it may be expected to do so in other productive activities as well. If education raises the productivity of one's time in nonmarket production, it thereby lowers the costs or increases the efficiency of nonmarket production, other things held constant.
>
> Second, the level of education may affect productivity in the household for the same reasons that the level of technology affects productivity in the firm . . . education represents exposure to knowledge and perhaps the development of a receptive attitude toward the use of new information.[1]

As pointed out in the theory of increased education leading toward an increase in individual income, this has both a market and nonmarket effect. What this boating expenditure study must do is determine the impact of various education levels on consumption in the boating market.

Income.--The second of the (SES) characteristics, and one which will be researched in making determinations as to what factors produce variances in boating expenditures, is the income variable. Current theories dealing with income and expenditures point to a trend which suggests that as incomes increase the percentage of these increases that is spent on necessary goods (i.e., food) decreases while that spent on non-necessities such as recreation increases. Investigating the income variable in this study will help determine what the individual expends in boating

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[1]Robert T. Michael, The Effect of Education on Efficiency in Consumption (New York: Columbia University Press, 1972), p. 17.

and will aid in distinguishing between groups with different expenditure characteristics.

A problem encountered in this study, when looking at income categories, arises when two individuals in the same income class purchase different craft types (motorized vs. sail) causing one boater to have predicted greater expenditures for gas, oil, and maintenance than the other. To help eliminate this problem, a breakdown between craft types will have to be instituted with comparisons of length categories and then compared for each of the two groups (motorized and sailing craft).

When looking at income and what effect it might have on expenditures, Fisk, in his book Leisure Spending-Behavior, looks at not only actual existing income, but income expectations as well. If a person were expecting a raise in his income, he might then proceed to purchase increased amounts of goods, goods of a better quality, or increased services. This could relate to a new craft, boating equipment, or less maintenance performed by the owner and more by a professional.

The inverse would then also hold true. If the boater were able to foresee a decrease in his income, he would then tend not to buy a new craft, or equipment, and perform more maintenance by himself. This would relate also to the boater going into retirement. Unless accrued savings were set aside to purchase a new craft, the

individual would be resigned to fewer expenditures predictably "across the board."[1] The following quotation illustrates the idea behind the expected increase or decrease in income.

> Optimism about one's own income prospects, expectations of income increases in the near future, and a feeling of security regarding one's job and income tend to promote spending. Recent past income increases, if considered to be enduring rather than temporary, operate in the same direction. . . .
>
> On the other hand, fear of income declines or unemployment . . . promote saving. If a person has a satisfactory income but believes that the prevailing good times will come to an end, his incentives to create reserves for the future become powerful.[2]

Clawson and Knetsch view expenditures on recreational goods and services as coming from the "discretionary" segment of one's income: That is what would remain after expenditures for existence and subsistence. In this study, a great deal of thought has been given to the following questions: What is the best figure to measure an individual's income? Which amount will he more readily provide in a questionnaire or interview--his total income, his after tax income, or his "discretionary" income? To maximize response, especially when dealing with personal incomes and

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[1]George Fisk, Leisure Spending-Behavior (Philadelphia: University of Pennsylvania Press, 1963), p. 105.

[2]George Katona, "Variability of Consumer Behavior," in Contributions of Survey Methods to Economics, ed. by L. R. Klein (New York: Columbia University Press, 1954), pp. 48-59.

expenditures, each question should cover an area for which the respondent can provide the most accurate answer with the least amount of work. This point will have to be researched even more thoroughly so that data obtained by each question will provide usable data for the study.

When we look at a boater's income in trying to explain his expenditures for the recreational activity he is involved in, it is sometimes necessary to look at the broader area of SES characteristics in combination with income levels to find an answer to what influences the individual's recreational boating expenditures. In large part, the use of income is socially determined; the person wants to do what other people of his social class do and to avoid being conspicuous or unusual.[1]

A final brief paragraph on measuring income's effect on expenditures deals with the estimation of income-expenditure curves (Engel curves). Although a number of other variables are included (i.e., education level, family size, age, and geographical region), the use of Engel curves indicates the partial effect that income has on expenditures. Through the use of multiple regression techniques, each of the independent variables can be measured for explaining in part the variance in

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[1]Robert T. Michael, The Effect of Education on Efficiency in Consumption (New York: Columbia University Press, 1972), p. 22.

expenditures. This statistical method will be discussed in depth later in this chapter.

Age.--Another variable in the SES category which was considered in the analysis of boating expenditures is the age of the craft owner. In previous studies, utilizing age as a variable, the individual studied was the head of the household. For the purpose of this study, the craft owner will be considered the head of the family and the prime income producer.

It has been assumed that knowledge is acquired by experience and that age may contribute to human capital through experience or a form of on-the-job training in consumption.[1] Differences in age would reflect a life cycle of earning capability. Individuals in their late teens and early twenties, although they might have a job, would not start out in the top salary or wage bracket for the firm of institution they would be working for. As the individual increases in age, and assuming that he has learned through his experiences and has realized position and pay raises, his income will climb.

At some point prior to the age of retirement, the income level would tend to stabilize, and then at retirement, the income level would decline. In view of this

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[1]Robert T. Michael, The Effect of Education on Efficiency in Consumption (New York: Columbia University Press, 1972), p. 32.

sequence of earning capability to the predicted expenditures made by the boat owners in this study and especially considering the initial cost of the craft, one would expect that the mean age of the people in the sample population would fall somewhere between 35 and 55. The theorem here is that the younger individual would not have the income to participate in the boating activity addressed in this study (own a boat greater than 20' in length) and that most older individuals looking towards retirement will save their funds in the anticipation of future decreases in income.

Family size.--The fourth SES characteristic important to this study is family size. The size of an individual's family is correlated to the age of the head of the household. The observed fluctuation in family size refers to the "family life cycle."[1] It is expected that as the family size increases, the amount of money spent for recreation would decrease since the larger family would require greater expenditures for such necessities as food, clothing, shelter, education, and medical expenditures.

In trying to predict the impact the family size variable will have on recreational expenditures, it is expected that the larger the family size, the less spent

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[1]Peter D. Bennett and Harold H. Dassarjian, Consumer Behavior (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972), p. 101.

on boating than those with one or no children. One point that must be investigated is that when the children leave home, there is an increase in funds available to the head of the household for discretionary spending. This fact might aid in explaining any recognizable increases of expenditures for individuals over 40 or 45 years of age.

Occupation.--The final SES factor considered for analysis in this study is occupation. In reviewing the literature on education, there appears to be a link between the education level of a person and the type of job he has. This linkage between education, occupation, and income is not always clear. In this country, an individual with little or no formal education can earn enormous sums of money through creating a new product or idea. Although tied to income, occupation in relation to expenditures is also tied to what is called group conformity.[1]

An example of the above would relate to a salesman whose job and income are reflected in his ability to influence prospective customers. The use of a pleasure boat to entertain these customers might relate to the general body of salesmen and their task of influencing customers. Probably a clearer example would be found between professionals in the medical profession

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[1]Peter D. Bennett and Harold H. Dassarjian, Consumer Behavior (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972), p. 98.

where a sizable amount of the individual's income is discretionary. If a fellow practitioner becomes involved in boating for any number of reasons, his actions might then influence other individuals in his social group.

Psychological Characteristics and Spending Patterns Literature

Although the psychological reasons behind consumer behavior will not be tested by this expenditure study, a brief overview is necessary to help explain more fully why a consumer's spending patterns are the way they are. Research dealing with the psychological characteristics of the consumer is primarily carried out to predict the impact of advertising products.[1]

This body of research looks at individual personality traits to aid in predicting consumer behavior. The following statement illustrates how personality traits might influence expenditures.

> The same personality trait can be made manifest in very different ways, depending on local and temporary conditions and circumstances. The need for esteem, for instance, can lead to the purchase of an expensive car. But, if everyone on the block knows that Mr. Jones can afford an expensive car, and if all his friends own expensive cars, the need for esteem may lead to the purchase of a secondhand Ford.[2]

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[1] Scott Ward and Thomas S. Robertson, Consumer Behavior: Theoretical Sources (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1973), p. 176.

[2] Ibid., p. 178.

Characteristics that have been studied and relate to recreational expenditures are: needs of achievement, the need to be active, the need of affiliation, the need for capacity, the need for exhibition, the need for masculinity, self confidence and self esteem, sociability, social presence, and venturesomeness.[1] Many of these psychological needs can be manifested in challenging the Great Lakes in a sailing craft, of taking friends out for a ride in the new luxury motor cruiser, etc. The point here is that there is a myriad of possible combinations of factors affecting the purchasing behavior of each individual. No two people are exactly alike and what prompts one person to buy a recreational boat may be very different from what might prompt another to buy a boat.

Katona emphasizes the need for studying the psychological make-up of individuals in the economic setting by stating:

> The psychological study of economic processes is possible because human decisions, and human behavior in general, are governed by laws, that is, are not arbitrary, unpredictable, indeterminate. While human beings are not marionettes pushed around by external forces, the latitude of their choice itself is subject to scientific analysis. Differences in perceptions, motives, and attitudes are measurable and can be related to causal factors.[2]

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[1]Scott Ward and Thomas S. Robertson, Consumer Behavior: Theoretical Sources (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1973), p. 176.

[2]George Katona, Psychological Analysis of Economic Behavior (New York: McGraw-Hill Book Company, 1963), p. 8.

Travel and Recreational Expenditures

In the area of recreational research, a great deal of effort has been devoted to analyzing the relationship between the amount of traveling required for an individual to reach a recreation area and the impact of that travel on the number of visitations and on expenditures. A majority of this research has been focused on the western national parks because of their distance from the population centers of this country.

It is assumed here that the farther away from the recreation area the participant lives, the greater the cost to travel to that site. Hence expected number of visitations would decrease as distance increases. Evidence to support this assumption will be shown later in reference to several studies. If the first assumption is true, conversely then, the individual living close to the recreation area would more readily travel to the site since travel costs would be minimal. Reliable information is needed for travel patterns in order to facilitate system planning and facility development.[1] For the proposed St. Joseph/ Benton Harbor marina project, information is needed on travel patterns of the boaters and potential users of the facility in order to plan the actual composition of the

[1] J. A. Deacon and others, "Travel to Outdoor Recreation Areas in Kentucky," Journal of Leisure Research, 4:4 (Fall, 1972), p. 312.

facilities at the site. This information is to be determined through a three state demand study around the southern end of Lake Michigan.

Fisk indicates that expenditures on domestic vacation travel and weekend trips may have increased more rapidly than any other recreational expenditure categories since the middle '50s.[1] If one looks at recreational expenditures made by the individual out for a weekend drive or even a vacation, we would find that the travel costs incurred would make up a substantial part of the total sum for recreational expenditures. What was determined in this boating expenditure study is how travel time or distance between the craft owner's home and the "slip rental site" where his boat is kept will affect the total annual amount of expenditures related to boating. The figures on the amount of visitations both during the boating season and while the craft is stored in relation to travel time will be an indicator for participation in the activity. A positive correlation should be shown between amounts of visitations and total expenditures to relate increased travel to the craft to increased total expenditures for boating.

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[1]George Fisk, Leisure Spending-Behavior (Philadelphia: University of Pennsylvania Press, 1963), p. 46.

Hypotheses

Socio-Economic Status (SES)

1. Boat owners with the highest SES levels will expend more for the recreational boating experience in each of the craft type and size categories.
   A. The boat owner's income is a positive factor related to his recreational boating expenditures. The higher the income, the greater will be the amount of expenditures in all categories.
   B. The boat owner's education level (which is positively correlated to income) affects the amount of boating expenditures. The higher the education level achieved, the greater will be the predicted amount of expenditures.
   C. Total expenditures are inversely related to family size. As the family size increases, total expenditures decrease.
   D. The amount of recreational boating expenditures increases as the age of the owner increases up to the age of retirement.

Differences in Craft Size and Type

1. Owners of motorized craft have higher total expenditures than owners of sailing craft. The greater the overall length in each of these two categories, the greater the total expenditures.

Differences in Craft Utilization

3. Those boat owners showing the greatest amount of craft utilization have the greatest expenditures for the boating activity.

   A. Craft owners with the greatest amount of travel time between their home and slip rental site will show the least amounts of expenditures.

   B. Individuals who use their craft frequently will spend more money for recreational boating than those with a lesser amount of days usage.

   C. The longer the craft is kept in the water, the greater are total expenditures.

   D. The greater the amount of maintenance performed by the owner, the fewer the expenditures in both the "total expenditures" and "craft-related expenditures" categories.

CHAPTER IV

RESEARCH ADMINISTRATION AND GENERAL FINDINGS

The Expenditure Questionnaire

While exploring possible research designs for this study, a great deal of consideration was given to how confidential information could best be obtained on personal expenditures from a sample taken from the boater population. The first method considered was personal interviews. When looking at where the boaters lived in relation to where they kept their craft during the boating season, however, a problem was immediately recognized. Since the home addresses were spread out over the three states of Michigan, Indiana, and Illinois as well as even more distant states, it would not be possible given project budget constraints to travel to the craft owners' homes for interviews.

Conducting personal interviews at the marinas where the craft are kept during the boating season was considered next. In order to obtain reliable data on expenditures that had been made in the past year for everything from special clothing for boating to the amount of money paid for fuel and oil, the craft owner would need to consult records which probably would not be available at

the slip rental site. Another consideration was the availability of the craft owner while at the slip rental site. To collect the information needed for the study, a lengthy interview would have to be carried out. This would not be looked upon favorably by the craft owner out for a weekend of recreational boating. It was finally decided that the craft owner would not, in most instances, be willing to sacrifice his valuable boating time to answer a series of questions, and/or any responses given would probably be only gross estimates.

A second method for eliciting the responses of the boaters considered was that of telephone interviews. This idea was decided against primarily because without prior knowledge of the call the response for boating expenditures would yield inaccurate estimates. If the craft owners were informed in advance of the telephone call, the responses would probably be more accurate, but the high interview cost for each respondent would be prohibitive for a sizable sample.

After reviewing the possibilities of utilizing the above methods of obtaining data, and determining each to be unacceptable primarily because of cost considerations, a mailed questionnaire was considered next. By using a mailed questionnaire, the respondent would (1) be able to refer back to past records on boating expenditures--increasing accuracy of the information, (2) not involve personal

contact--possibly decreasing the respondents' unwillingness to respond to personal questions, (3) be able to utilize as much time needed to answer the questions without being pressured by an interviewer, and rushing through the questions.

The usual weakness of mailed questionnaires is a low rate of responses. In this instance, it was felt that the boaters would be motivated to answer the questionnaire since their response would stimulate facility and service improvements from which they would benefit directly. Another important factor in boating response rates for mailed questionnaires is the use of "follow-up" procedures.

After considerable weighing of alternatives, it was decided that a mailed questionnaire would be utilized for the study, and that extensive follow-up procedures would be used to achieve the highest possible response rate.

A preliminary questionnaire was drawn up, and mailed out as a pretest to boat owners in the Lansing, Michigan, area who owned craft registered at marinas located in the sample area. The purpose of this pretest was to determine the ability of respondents to answer the questions, and to solicit the type of information the study was actually seeking for tabulation and analysis purposes. A total of ten pretest questionnaires were mailed out, each with a cover letter explaining the purpose of the questionnaire, emphasizing the importance of response, and requesting

comments on clarifying the questions as they were written. Nine of the pretest questionnaires were returned, all with comments helpful in preparing the finalized questionnaire.

The finalized questionnaire, after several reviews and re-writes, contained a total of 44 questions. Utilizing the questionnaire format used in the 1971 Michigan Recreational Boating Study, the boating expenditure questionnaire was divided under five separate sub-headings.[1]

The first subheading was Craft Information. Questions in this section included:

A. Craft type (motorized or sail)
B. Centerline length of craft (coded 20-30', 30'1"-45', 45'+)
C. Hull material
D. Number of engines
E. On-board overnight accommodations
F. Galley and rest room facilities

The second subheading used was Craft Operations/Related Trip Information. Questions in this section included:

A. Distance between slip rental site and home address
B. Where the craft is stored in the off-season
C. If the craft is stored inside or outside
D. Amount of visits to the craft while it is stored
E. Visits while stored for inspection or maintenance
F. Pre-launch maintenance performed while craft stored
G. Amount of pre-launch maintenance performed by owner
H. Days craft utilized during the boating season

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[1]Recreation Resource Consultants, 1971 Michigan Recreational Boating Study (East Lansing, Michigan: 1972).

I. Average length of time out of port
J. Average number of persons on the craft
K. Where meals eaten
L. How long the craft is kept in the water
M. Amount of maintenance for storage preparation

The third subheading used was Craft Related Expenses. Questions in this section included:

A. Pre-launch maintenance costs
B. Craft launching fee
C. Purchases of boating equipment (1972 season)
D. Expenditures on fuel and oil
E. In-season maintenance costs
F. Haul-out costs
G. Storage preparation costs
H. Effluent pump-out costs (seasonal)
I. Boat insurance (annual)
J. Initial cost of the craft

The fourth subheading used was Trip Related Expenses. Questions under this subheading included:

A. Estimated travel expenditures (to and from site)
B. Food expenditures related to boating
C. Expenditures for off-craft lodging (marina site)
D. Boating related recreational equipment expenditures
E. Expenditures for non-boating recreation at marina site
F. Boating related expenditures for clothing
G. Seasonal laundry costs at marina site

The fifth and final subheading used was Craft Owner Information, which covers the basic SES characteristics of each boat owner. Questions under this subheading included:

A. Age of craft owner
B. Education level of craft owner
C. Occupation of craft owner
D. Number of persons in immediate family
E. Annual family income

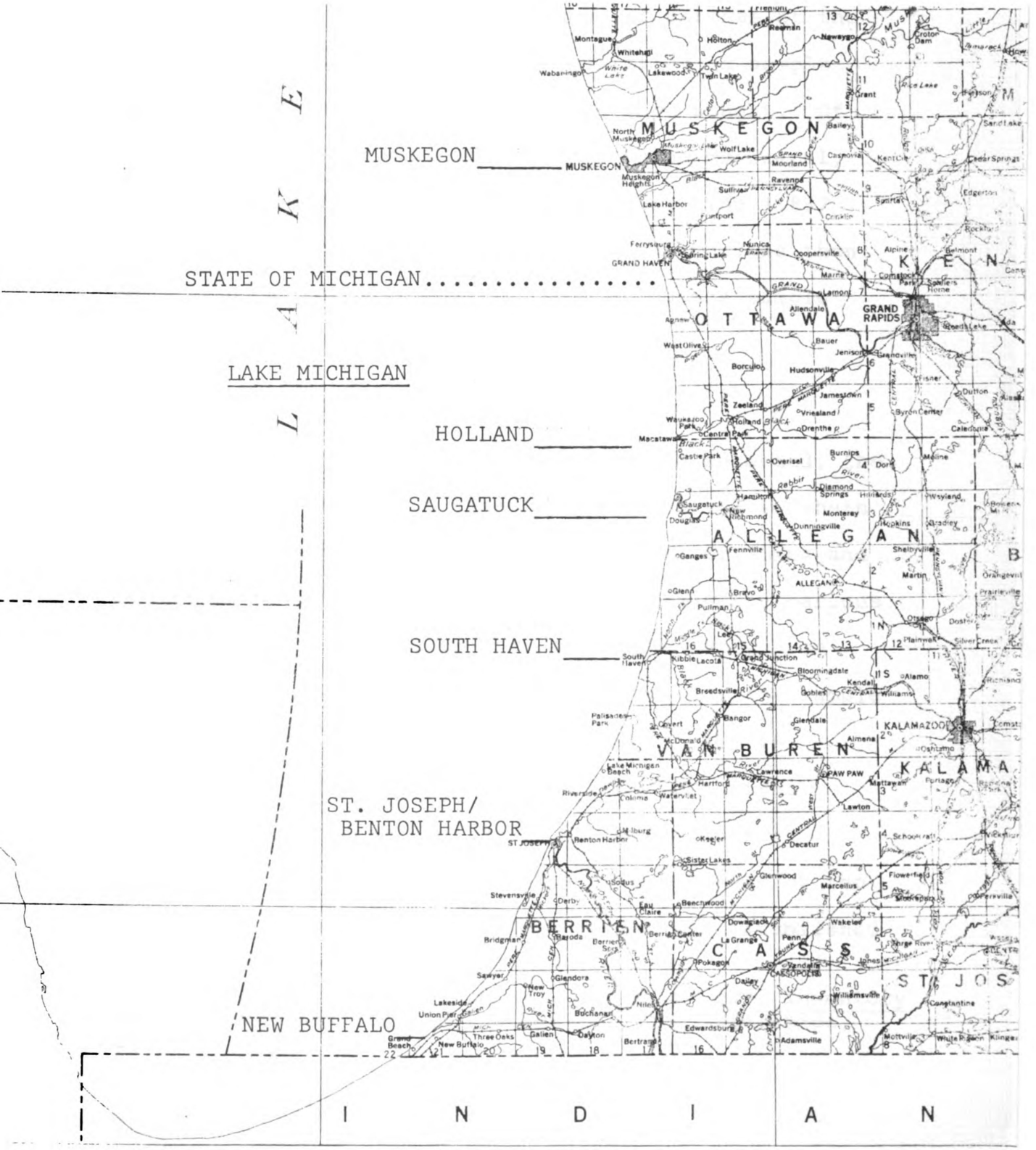
A copy of the questionnaire is included in Appendix B of this thesis.

Marina Site Selection

In order to determine expenditure characteristics which would be most similar to ones at the proposed new site, users of marinas located both above and below St. Joseph and Benton Harbor, Michigan, were selected as the total population of boaters from which the sample population was drawn. Muskegon was selected as the northernmost harbor site, and New Buffalo, Michigan, was selected as the southernmost harbor site in establishing the boundaries of the study area (see Figure 1). Muskegon was selected since it is used as an arbitrary mark-off point between the upper and lower halves of Michigan's lower peninsula. New Buffalo is the southernmost community in Michigan that has a harbor open to Lake Michigan where marinas would be operating. At the seven communities each with open water access to Lake Michigan between the northern and southern study area boundaries, there are a total of 48 marinas offering 3,563 seasonal slips and broadside moorings. Since the proposed marina developmental complex at the St. Joseph/Benton Harbor site would have slip accommodations for between 200 and 300 craft, the decision was made to choose those marinas out of the available 48 that had a slip capacity within this range.

The existing breakdown of marina types along the five southern Michigan counties along Lake Michigan is

FIGURE I
MARINA SELECTION SITES
LOWER LAKE MICHIGAN



71% commercial, 21% private, and 8% municipal.[1] In order to choose a representative sample of craft types and sizes for analysis, respondents were drawn from all three types of marinas. Of the total number of marinas at the selected harbor sites, ten marinas qualified as sample sites from which names of craft owners were sought. Of the ten marinas, five were commercial, three municipal, and two private (yacht-boat clubs) marinas. The 1,887 boaters renting seasonal slips at these ten marinas then constituted the total population from which the sample was drawn.

The Respondent Sample

Once the individual marinas had been selected, the next task was to travel to these sites along the southern Lake Michigan shoreline to request the lists of names and addresses of the craft owners renting slips at the various marinas. The one stipulation for selecting names from these lists was that the minimum craft size for the sample would be 20 feet in length because, as indicated in Chapter II, the proposed marina site would not offer accommodations for trailered craft since facilities already exist in the area on the St. Joseph River for the smaller boats. The 20 foot minimum length was established

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[1]Michigan Water Resources Commission, 1972 Inventory of Michigan Marinas (Lansing, Michigan: The Commission, 1972).

as the smallest craft not readily trailered but yet large enough to ply the Great Lakes.[1]

A total of three trips were made to the marina sites to gather the slip rental lists. The first trip on May 5th and 6th, 1973, covered the entire shoreline between Muskegon and New Buffalo. On this trip, two lists of names were provided immediately upon request and four marinas mailed their lists to the University within the next week. The second trip to the marina sites took place on May 16, 1973, and two more of the lists were made available. On this trip, it was discovered that the owner/operator of the largest marina in the study area felt that he could not release the names of his customers but that if the cover letters, questionnaires, and return envelopes were sent to his office, the questionnaires would be sent out using his own business envelopes.

This method would not allow for any follow-up procedures for non-respondents from this marina, but since this site had some of the development features of the proposed site at St. Joseph/Benton Harbor, it was decided to accept this modified method of sending out the questionnaires. After the first two trips, eight out of the ten lists of names being sought for the study were obtained. On the third and final trip on June 8, 1973, one more list

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[1]Recreational Resource Consultants, 1971 Michigan Recreational Boating Study (East Lansing, Michigan: 1972), p. 46.

was collected and a commitment was made by the final marina owner to mail in the list of slip renters from that site. Problems in obtaining this last list arose because the marina changed ownership about this time and the new owners, though apparently willing to cooperate in the study, were too busy organizing the newly acquired business to supply the boater list for the study.

In total, nine of ten marinas in the study area provided lists of names of all their slip renters owning craft over 20' in length. This excellent cooperation was made possible by a letter of introduction provided by Mr. Keith Wilson, Director of the Michigan Waterways Division (a copy is located in Appendix A of this thesis). The lists obtained from the nine marinas contained 1,332 names of boaters owning craft greater than 20' in length. From this list of names, a random sample was drawn.

The total number of names on the nine lists by marina type was as follows: commercial marinas (four), 928 names; municipal (three), 199 names; and private (two), 205 names (numbers in parentheses indicate the number of marinas). From these totals, an equation for determining the sample size was developed giving a total of 500 as the amount of boaters to be sampled for the study. The breakdown of the sample size for each marina type was: commercial (four), 300 boaters; municipal (three), 100; and private marinas (two), 100 boat

owners.[1] Once the sample size was determined, each of the names of the craft owners was given a 4-digit identification number. Numbers were then drawn from a random digit table, and those numbers selected became the sample population.

Questionnaire Mailout Procedure

On July 13, 1973, two weeks before the mailing out of the actual questionnaires, a letter of transmittal (which is included in Appendix B of this thesis) was sent out to the 350 craft owners that were sampled through the Recreation Research and Planning Unit office. The remaining letters were mailed out by the one marina owner unwilling to provide a list of boaters using his marina along with the questionnaires. The goal of this letter was two-fold: First, to inform the craft owners that a questionnaire dealing with recreational boating expenditures would be sent to their address from Michigan State University's Department of Park and Recreation Resources, and that this questionnaire required information which would be contained in past expenditure records and that this letter of transmittal would allow them time to go back into these records. The second goal of the letter was to inform the possible respondent of the importance of actually filling out the questionnaire. It was indicated

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[1]Equation drawn up and worked out by Dr. James Stapleton, Chairman of the Statistics Department, during a personal interview held June 13, 1973.

in the letter that only a small portion of the boaters could be sampled, and for this reason each boater represented a larger number of boaters, and that only through response to this questionnaire could improvements of boating services and facilities be improved along the Great Lakes.

On July 24, 1973, after mailing out the letter of transmittal and before mailing out the main body of questionnaires, 150 letters of transmittal, questionnaires, stamped return envelopes, and 8¢ stamps were sent to the marina that was unable to release its list of slip renters. These 150 questionnaires, as was pointed out earlier in this chapter, were mailed out using the marina's business envelope, with the return envelope having the Research Unit's address on it.

On July 27, 1973, the remaining 350 questionnaires were mailed out to the remaining boaters in the sample. In order to carry out follow-up procedures, each of the respondents was given a 5-digit identification number. The first two digits indicated the marina type and which marina the respondent utilized. The last three digits were used to identify the individual respondent. These five digits were placed on the back page of each questionnaire to identify respondents as the questionnaires were returned. Non-respondents could then be identified for follow-up purposes.

Questionnaire Response

It was decided that three weeks would be allowed for returns of the questionnaires before mailing the follow-up questionnaires. After one week, 102 of the 500 questionnaires mailed out had been returned. An additional 37 questionnaires were returned in the following week as the rate of return rapidly began to diminish. At this time there had been no returns from the sample of boaters utilizing the marina which was to mail out questionnaires under its own letterhead. By the end of the third week, only 21 more questionnaires were returned. At the end of the third week, a total of 160 questionnaires had been returned to the Research and Planning Unit, or 32% of the population. However, a call to the marina mailing out questionnaires directly revealed that their 150 questionnaires had just been mailed out three days earlier.

Follow-Up Procedures

At the end of the initial three weeks, 190 follow-up questionnaires and cover letters were mailed out to the non-respondents. The follow-up cover letter (a copy is located in Appendix C of this thesis) attempted to elicit higher response by again stating the importance of each individual response. By the end of the fourth week, or the first week after the follow-up questionnaire had been mailed out, 81 questionnaires were returned (16% of the population) of which 41 were unmarked from the mail-out

marina. At the end of the fifth week 28 more questionnaires were returned (5.6%).

During week number six "thank you" post cards were mailed to the entire group of 350 individuals in the sample population handled through the Research Unit. The purposes of this card (a copy is located in Appendix C of this thesis) were to thank the respondents who had cooperated in the survey and to indicate that if they had not mailed in the questionnaire, to do so at their earliest possible convenience--this to stimulate additional response.

In the following three weeks, another 49 questionnaires were returned. By September 21, 1973, 318 questionnaires had been returned, or 63% of the 500 sent out. This figure, however, was not the final total for returns. After another month, while the questionnaires were being coded and prepared for key-punching onto computer cards, another 12 questionnaires were returned. The final tally of questionnaires received was 330, or 66% of the total 500 sent out; of these, 312 (62.4%) were usable for tabulation and analysis purposes.

Of the 18 questionnaires that were sent in but not usable for the study, six were from boat owners who had sold their boats, four had been returned unanswered, two respondents were unable to provide expenditure information since they indicated they did not have that type of information in their records, two of the respondents owned craft

less than 20' in length, one respondent did not provide information because he felt the questionnaire was "too personal," and three questionnaires were usable but arrived after tabulation and analysis had been completed.

Of the 350 questionnaires sent out from the Recreation Research and Planning Unit office on July 27, 1973, 182 were returned representing 36.4% of the 500 respondents. Of the 190 follow-up questionnaires, 54 were returned, or an additional 10.8% of the population. Out of the 150 sent out of the marina office, with no identification numbers on the back of the questionnaire, 94 were returned adding 18.8% of the total population.

The interesting point here is that out of a total of 350 questionnaires mailed out with identification numbers, 236 were returned, slightly over 67.4% of that total. Of the 150 mailed out directly by the marina, 94 were returned, or 62.7% without any follow-up procedures being utilized.

Non-Response

Of the total 170 non-respondents, 114 were identifiable from the lists provided by the marina owners. A telephone follow-up was carried out to determine if those individuals that failed to respond were in any way different from those who did respond. Non-respondents from a cross section of the marina sites were selected and contacted via telephone. Determination of the number of non-responents

contacted by telephone was based upon budgetary considerations. A total of 25 of the 114 identifiable non-respondents (slightly less than 25% of that population) was selected for the telephone interview. The purpose of these interviews was to ascertain whether or not the non-responding population was significantly different from the responding population, and if different, to estimate the impact of these differences on overall study findings.

The questions given below were developed to obtain information through the telephone interview.

Telephone Follow-Up Questions

1. Did you receive a copy of a boating expenditure questionnaire?
2. Do you presently own a boat?
3. What type of craft do you own/power or sail?
4. Length of craft?
5. Travel time from home address to slip rental site?
6. How often is your craft utilized (number of days)?
7. Average annual expenditure for boating activity?
8. Reason for not filling out the questionnaire:
    a. Felt your response was not important
    b. Questions too personal
    c. You feel existing marina facilities are adequate
    d. Did not care to comment
    e. Too busy

In order to achieve a cross section of the non-respondents, random identification numbers were selected from each of the eight marinas from which the original lists had been obtained. The actual telephone interviews were conducted at the end of October. Results of the telephone interviews will be given at the end of the next section, General Findings, for comparison purposes between the two bodies of data.

General Findings

To facilitate data tabulation and analysis, the boating expenditure questionnaire was designed so that each question could be coded directly on the questionnaire in the page margins. Once the coding was completed, and the data deck key-punched, a COBOL computer program was written to summarize the data.[1]

Although most of the questions on the questionnaire were usable for this expenditure study, some of the questions were designed and placed on the questionnaire to obtain information for the linear programming model being set up for the St. Joseph/Benton Harbor site. Several of the questions on boat storage were not included in the tabulation. The tabulation program was designed to summarize responses by two craft types (motorized and

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[1]Computer program consultant for the project was Mr. Paul Rochlen.

sail), by three length categories (20-30', 30'1"-45', 45'1"+) and by length categories within craft types.

Craft Type and Size

Of the 312 usable questionnaires, 200 were from owners of motorized craft and 112 from owners of sailing craft. Since one of the nine marinas sampled (a yacht club) had only sailing craft that utilized its facilities, sailing craft representation is higher in the sample than would be expected given the population mix of sail and motorized craft. As can be seen in Table 2, 64.1% of the questionnaires returned were from owners of motor craft and the remaining 35.9% from sail craft owners.

Table 2 also indicates the breakdown by size according to craft type. An assumption is made here, that

TABLE 2

SUMMARY OF RESPONDENTS BY TYPE OF CRAFT OWNED
(Size and Length of Craft)

	Motor Craft			Sailing Craft		
	20-30'	30-45'	45'+	20-30'	30-45'	45'+
Type of craft/Freq.		200			112	
Type of craft/%		64.1%			35.9%	
Craft length/Freq.	102	89	9	79	32	1
Craft length/%	51%	44.5%	4.5%	70.5%	28.6%	.9%

the number of craft in each craft type and length categories is correlated to a personal income distribution existing in the population. The larger numbers in the smaller craft length categories are found in all boating studies for the Great Lakes or statewide waters. It must be pointed out that there was only a single respondent in the 45'+ length category for sailing vessels. This effectively eliminates this category from providing statistically sound data for tabulation or analysis.

Number of Engines Per Craft

This question on number of engines was asked so that expenditures related to motor craft over sailing craft and larger motor craft over smaller motor craft could be analyzed. This information is found in Table 3 on page 55. In the motorized category, the greatest percentage of 20-30' craft were found to have one engine (67.0%). The 30'1"-45' motorized craft generally have two engines per craft (87.6%). All boats in the largest motorized craft category had two engines.

Most (55.4%) sailing vessels in the sample possessed one auxiliary engine, while a sizable percentage (40.5%) had one standard engine. A few sail boat owners (4.1%) reported having no motor on board their craft. Most sailing vessels (58.6%) from 30'1" to 45' in length had one standard engine while 32.3% were reported to have only an auxiliary engine.

TABLE 3

NUMBER OF ENGINES
(By Craft Type and Length)

	Motor Craft			Sail Craft		
	20-30' n=102	30-45' n=89	45'+ n=9	20-30' n=79	30-45' n=32	45'+ n=1
Engine-Freq./One	67	10	0	30	18	0
Engine-Percent/One	67%	11.2%	0	40.5%	58.0%	0
Engine-Freq./Two	26	78	8	0	1	0
Engine-Percent/Two	26.0%	87.6%	88.9%	0	3.2%	0
Engine-Freq./One and Aux.	4	0	0	3	2	0
Engine-Percent/One and Aux.	4.0%	0	0	4.1%	6.5%	0
Engine-Freq./Two and Aux.	2	0	1	0	0	0
Engine-Percent/Two and Aux.	2.0%	0	11.1%	0	0	0
Engine-Freq./One Aux.	1	1	0	41	10	1
Engine-Percent/One Aux.	1.0%	1.2%	0	55.4%	32.3%	100.0%
Total number of responses	100	89	9	74	31	1

Galley and Rest Room Facilities

The questions concerning on-board galley and rest room facilities were included to further determine the types of expenditures made by boaters and where these are made. If the craft has a galley or kitchen facilities, a larger percentage of meals would be expected to be prepared on the craft. This would translate into higher food expenditures for groceries than for meals eaten at restaurants on shore. This would not always be the case, but the presence of a galley would create some variance in where expenditures for food would be made by the boater. As indicated in Table 4, most (83.1%) of all motorized craft in the study had galleys and 85.5% of all sailing craft had galleys.

The availability of on-board rest room facilities was reported for 88.1% of all motorized craft, and 88.2% of all sailing craft (see Table 4). The importance of rest room facilities to recreational boating expenditures is that one cost the Great Lakes boater incurs during the boating season is that for holding tank pump-out service. Although this service is sometimes included as part of the slip rental cost, it is still a cost the boater must pay when cruising the Great Lakes.

Winter Storage of Craft

Because of the severity of Michigan winters and the resulting problems of ice formation on the bodies of

TABLE 4

GALLEY AND REST ROOM FACILITIES
(By Craft Type and Length)

	Motor Craft			Sail Craft		
	20-30' n=102	30-45' n=89	45'+ n=9	20-30' n=79	30-45' n=32	45'+ n=1
Craft has galley/Freq.	73	85	9	66	32	1
Craft has galley/Percent	71.6%	95.5%	100%	83.5%	100%	100%
Craft has no galley/Freq.	29	4	0	13	0	0
Craft has no galley/Percent	28.4%	4.5%	0	16.5%	0	0
Craft has rest room fac./Freq.	79	89	9	66	30	1
Craft has rest room fac./%	77.5%	100%	100%	83.5%	93.8%	100%
Craft has no rest room fac./Freq.	23	0	0	13	2	0
Craft has no rest room fac./%	22.5%	0	0	16.5%	6.2%	0

water in this state, winter storage of craft is another expenditure made by the recreational boater. Since the craft included in this study are generally too large to transport from the marina site to the owner's home, most boats are stored at or near the marina during the winter months.

Most of the marinas have no or very limited indoor winter storage facilities, and the cost of using these structures increases the winter storage expenditures and consequently total expenditures for the overall boating activity. Table 5 indicates where the craft included in this study are stored by each length and craft type category.

Visits to the craft while they are stored averaged 13, 19, and 9 days, respectively, for each of the three

TABLE 5

WINTER STORAGE OF CRAFT
(By Craft Type and Length)

	Motor Craft			Sailing Craft		
	20-30'	30-45'	45'+	20-30'	30-45'	45'+
Stored inside/Freq.	58	42	6	20	5	1
Percent	57%	47%	67%	25%	16¢	100%
Stored outside/Freq.	44	47	3	59	27	0
Percent	43%	53%	33#	75%	84%	-

motorized craft length categories. Visitations of sailcraft owners to stored boats were 16, 13, and 30 days for each of the length categories.

Seasonal Use of Craft

One group of unexpectedly high figures obtained from this survey was that of craft utilization during the boating season. Table 6 on the following page indicates the total figures broken down into average number of days of usage by the owner and his family, relatives of the family, and friends of the family. The question actually used on the questionnaire is as follows:

15. How many days each boating season is your craft utilized? (exclude visits in which maintenance was the prime objective)

    1. By you and your immediate family.
       _____Cruising trips _____Docked use
    2. By relatives. _____Cruising trips _____Docked use
    3. By friends. _____Cruising trips _____Docked use

There are a number of possible reasons for the high number of days the craft is used. The question utilized in the questionnaire might have been misinterpreted by the respondent. Instead of giving the number of days the craft was used solely for cruising or docked use, the respondent could have included the number of days the craft was utilized for both activities. If in fact this is the case, this double counting will have inflated the figures presented in Table 6.

TABLE 6

SEASONAL USE OF THE CRAFT--DAYS UTILIZED BY FAMILY, RELATIVES, AND FRIENDS
(By Craft Type and Length)

	Motor Craft			Sail Craft		
	20-30' n=102	30-45' n=89	45'+ n=9	20-30' n=79	30-45' n=32	45'+ n=1
Days utilized (Fam.) cruises	37.7	30.3	30.7	34.9	34.0	99
Days utilized (Fam.) docked	25.6	42.4	43.9	24.5	37.6	0
Days utilized (Rel.) cruises	7.9	9.9	0	10.4	11.0	0
Days utilized (Rel.) docked	10.3	11.7	0	3.0	19.7	0
Days utilized (Fri.) cruises	10.0	13.6	25.0	13.0	15.1	0
Days utilized (Fri.) docked	8.4	17.5	10.0	5.9	13.3	0
Total cruises	55.6	53.8	55.7	58.3	60.1	99
Total docked	44.3	71.6	53.9	33.4	70.6	0
Days utilized--total	99.9	125.4	109.6	91.7	130.7	99

(Fam.) = Family
(Rel.) = Relatives
(Fri.) = Friends

A second possible explanation would relate to the number of days the family used the craft with relatives and/or friends on board the craft. In response to the question, the craft owner might have included the number of days the craft was utilized jointly in responding to the number of days the craft was used solely by relatives or friends. This would again lead to an increased count over actual usage of the craft.

A problem might not exist with these figures--and in fact they might represent the actual usage. According to a Waterways Division research staff member, the response to the number of days of craft utilization by the craft owner falls within the response figures that were given by boaters in previously conducted studies. This point wuld tend to give face validity to the figures; however, further work should be carried out to get a more accurate response from the craft owners. In future studies, the question should be given stricter design restrictions to find out craft usage, and minimize the possibility of double counting.

Length of Time Craft Is in the Water

The final figure tabulated for craft operations section was the average length of time the craft (for each size and type category) was kept in the water. This figure would represent the maximum amount of days the craft could be utilized for the boating season. The

average number of days motorized craft were kept in the water, for each of the three length categories, was 162.8, 174.1, and 163.3 days, respectively. Sail craft averaged 165, 175, and 150 days. The average number of days that the boats were in the water for both craft types and all craft length categories was 166.5 or 5.6 months.

Craft Related Expenditures

In order to obtain boating expenditures incurred by the craft owner, a total of eleven questions on the questionnaire were asked each craft owner. The figures for craft expenditures are listed in Table 7 on the following page to allow for comparison of expenditures for each craft type and size category. In the following sections, the contents of this table are discussed and emerging spending patterns highlighted.

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 would include activities ranging from repainting the hull and polishing chrome fixtures, to overhauling the engine and testing radio equipment.

Question 21 on pre-launch maintenance asked for a breakdown on expenditures in 14 categories. The question then asked for the total average amount spent on the craft

TABLE 7

CRAFT RELATED EXPENDITURES
(By Craft Type and Length)

	Motor Craft			Sail Craft		
	20-30' n=102	30-45' n=89	45'+ n=9	20-30' n=79	30-45' n=32	45'+ n=1
Pre-launch maint./Total	198.56	322.39	679.56	110.23	252.10	NR
Launching fee	45.08	58.43	80.00	33.91	84.09	NR
Slip rental fee	207.69	284.29	499.78	182.43	247.25	NR
Boating equip.-slip site	129.93	195.82	462.75	210.91	360.06	NR
Boating equip.-home	226.59	159.14	235.00	93.96	321.13	NR
Boating equip.-other	172.39	182.24	211.67	106.00	285.00	NR
Boating equip.-total	528.91	537.20	909.42	410.87	966.19	NR
Fuel and oil	217.90	427.61	722.50	24.91	75.93	100.00
In-season maint. costs	109.44	319.71	852.50	33.57	97.31	1500.00
Craft haul-out	55.37	63.03	80.00	36.14	76.94	NR
Storage prep. costs	103.83	76.81	95.00	244.29	145.00	NR
Off-season boat storage	172.00	264.87	455.00	103.68	248.11	NR
Effluent pump-out	48.67	46.67	115.33	68.85	27.53	100.00
Annual insurance costs	157.61	272.91	600.00	121.91	288.12	1000.00

NR = Non-response.

in preparation for summer operation. For tabulation and analysis purposes, only the total figure was pulled out of the data to show the trend between craft types and length categories for expenditures. As can be seen in Table 7, the greater the size for both motorized and sailing craft, the larger the average expenditure for pre-launch maintenance. Comparing the two craft types, expenditures ran considerably higher for motor craft than sail craft. This relationship is explained by increase in maintenance costs required for engines found on the motor craft.

Craft launching fee.--The tabulated figures for launching the craft do not reflect standardized launching rates found at most marinas. The figures for this category are derived from three different marina types (commercial, municipal, and private) and so only averages for each craft type and length is given. As was found with pre-launch maintenance, the larger the craft the greater the expenditure. This same pattern held true for craft launching. Motorized craft again showed higher expenditures than sail, but the difference here might possibly reflect the cooperative efforts of the yacht club members in the survey. The launching of the sailing craft at the one yacht club in the survey was done by the owner with other yacht club members to keep costs at a minimum.

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. The tabulated figures for slip rental fees represent the averages derived from the three marina types. It was found once again, as the craft size increased, so did the cost for slip rental. There is little difference between craft type and amount of expenditures in this category.

Purchases of boating equipment.--In order to determine the amount of money being spent annually for boating equipment and where the actual purchases were being made, question 24 was broken down into boating equipment expenditures made at the "slip rental site," home address, and other (i.e., through catalogs, etc.). As can be seen in Table 7, expenditures on boating equipment increased for each length category except in the case of motorized craft, lengths I and II (20-30', 30'1"-45'), for expenditures at the "home address." A partial explanation for this expenditure pattern would be that the craft owner in this length category might be purchasing optional equipment that is found as standard equipment on larger craft.

Expenditures for fuel and oil.--This question presented to the craft owner was expected (1) to elicit amounts

of expenditures made by the craft owner, and (2) to quantify the expected differences in spending between motorized and sailing craft. The tabulation of data showed that the larger the craft, the greater the expenditures. Motorized craft, as expected, showed considerably greater expenditures than sail craft. The average annual expenditures when combining the averages for all three lengths of motorized craft was $1,368.00 against only $200.84 for the total averages of the three sailing craft length categories.

As expected, this category on boating expenditures again indicated the quantitative difference in spending for different craft type.

In-season maintenance costs.--Expenditures made by the boater to maintain his craft in operating condition were requested in question 26 of the questionnaire. In-season maintenance would include any type of maintenance activity covered during pre-launch preparation except work done on the hull. The average expenditures found in this study again increase for each length category with motorized craft having considerably higher averages than sail craft. The figures represented in this category for craft maintenance indicate as great a difference in expenditures as was shown by the averages for fuel and oil purchases between motor and sail craft.

Craft haul-out expenditures.--The average figures for craft haul-out at the end of the boating season were expected to approximate the cost for craft launching. As seen in Table 7 this was the case with only a slight increase for haul-out over launching fees. The slight difference in expenditures can be partially explained by the fact that some respondents included their launching fee in their slip rental fee, causing somewhat lower overall averages for launching. The relatively high price for having the craft taken out of the water reflects the expense of the equipment to lift and move the large craft.

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 storage. Question 28 on the questionnaire dealt with expenditures made by the boater for storage preparations. An interesting point here is that the length category I craft for both motorized and sailing vessels had greater expenditures for storage preparation than the larger length categories. The possible explanation for the difference would be that a greater percentage of the larger craft are stored inside buildings which would eliminate the need for costly coverings, etc. for the craft that are stored outside.

Boat storage costs.--The need for dry-land winter boat storage was covered earlier in this chapter, and expenditures for storage came out at about the same price as the seasonal slip rental fee. The average figures for all length categories reflect expenditures made for the rental of storage space both inside and outside of storage structures.

Motorized craft had higher rates for winter storage than sailing craft, but this can be explained by the fact that 78.2% of all sailing craft were stored outside of buildings compared to only 46.8% of the motorized craft. When a boat is stored inside a building, storage costs increase.

Seasonal expenditures for craft insurance.--The final question dealing with craft related expenditures requested the annual cost for boat insurance carried by the craft owner. A comparison between length categories of both motorized and sailing craft shows similarities in amounts of expenditures except in category III which has questionable data for the one 45'+ sailing craft in the study.

The need for insurance coverage is obvious considering the investment the craft owners have made in purchasing their craft. The average cost for the 45'+ motorized craft, for example, is over $83,000.00.

Trip Related Expenditures

The second category of recreational boating expenditures and fourth section of the questionnaire is "trip related expenditures." This section covers expenditures made between the home and marina site, or while participating in recreational boating. The expenditure questionnaire contained seven questions covering "trip" costs to determine the true spending patterns for the participants in this recreational activity. The figures on "trip related" expenditures can be found in Table 8 on the following page, and are highlighted in the following sections.

Seasonal food expenditures.--Under this heading, information on seasonal expenditures of grocery purchases, alcoholic beverage purchases, and meals ordered in restaurants, connected to the boating activity, was sought. These three expenditure categories under the broad heading of food purchases are then broken down into expenditures made at the home address, slip rental site, and en route to the marina. Figures on expenditures for prepared meals were not included for the home address. Only the total figures are shown for each food category in Table 8.

Unlike expenditures for craft operations and maintenance, which fairly consistently exhibited increases with craft size increases and higher expenditures for motor craft than for sail craft, spending patterns for "trip related expenses" did

TABLE 8

TRIP RELATED EXPENDITURES
(By Craft Type and Length)

	Motor Craft			Sail Craft		
	20-30' n=102	30-45' n=89	45'+ n=9	20-30' n=79	30-45' n=32	45'+ n=1
Food expend./Groceries	192.28	365.66	336.75	163.04	301.12	NR
Food expend./Alcohol	124.91	156.65	129.78	78.16	155.48	NR
Food expend./Prepared meals	151.77	210.22	211.25	106.73	241.18	NR
Food and beverage total	478.96	732.53	677.78	347.93	697.78	NR
Off-craft lodging	26.93	16.29	0.00	45.75	0.00	NR
Rec. equip./Boating related	155.44	152.43	226.25	102.17	111.45	NR
Rec. expend./Non-boating	147.67	94.33	228.29	68.73	167.00	NR
Boating clothes	96.61	132.58	247.14	72.36	158.55	NR
Laundry costs	33.87	29.75	40.00	11.90	27.38	NR

NR = Non-response.

not follow that some exact pattern. Expenditures for food (groceries) increased from length I to length II in both categories of craft type, but under motorized, length III craft owners average expenditures dropped.

The expenditures for alcoholic beverages again fluctuate downward for the length III craft owner. In fact, only the length I sail craft owner averages less money spent for alcohol than the largest craft size for motorized boats. This is not the expected trend in spending behavior that had been predicted for all expenditures per category. The average amount of money spent by craft owners for prepared meals showed substantial increases in every length category, although II and III motorized only show a difference of slightly over one dollar.

Seasonal expenditures for off-craft lodging.--The second question on "trip expenditures" covered in this thesis deals with the amounts of money the craft owner paid out on the average for off-craft lodging at the marina site. It would, of course, be necessary to seek off-craft lodging when the number of individuals to be lodged exceeded on-board lodging capacity. However, boaters may choose for one reason or another to use off-craft lodging rather than stay on the craft. One respondent built a $68,000 summer home to avoid sleeping on the craft.

In the motorized category, length I, only 22 craft owners out of 102 indicated any expenditures for off-craft

lodging with the average expenditure for all craft owners in that category totaling $26.93. In length II motorized, 14 boaters out of 89 paid for off-craft lodging with the average expenditure for the category being $16.29. Owners in length category III motorized, and lengths II and III in sailing craft, made no expenditures for off-craft lodging.

The only other expenditures for off-craft lodging was in length category I sailing craft: The average was $45.75 for this group with only 10 responding that they used off-craft lodging out of the 32 in this category. The trend concerning off-craft lodging which one might expect would have owners of smaller craft seeking off-craft lodging for weekend guests since on-board overnight accommodations are not as great as are found on the larger craft. Of the total 312 respondents, only 46, or only 14.7% of the sample population, indicated they utilized off-craft lodging.

Recreational equipment/boating related.--The question concerning the purchases of recreational equipment that would be utilized during or related to the boating activity was broken down into three categories: fishing equipment, water skiing equipment, and skin-SCUBA diving equipment with two "other purchases" categories left open. Again the figures represented in Table 8 indicate the total for expenditures for recreational equipment purchased at both the "home address" and "slip rental" site.

Purchases of recreational equipment decreased from length II in relation to length I for motorized craft. The remaining length categories showed increases for each size group. Expenditures for recreational equipment averaged somewhat less for the sail craft owners, possibly because they consider sailing a complete sport in or of itself.

Non-boating recreational expenditures at "slip rental site."--Question 37 on the expenditure questionnaire was designed to determine seasonal spending patterns for boat owners participating in other forms of recreation while at the "slip rental site." Oftentimes, the craft is considered a mobile cabin or summer home to be used as a base of operations. This question 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."

Referring back to Table 8, less money was spent by the length II motorized craft owner than length I motorized; however, the general finding was that this category of expenditures increased with boat size. Motor craft owners included in this sample on the average spent more on non-boat related recreation activities than did sampled sail boat owners.

Boating related seasonal clothing expenditures.--The average amount of expenditures for boating clothes follows

the trend of the larger the craft, the greater the observed expenditure. Totals between the two craft types are fairly close together, indicating little difference between craft type and amount of money spent for clothes for recreational boating. The differences in expenditures between length classes would not necessarily indicate greater amounts of clothes being purchased, but possibly better quality.

Seasonal laundry costs at "slip rental site."--The final question related to "trip" expenditures relates to laundry costs incurred while at the slip rental site. These figures for all craft length categories are all relatively small and reflect that either the laundries aren't used to a great extent at the marina or simply are not available to be used. Again the only difference in actual expenditures when compared to the upward trend per craft length category is found when comparing the length I and length II motorized categories with I showing a slightly higher average ($33.87 to $29.75).

Total Expenditures

The total expenditures made by the craft owner reflect the sum of "craft" and "trip expenditures." Table 9 shows the actual average figures for each boat length and craft type. A comparison between motorized and sail craft indicates only moderate differences in

TABLE 9

TOTAL EXPENDITURES
(By Craft Type and Length)

	Motor Craft		
Number of responses	102	89	9
Craft size	20'-30'	30'-45'	45'+
Expenditures total	$2,774.56	$3,831.76	$6,401.44
	Sail Craft		
Number of responses	79	32	1
Craft size	20'-30'	30'-45'	45'+
Expenditures total	$2,243.85	$3,620.23	$2,200.00

amounts of expenditures, with the greatest differences probably accounted for in purchase of fuel, oil, and boating equipment.

Except for the 45'+ sailing category, each succeeding length category showed substantial increases in average expenditures for the activity of recreational boating. The 45'+ sail craft figure must be heavily discounted because it represents only a single response combined with incomplete answers on the questionnaire.

The average figures presented here are conservative estimates of total expenditures since expenditures for travel are not computed in the final tabulation. Response

to the questionnaire on amount spent to travel from the home address to the slip rental site was considered so inaccurate (i.e., $3.00 for 120 mile round trip between the two sites) that these perceived travel costs were not included in the "total" expenditure figures.

Socio-Economic Status (SES) Characteristics

The final group of questions on the expenditure questionnaire covered the socio-economic status (SES) characteristics of the boater. There were a total of five questions covering the age, education level, occupation, and income of the craft owner as well as the determination of family size. Table 10 on the following page lists the average figures for each of the SES characteristics.

Age of craft owner.--In all six craft lenth categories, the average age of the boat owners was over 40 years. The age of the motorized craft owners had an average increase in years from length category I at 46.9 up to 51.2 in category III. The sail craft owners start the same upward trend for the age category, but the single 45'+ sail craft owner's age drops below the length II sail category for average age. One thing the age category points out is that recreational boating, at least in the class of Great Lakes boats this study covered, is participated in by individuals that have been working, and building up their discretionary funds for their recreational activities.

TABLE 10

SOCIO-ECONOMIC STATUS (SES) CHARACTERISTICS
(By Craft Type and Length)

	Motor Craft			Sail Craft		
	20-30' n=102	30-45' n=89	45'+ n=9	20-30' n=79	30-45' n=32	45'+ n=1
Age of craft owner/Average	46.9	47.6	51.2	43.8	49.2	42.0
Education level of owner[a]	5.47	5.65	5.78	6.32	6.44	7.00
Number of persons in family	3.88	3.88	3.66	3.81	3.66	8.00
Annual income[b]	7.88	8.44	12.78	6.99	14.76	18.00
Occupation/Frequency						
Doctor/M.D.	3	7	0	12	1	
Attorney	4	1	0	0	1	
Business executive	18	17	4	9	13	
Business owner	28	17	2	9	6	
Engineer	6	9	1	10	2	
Professor	1	0	0	3	1	
Teacher	1	1	0	9	0	
White collar-general	0	0	0	0	0	
Clergy	0	1	0	0	0	
Factory worker	10	9	0	6	1	
Sales representative	14	19	1	10	4	
Blue collar-general	0	0	0	0	0	
Law enforcement	4	0	0	2	2	
Retired	7	3	1	2	1	
Other	6	6	0	7	0	

[a]Code for education given on page 78.

[b]Code for income given on page 79.

Education level of the craft owner.--For coding purposes, educational achievement of the craft owner was divided into nine response categories:

1. Elementary school
2. Junior high
3. High school (some)
4. High school
5. Some college
6. Associate degree
7. B.S. and B.A.
8. M.S. and M.A.
9. Doctor's (M.D./Ph.D.)

The figures in Table 10 represent the average of all responding craft owners. As can be seen in the tabulated figures, each succeeding craft length category has higher averages for educational level for the craft owners. In comparing the average educational levels of motor craft owners to that of sail craft owners, it is interesting to note that the lowest average educational level for the sail craft owners is higher than the highest average level of education for the motor craft owners.

The reason or reasons for this difference were not specifically addressed in this study. Perhaps one reason is that the handling of a sailing vessel would be more intellectually demanding than operating a motor craft. Maybe the reason lies in sailing's "return to nature" character which appeals to individuals with higher levels of education. In any case, this finding merits consideration by those involved in planning and managing boating facilities.

Size of the family.--The average response related to the size of the family, for five of the six craft

categories, was slightly greater than 3.5 per family. The averages for family size seem relatively low. Possibly this reflects a smaller family size for the older craft owners who have had their children grow up and leave home. There is no real trend apparent in the tabulated figures concerning craft owners' family size and size and type of craft purchased.

Income.--Question 44 on the boating expenditure questionnaire offered 18 possible income groups which the craft owner could check to indicate the amount of family income. Income was solicited in this manner because it was felt that the rate of response to this key question would be increased over what might be achieved if the respondent was required to list his exact income. Income categories were listed in $2,500 increments starting at less than $10,000 annually and ending with over $50,000 in income.

1.____Less than $10,000	10.____$30,001 to 32,500
2.____$10,001 to 12,500	11.____$32,501 to 35,000
3.____$12,501 to 15,000	12.____$35,001 to 37,500
4.____$15,001 to 17,500	13.____$37,500 to 40,000
5.____$17,501 to 20,000	14.____$40,001 to 42,500
6.____$20,001 to 22,500	15.____$42,501 to 45,000
7.____$22,501 to 25,000	16.____$45,001 to 47,500
8.____$25,001 to 27,500	17.____$47,501 to 50,000
9.____$27,501 to 30,000	18.____$50,001 and over

As can be observed in Table 10, as the size of the craft increased for both motor and sail craft, so did the average amount of income. The lowest average income of $22,466.00 was for sail craft length category I. The

highest response for a group was 18 for sail craft III at over $50,001 (only one respondent in this category). The complete figures for average income are found in Table 11.

Occupation of the craft owner.--The final SES characteristic that is discussed in this chapter on general findings is that of occupation of the craft owner. The occupations were coded under 15 different categories with the tabulated figures shown in Table 10. Figures 3 and 4 on the following two pages illustrate graphically the differences in occupation groups for motor craft and sail craft.

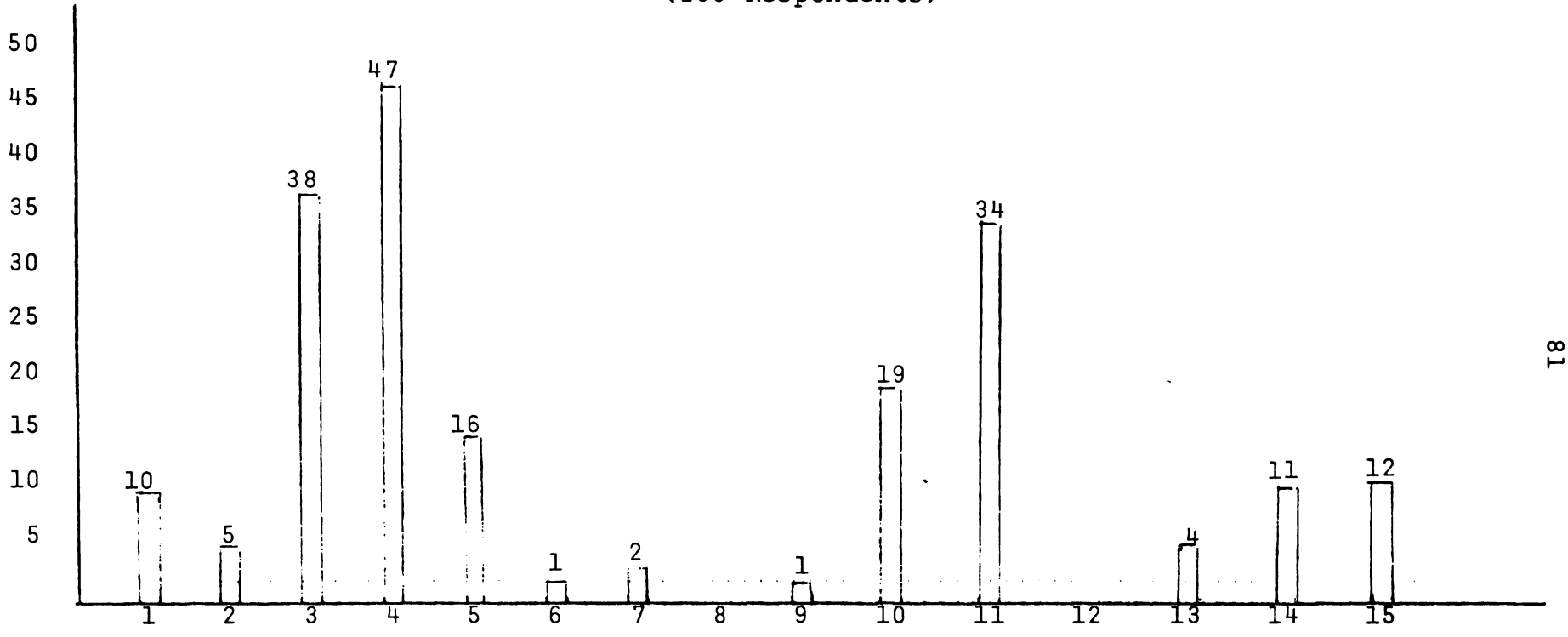
TABLE 11

AVERAGE COMPUTED INCOMES
(By Craft Type and Length)

	Motor Craft		
Number of craft	102	89	9
Craft length	20'-30'	30'-45'	45'+
Coded average	7.89	8.44	12.78
Act. income level	$24,725	$26,100	$36,950
	Sail Craft		
Number of craft	79	32	1
Craft length	20'-30'	30'-45'	45'+
Coded average	6.99	14.76	18.00
Act. income level	$22,466	$41,900	Over $50,000

FIGURE 2

OCCUPATIONS FOR ALL
"MOTOR CRAFT" OWNERS
(200 Respondents)

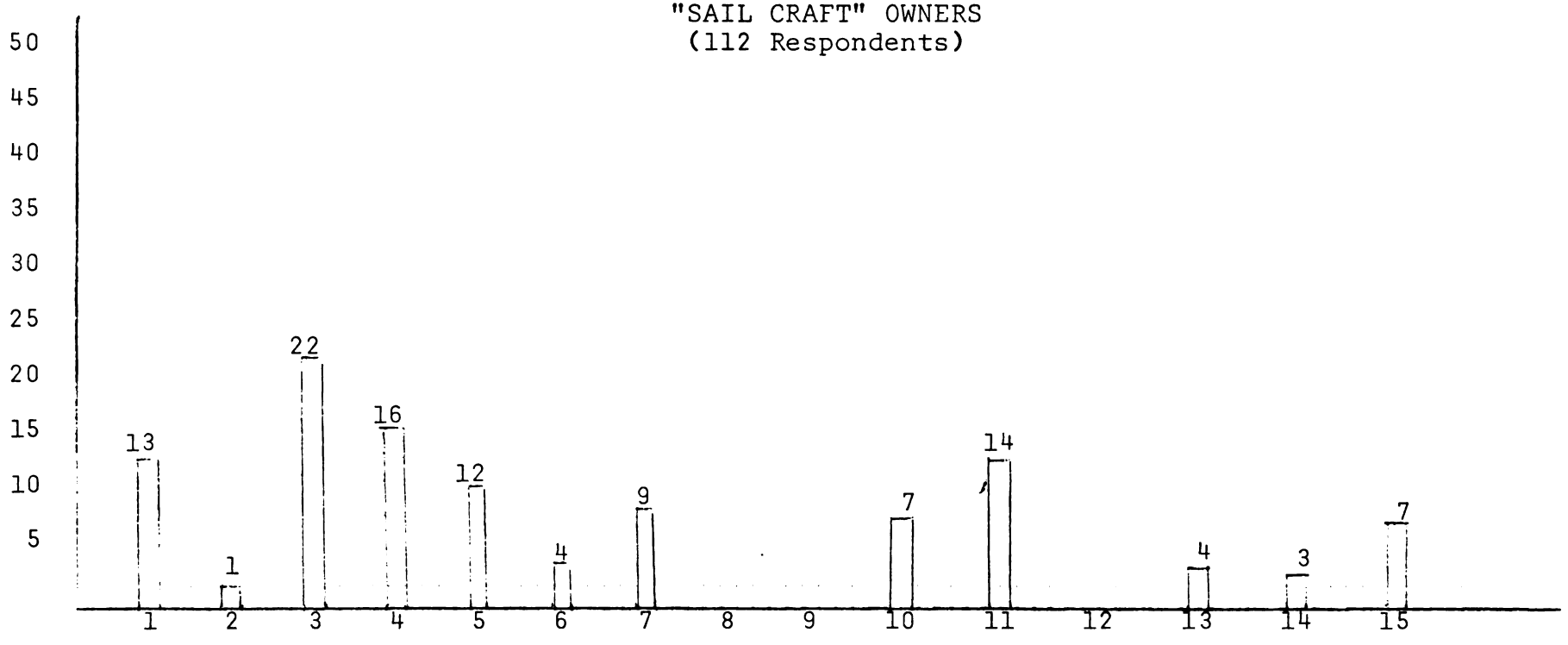


Occupation Classifications:

1. Doctor/Medical
2. Attorney
3. Business Exec.
4. Business Owner
5. Engineer
6. Professor
7. Teacher
8. White Collar(gen)
9. Clergy
10. Factory Worker
11. Sales
12. Blue Collar(gen)
13. Law Enforcement
14. Retired
15. Other

FIGURE 3

OCCUPATIONS FOR ALL
"SAIL CRAFT" OWNERS
(112 Respondents)



Occupation Classifications:

1. Doctor/Medical
2. Attorney
3. Business Exec.
4. Business Owner
5. Engineer
6. Professor
7. Teacher
8. White Collar(gen)
9. Clergy
10. Factory Worker
11. Sales
12. Blue Collar(gen)
13. Law Enforcement
14. Retired
15. Other

From the tabulated figures, it can be observed that boaters come most commonly from five job categories. The occupation that had the highest number of boaters, for both motor and sail craft categories, was business owners, followed in order by (2) business executives, (3) salesmen, (4) engineers, and (5) factory workers. The remaining ten occupations in order of importance from highest to lowest (for both sail and motor craft) were doctor, retired, other, teachers, law enforcement, attorneys, professors, and clergy, with none found in the blue and white collar jobs-general categories.

Results of the Telephone Follow-Up Survey

As was indicated earlier in the section on research administration, a telephone survey was carried out to determine if there were any substantial differences between the boat owners that responded to the questionnaire and those who didn't. Table 12 on the following page indicates the response to each of the eight questions asked of the 25 craft owners contacted by phone.

It can be seen that 92% of the non-respondents sampled did receive a questionnaire through the mail. This finding would appear to rule out the possibility of large numbers of individuals not even receiving questionnaires which could have accounted for considerable non-response. Of the 25 non-respondents called, only 18 or 72% still

TABLE 12

RESULTS OF THE TELEPHONE FOLLOW-UP SURVEY
(25 Craft Owners)

Question	Response
1. Did you receive a questionnaire	Yes-92%/23 No-8%/2
2. Do you presently own a craft	Yes-72%/18 No-28%/7
3. What type of craft	Motor-72.2%/13 Sail-27.8%/5
4. What is the length of the craft	I-50%/6 II-50%/6 I-80%/4 II-20%/1
5. Travel time-between home and marina	All respondents/Average-40 min.
6. Number of days craft is utilized	All respondents/Average-34 days
7. Average annual expenditure for boating	All respondents/Average-$1,300.00
8. Reason for non-response	
A. Response not important	4
B. Questions too personal	1
C. Marina facilities adequate	0
D. Didn't care to comment	0
E. Too busy	12

owned craft. This finding suggests that another sizable percentage of non-respondents probably no longer own boats and therefore had little incentive to fill out and return the questionnaire.

Of the 18 respondents still owning boats, 13 had motor craft (72.2%) and 5 had sail craft (27.8%). These figures when compared to the 64.1% to 35.9% ratio (motor to sail) of respondents suggests that the ratio of motor craft to sail craft owners may be higher in the non-responding population. Of the 13 motor craft, one was too short (17') to be included in the study, while the remaining 12 were split up evenly between length categories I and II. The five sail craft were found to be in the first two length categories also (Length I--4 craft, Length II--1 craft).

Travel time between home address and slip rental site for those contacted via telephone averaged 40 minutes which is lower than the mean of just over 60 minutes found among those responding to the expenditure survey. The number of days the craft was utilized was also low: 34 days in the telephone survey to 56 days in the questionnaire response. The average for the 14 individuals that would hazard a guess as to what their total recreational boating expenditures might be was only $1,300. The lowest average for questionnaire respondents was $2,243.85 for length I sail craft. It should be pointed out here that when the individuals were asked questions on days of craft usage

and amount of expenditures made by them they were unsure of whatever figure they came up with. They had no time to check for the accuracy of their figures.

Reasons for non-response were also solicited from the selected non-respondents. Twelve said they were "too busy" to answer the questionnaire; four felt their response was not important, and one felt the questionnaire was too personal.

In summary, a rather high proportion of non-respondents (28%) did not respond because they no longer owned a boat. This group of non-respondents would appear to have little if any impact on the validity of the expenditure data presented herein. The lower estimated expenditures reported by non-respondents in the telephone follow-up than for respondents, the lower usage of the craft during the season, and the "too busy" to respond high rate of selection combine to suggest that non-respondents probably use their boats less and spend less money--possibly because they are "busier" than boaters who responded to the questionnaire. In generalizing the expenditure pattern data reported here to the population of Lake Michigan boaters, one should be advised that the figures, due to the lack of accurate responses, are predicted to be somewhat lower than what actually exists.

CHAPTER V

TESTING THE HYPOTHESES

Analysis of the Data

In order to analyze the data on recreational boating expenditures made by Lake Michigan Great Lakes boaters, a number of data analysis methods were utilized. These procedures were used for two purposes: (1) to predict trends in future recreational boating expenditures and (2) to test the hypotheses as to the strength of the variables in determining expenditure patterns presented in this thesis. The analysis included simple regression analysis, multiple regression analysis, and non-parametric two-way analysis of variance.

It was decided to look primarily at three different dependent variables covering boating expenditures. The first dependent variable being "total" expenditures; the second, "craft" expenditures; and the third, "trip related" expenditures. There were other possibilities for dependent variables such as the purchases of prepared meals at the slip rental site, grocery purchases, or literally any other itemized expenditure category covered in the questionnaire. For the purpose of narrowing the scope of the analysis, however, the three larger categories were utilized as the dependent variables.

The number of independent variables chosen for analysis is considerably larger than the number of dependent variables. The following descriptive variables were selected to hopefully explain the differences found in expenditure patterns: craft type (motorized or sail), craft size (20-30', 30-45', 45'+), travel time between the home address and slip rental site, percent of maintenance performed by the craft owner, number of days the craft is used during the boating season, income level, education level, family size, age, and occupation.

In the following section, Testing the Hypotheses, scatter diagrams and statistics necessary for interpretation are placed with each hypothesis to be tested. Finally, non-parametric two-way analysis of variance will be used to determine whether or not total expenditures are significantly different by craft type and length.

The coverage of analysis in this thesis is restricted to the testing of the hypotheses on variable effects and does not attempt to predict expenditure trends or patterns for the Great Lakes boater. Through the utilization of the available analysis techniques, it is hoped the hypotheses that are presented will be positively tested.

In terms of the simple regression analysis techniques, the model used was

$$Y = \alpha + BX + u$$

where Y represents the dependent variable (expenditures), α the Y intercept, B the regression coefficient, X the independent or descriptive variable, and u the disturbance term.[1]

The multiple regression technique utilized the formula

$$Y_1 = B_0 + B_1X_1 + B_2X_2 + \ldots B_kX_k + u \ .$$

It is generally implied that the variation in Y_1 is systematically explainable by the part of the Y_1 that is represented as $(B_0 + B_1X_1 + B_2X_2 + \ldots B_kX_k)$ and that the part of Y_1 not explained by the Xs is represented by u.[2] Results of the multiple regression computer runs can be found in Appendix E.

Testing the Hypotheses

Socio-Economic Status

Hypothesis 1: Boat owners with the highest socio-economic status (SES) characteristics level will expend more for the recreation boating experience in each of the craft type and size categories.

To determine the validity of this hypothesis, the individual SES characteristics must be compared to expenditure patterns since no single all inclusive SES measure was established for this study.

---

[1]David S. Huang, Regression and Econometric Methods (New York: 1970), p. 12.

[2]Ibid., p. 53.

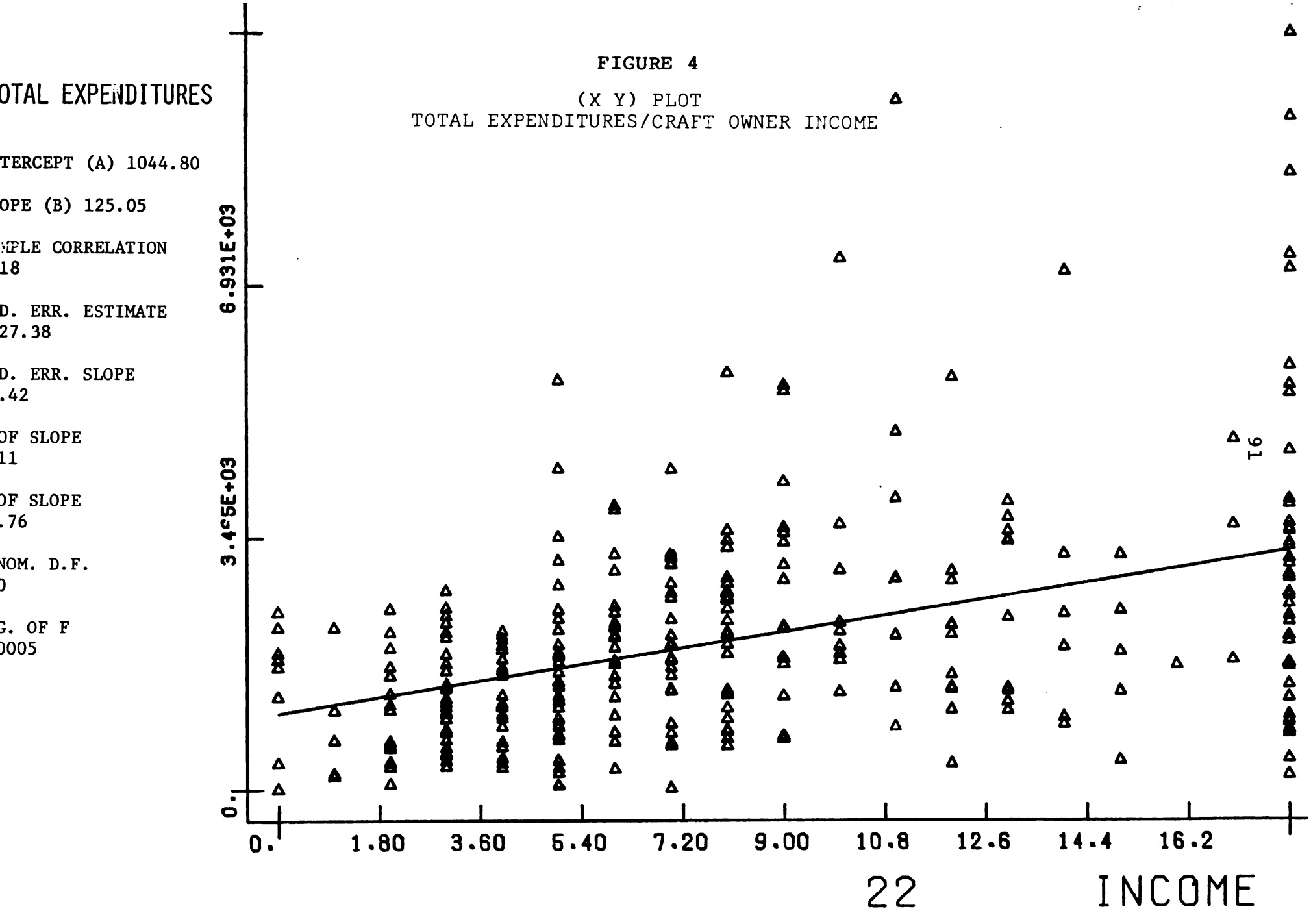
In looking at the tabulation of the expenditure data, one notes that there is a positive relationship between craft size and amounts of expenditures. Similar comparisons to expenditures can be made with such SES characteristics as education level, income, and age. After looking at the sub-hypotheses under the SES heading, this section will be concluded with a statement concerning the validity of Hypothesis 1.

> Sub-Hypothesis 1-A: The boat owner's income will be positively related to his recreational boating expenditures. The higher the income, the greater the amount of expenditures in all craft categories.

Referring to the simple correlation data in the margin of Figure 4, it can be seen that income had a positive correlation of .418 to total expenditures. The plot of the regression line for total expenditures versus amount of income indicates that for the sample population of boat owners, the greater the income level, the greater the amounts of expenditures. To actually test the hypothesis that income does affect expenditures, one must determine which of the following is accepted: the null hypothesis (H_0: = 0) or the alternate hypothesis (H_a: $\neq$ 0), with the level of significance at 5 percent. The t test ($t = \frac{\bar{X} - \mu_X}{S_X}$) when looking at the data in Figure 4 shows that the t value of 8.11 is far greater than the critical value of t (1.960) with 310 degrees of freedom and a level of significance of 0.5. Thus the null hypothesis cannot be accepted, and it

FIGURE 4

(X Y) PLOT
TOTAL EXPENDITURES/CRAFT OWNER INCOME



is concluded the slope is significantly different from zero. The alternative hypothesis then is accepted supporting the hypothesis that total expenditures and boat owners' incomes are positively correlated.

> Sub-Hypothesis 1-B: The boat owner's education level will be positively correlated to total expenditures. The higher the education level achieved, the greater the amounts of expenditures expected.

The simple correlation figure derived from Figure 5 shows a negative correlation (-.059) between education and total expenditures. The plot diagram in Figure 5 shows a negatively sloped regression line from the sample population. The t value for the slope is -1.04 which is below the critical value of 1.960 for 310 degrees of freedom at .05 level of significance. From this data, the sub-hypothesis 1-B is rejected.

> Sub-Hypothesis 1-C: Family size will be negatively correlated with total expenditures for recreational boating--that is, as the family size increases, the recreational expenditures will decrease.

The simple correlation figure derived from Figure 6 shows a positive correlation (.008) between family size and total expenditures. The plot diagram in Figure 6 shows a slightly positive regression line for the sample population. The t value for the slope is .140 which is below the critical value of 1.960 for 310 degrees of freedom at .05 level of significance. From this data, the sub-hypothesis 1-C is rejected, and the null hypothesis is accepted.

FIGURE 5

(X Y) PLOT
TOTAL EXPENDITURES/EDUCATION

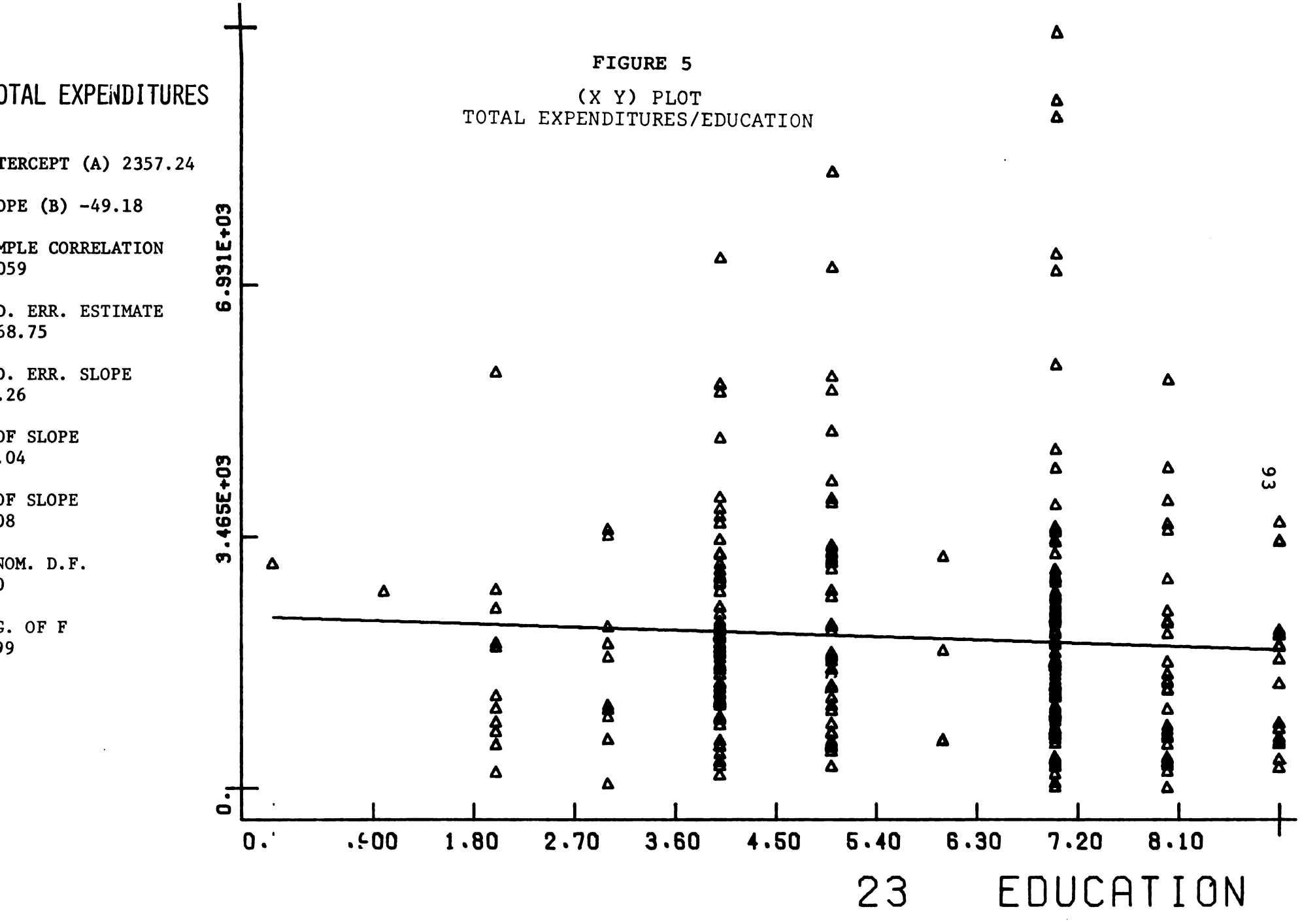


FIGURE 6
(X Y) PLOT
TOTAL EXPENDITURES/FAM. SIZE

TOTAL EXPENDITURES

NTERCEPT (A) 2040.99

LOPE (B) 7.54

IMPLE CORRELATION
008

TD. ERR. ESTIMATE
571.44

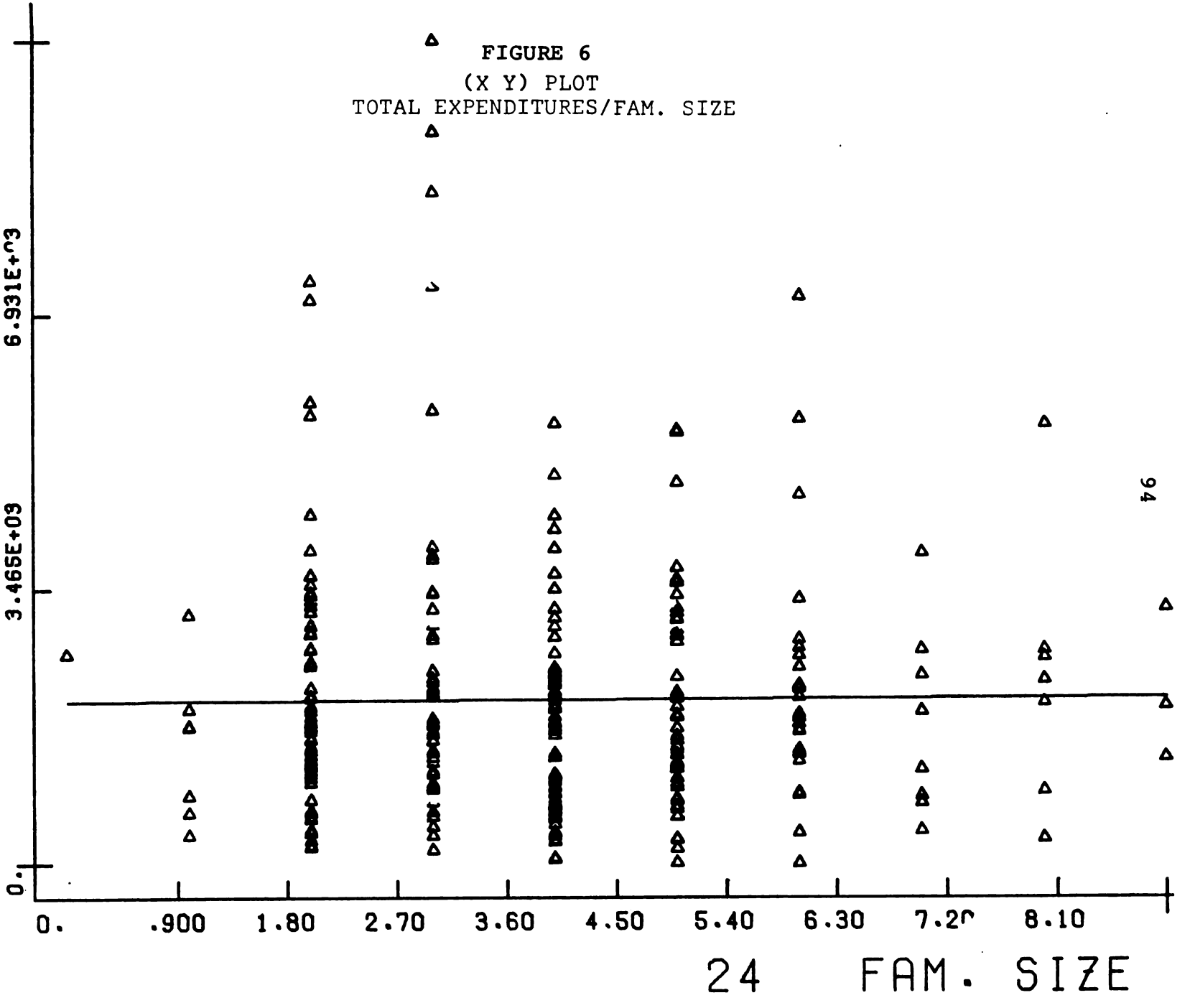
TD. ERR. SLOPE
3.86

OF SLOPE
140

OF SLOPE
.96

ENOM. D.F.
10

IG. OF F
889



Sub-Hypothesis 1-D: The amount of recreational boating expenditures will increase as the age of the owner increases--up to the age of retirement.

The simple correlation figure derived from Figure 7 shows a positive correlation (.039) between age and total expenditures. The plot diagram in Figure 7 shows a slight positive regression line for the sample population. The t value for the slope is .680 which is below the critical value of 1.960 for 310 degrees of freedom at .05 level of significance. From this data, the sub-hypothesis 1-D is rejected, and the null hypothesis accepted.

In trying to show that the greater the SES characteristics the greater are the predicted total expenditures, it was found that income of the craft owner is the only significantly correlated variable to recreational boating expenditures. The categories of education, family size, and age of the craft owner do not show a marked effect on the overall boating expenditure patterns found in this study.

Differences in Craft Size and Type

Hypothesis 2: Owners of motorized craft will show greater total expenditures than owners of sailing craft. The greater the overall length in each of these two categories, the greater the total expenditures.

In order to test this hypothesis, non-parametric two-way analysis of variance was utilized. This analysis technique is based on a distribution-free test of analysis

FIGURE 7

(X Y) PLOT
TOTAL EXPENDITURES/AGE

TOTAL EXPENDITURES

INTERCEPT (A) 1785.95

SLOPE (B) 6.08

SIMPLE CORRELATION
.039

STD. ERR. ESTIMATE
1570.32

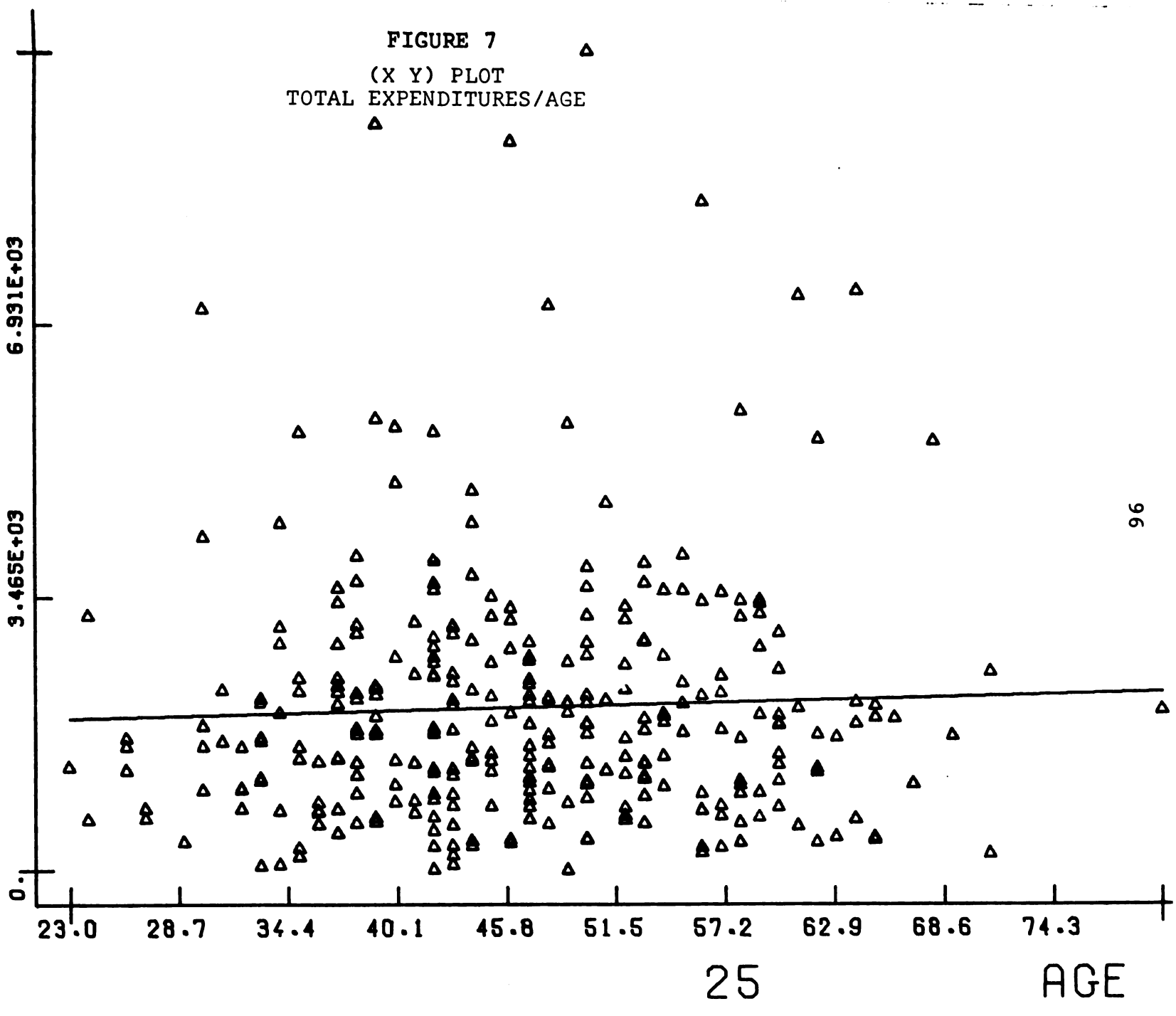
STD. ERR. SLOPE
8.95

T OF SLOPE
.680

F OF SLOPE
.462

DENOM. D.F.
310

SIG. OF F
497



of variance allowing for uneven distribution of observations for the variable categories. In the computer program model, the row and column variables, craft type (motor/sail) and craft size (length I, 20-30'; length II, 30-45'; length III, 45'+) were compared to the cell or "score" variable "total expenditures."

As can be seen in Table 13 located on the following page, the cell figures represent the number of craft that are above and below the median expenditure figure. Motor craft/length I showed 43% of the observations above the median with only 16% of sail craft/length I above the median. Motor craft/length II showed 80% of the observations above the median, while only 69% of the sail craft/length II are above the median.

The CHI-SQUARE figures for this program are listed below:

TOTAL CHI-SQUARE = 75.35645*

ROW CHI-SQUARE = 22.89304*

COLUMN CHI-SQUARE = 61.91624*

*Significance level at .05.

The analysis of data comparing craft types and sizes in relation to total expenditures clearly indicates (1) motor craft show higher expenditures over sail craft, and (2) as the size of the craft increases, expenditures also increase. Hypothesis 2 then is accepted for this study.

TABLE 13

NON-PARAMETRIC TWO-WAY ANALYSIS OF VARIANCE, CRAFT TYPE AND SIZE COMPARED TO TOTAL EXPENDITURES

	Craft Length I Freq./% for Freq.	Craft Length II Freq./% for Freq.
	Cell Total Above Median	
Motor Craft	44/43%	72/80%
Sail Craft	13/16%	22/69%
	Cell Total Below Median	
Motor Craft	58/57%	17/20%
Sail Craft	66/84%	10/31%

Differences in Craft Utilization

Hypothesis 3: Those boat owners showing the greatest amount of craft utilization will have the greatest expenditures for the boating activity.

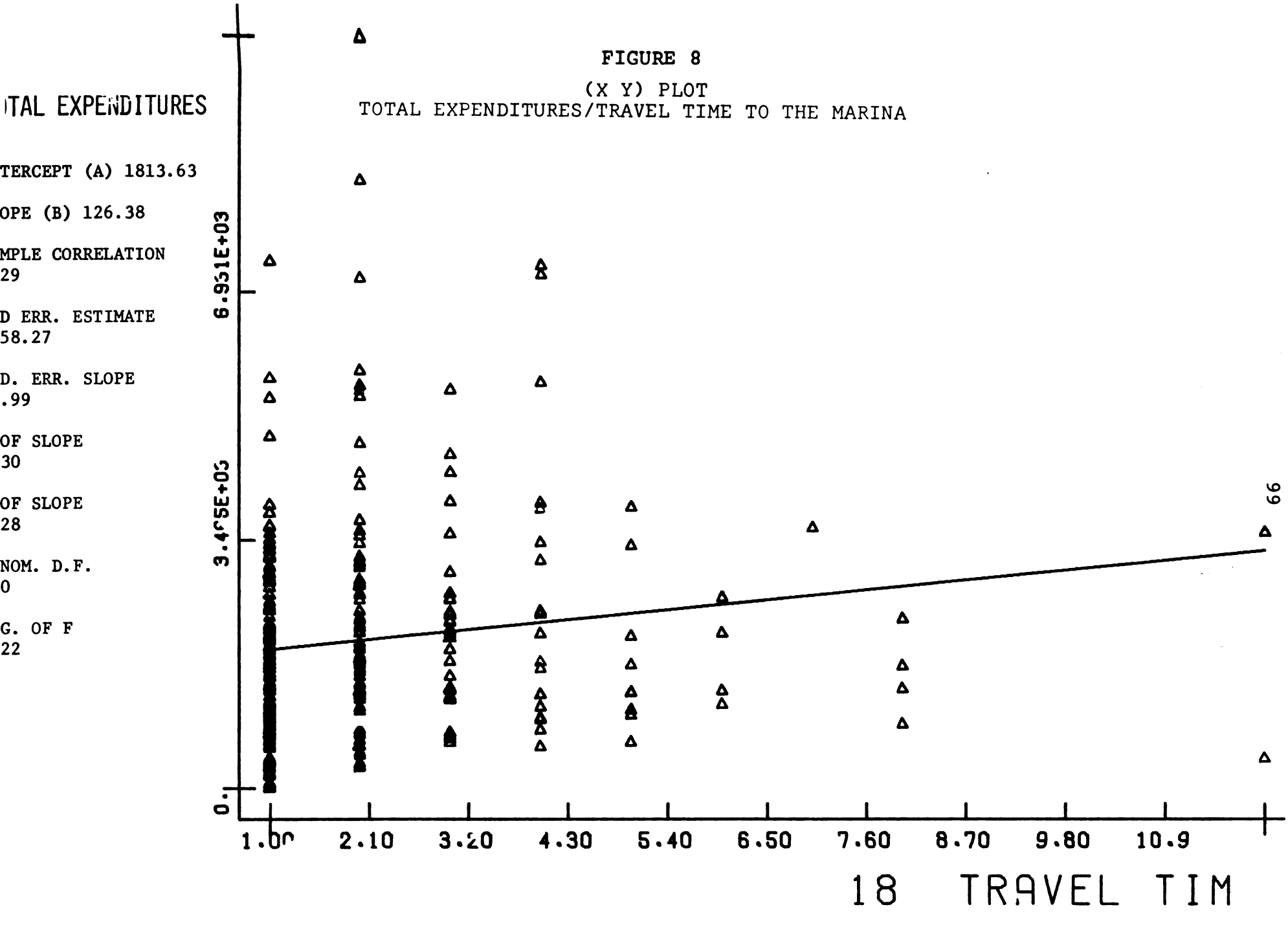
Again, to test this hypothesis, four specific areas related to craft use will be looked at: (1) travel time, (2) days utilized, (3) time craft kept in water, and (4) amount of maintenance performed by the owner.

Sub-Hypothesis 3-A: Craft owners with the greatest amount of travel time between their home and slip rental site will show the least amounts of expenditures.

The simple correlation figure derived from Figure 8 shows a positive correlation (.129) between "travel time" and total expenditures. The plot diagram in Figure 8 shows a positive regression line for the sample population. The

FIGURE 8

(X Y) PLOT
TOTAL EXPENDITURES/TRAVEL TIME TO THE MARINA



t value for the slope is 2.30 which is greater than the critical value of 1.960 for 310 degrees of freedom at .05 level of significance. From this data, the null hypothesis is rejected, and the alternate hypothesis is accepted. The sub-hypothesis 3-A is rejected since the correlation is opposite to what had been predicted.

> Sub-Hypothesis 3-B: The individuals that have the highest number of days in which the craft is utilized will show the greatest amount of expenditures.

The simple correlation figure derived from Figure 9 shows a positive correlation (.269) between the number of days the craft is utilized and total expenditures. The plot diagram in Figure 9 shows a positive regression line for the sample population. The t value for the slope is 4.92, which is greater than the critical value of 1.960 for 310 degrees of freedom at .05 level of significance. From this data, the null hypothesis is rejected, and the sub-hypothesis 3-B is accepted.

> Sub-Hypothesis 3-C: The longer a craft is kept in the water, the greater will be expenditures for the boating activity.

The simple correlation figure derived from Figure 10 shows a positive correlation (.208) between the amount of time the craft is kept in the water and total expenditures. The plot diagram in Figure 10 shows a positive regression line for the sample population. The t value for the slope is 3.74, which is greater than the critical value of 1.960 for 310 degrees of freedom at .05 level of significance.

FIGURE 9

(X Y) PLOT
TOTAL EXPENDITURES/DAYS THE CRAFT IS UTILIZED

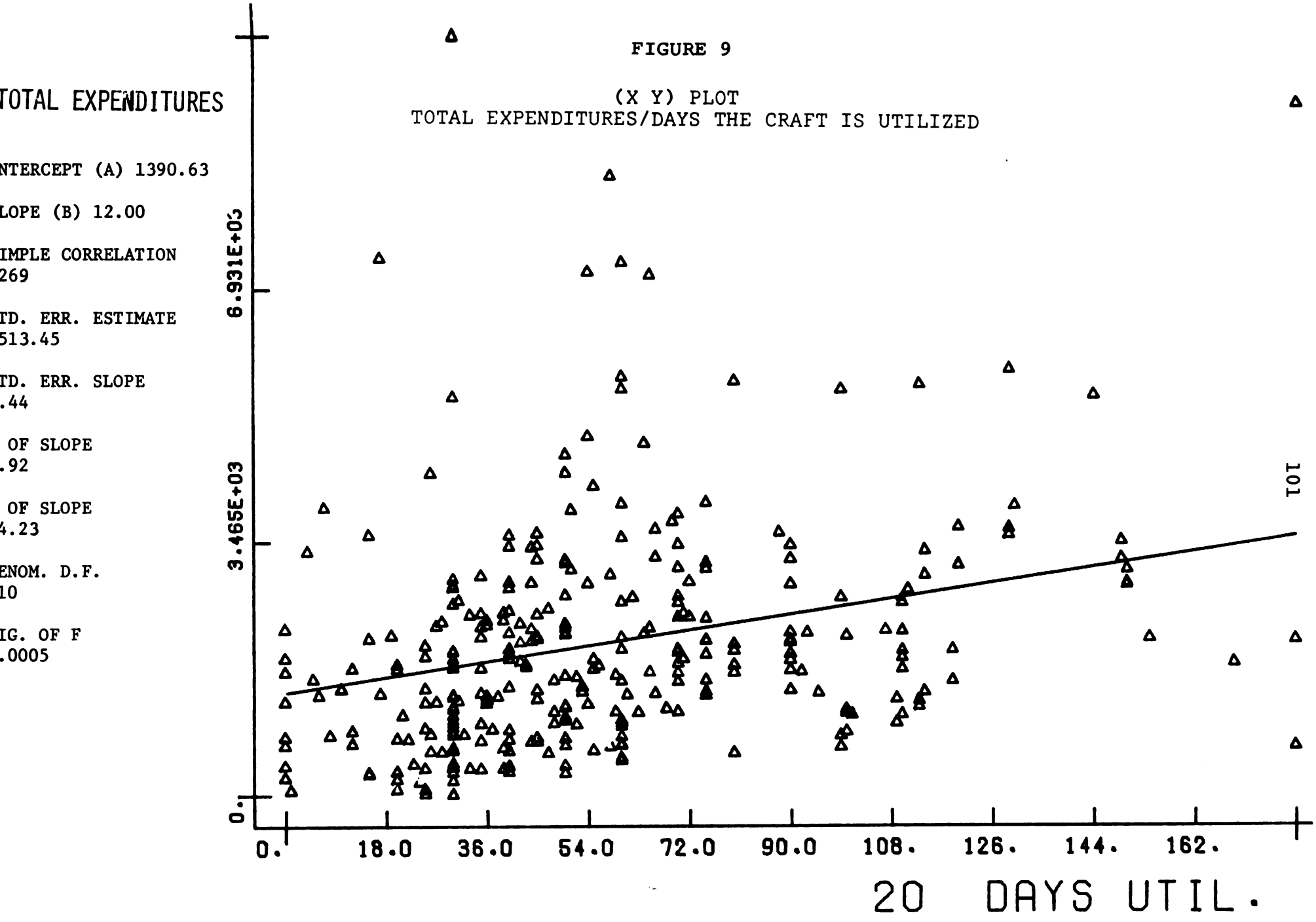


FIGURE 10

(X Y) PLOT

TOTAL EXPENDITURES/TIME CRAFT KEPT IN WATER

TOTAL EXPENDITURES

INTERCEPT (A) 564.27

SLOPE (B) 9.05

SIMPLE CORRELATION
.208

STD. ERR. ESTIMATE
1537.16

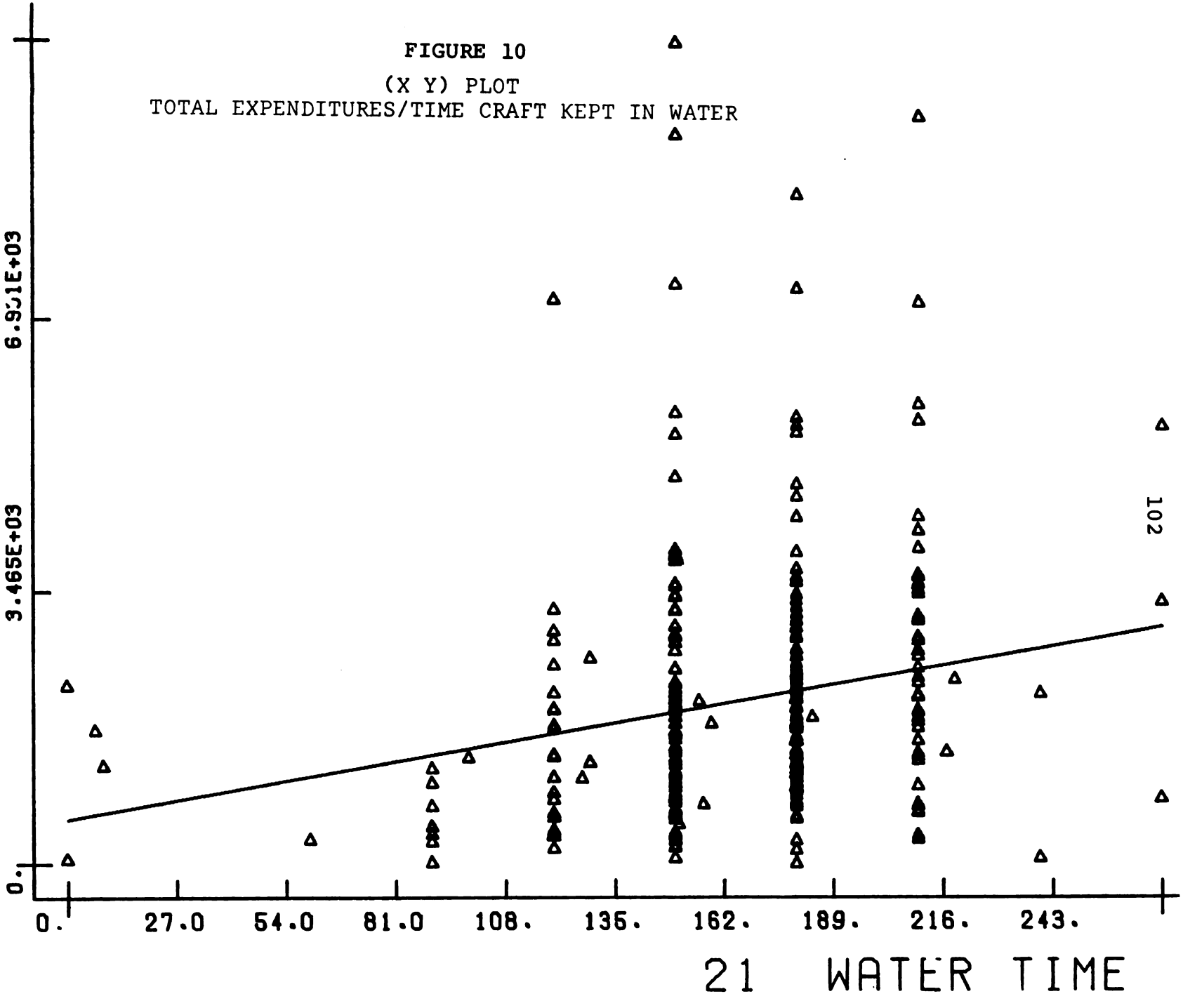
STD. ERR. SLOPE
2.42

OF SLOPE
3.74

OF SLOPE
4.00

DENOM. D.F.
10

SIG. OF F
.0005



From this data, the null hypothesis is rejected, and the alternate sub-hypothesis 3-C is accepted.

> Sub-Hypothesis 3-D: The greater the amount of maintenance performed by the owner, the smaller will be the total amount of expenditures made by the craft owner.

The simple correlation figure derived from Figure 11 shows a negative correlation between the amount of maintenance performed by the craft owner and total expenditures. The plot diagram in Figure 11 shows a negative regression line for the sample population. The t value for the slope is -7.35 which is greater than the critical value of 1.960 for 310 degrees of freedom at .105 level of significance. From this data, the sub-hypothesis 3-D is accepted, and the null hypothesis is rejected.

With the exception of the travel time variable, which tested opposite to what had been predicted at the start of the study, the remaining variables had a significant impact on the expenditures made by the boater in relation to craft utilization.

AL EXPENDITURES

RCEPT (A) 3338.27

E (B) -16.90

LE CORRELATION
5

ERR. ESTIMATE
.27

ERR. SLOPE

SLOPE
5

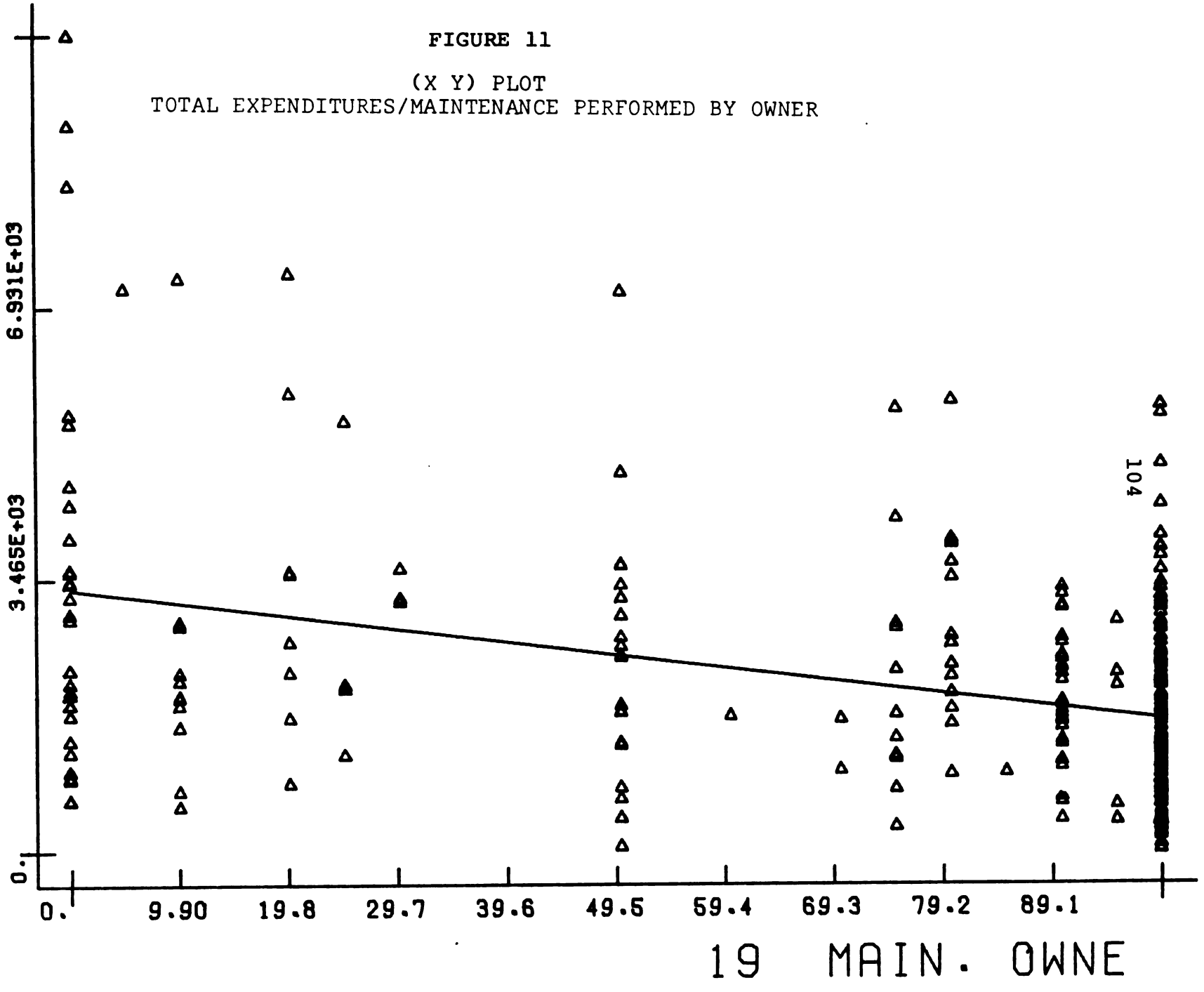
SLOPE
9

M. D.F.

OF F
005

FIGURE 11

(X Y) PLOT
TOTAL EXPENDITURES/MAINTENANCE PERFORMED BY OWNER



CHAPTER VI

SUMMARY AND RECOMMENDATIONS

Summary of Results

Through the use of various regression and analysis techniques, it was possible to determine the impact that various socio-economic status characteristics (SES) and craft usage patterns have on recreational boating expenditures. The tabulation of the expenditure data indicated possible positive correlations between expenditures and craft type, size, percent of maintenance by the craft owner, income, education, age, and a number of other variables on which data was collected for this study.

Simple correlations between the dependent variables (expenditures made by the craft owner) and independent variables of craft usage and SES characteristics were run, followed by simple and multiple regression analysis programs to provide test information for the various hypotheses presented in this thesis. In testing the hypotheses dealing with socio-economic status characteristics, it was determined that income was positively correlated to boating expenditures with the plotted regression line showing the increase in expenditures as the amount of income increases. The use of the one-sided t test for the slope of the

regression line also indicated acceptance of the hypotheses presented by this thesis.

The sub-hypothesis (1-B) dealing with the predicted increase in recreational boating expenditures as the education level of craft owners increases was not proved out by the data gathered for this study. The simple correlation between the two variables was -.059 and the t test did not support the hypothesis at a significance level of .05. The possible explanation for this outcome lies in the fact that it was observed for this study that the higher the education the individual craft owner achieved, the greater the tendency for owning a sail craft. As is seen in the tabulation of the data, the lowest education level of the sail craft owners was higher than the highest education level of motor craft owners. In every instance, the sail craft categories had lower expenditure figures than motor craft, this indicating the possible negative correlation for education and expenditure figures.

The family size variable was hypothesized to have a negative effect on recreational boating expenditures as the size of the family increased. The simple correlation was a positive .008 and the hypothesis presented by this thesis was not supported. The simple regression plot line clearly indicates a slight increase in boating expenditures as the family size increases, this to be related more toward "trip related" expenditures and the purchase

of food, clothing, etc. for the recreational boating experience. With the relatively high income levels these craft owners had in this sample population, it can only be assumed that the higher level of money for discretionary spending can account for the increase in expenditures as the family size increases. The hypothesis that increased age of the craft owner would show increases in total expenditures was not proven out in this study.

Utilizing non-parametric two-way analysis of variance for determining the significance of craft type and length on boating expenditures indicated a positive relationship of motor craft over sail craft and increases in expenditures as craft lengths increase. The hypothesis dealing with craft utilization shows that as travel time increases, expenditures also increase. This finding was opposite to what had been expected, since increased travel time between the craft owner's home and slip rental site would tend to decrease the overall amount of craft usage (-.116 correlation between travel time and number of days the craft is utilized). The number of days utilized variable related to expenditures proved out positive in testing the hypothesis that increased number of days the craft is used, the greater the total amount of recreational boating expenditures. The same also held true when looking at the number of days the craft is kept in the water during the boating season in relation to total expenditures. As the

number of days the craft is kept in the water increases, so do the expenditures. The final variable tested was that of percent of maintenance by the owner in relation to boating expenditures. The correlation figures for these variables came out a -.385 with the one-sided t test supporting the hypothesis that increased percentages of maintenance performed by the owner would decrease the amounts of expenditures made by the owner in both total and craft related expenditures.

Utilization of Study Information

The purpose of this study was to provide boating expenditure information by specific craft types (motor/sail) and craft size categories (20-30', 30-45', 45'+). This information is needed specifically for input into a linear programming model which is being designed to assist the Waterways Division in planning a marina development complex at a proposed site on Lake Michigan.

Given the boating expenditure data that was gathered and analyzed in this study, the Michigan Waterways Division can better estimate the economic impact boaters have in the state.

Beyond the Michigan State Waterways Division's use of this information, individual marina owners and operators with facilities on the Great Lakes or adjoining waters will be able to predict income from future planned services for the boaters, and thereby determine their economic

feasibility. Since the tabulation of the data is broken down into a wide range of expenditure categories, the projected income from sales of fuel, oil, craft maintenance services, etc. can be determined by the marina owner.

The knowledge of the expenditures made by the boaters is important to the commercial marina owner since, at best, the operation of a commercial marina in the Great Lakes region is a marginal income producer for the owner.[1] The number of craft on the Great Lakes is not the problem behind marginal economic returns for marinas in this region, since most marinas actually have long waiting lists of craft owners wanting to rent slips at these sites. The income problem for the marina owners relates to the limited boating season for the Great Lakes. Unlike the marina operations found in Florida or California which are open year-around, the Great Lakes marinas are in full operation only during the summer months. Since the fall, winter, and early spring months cannot be utilized by the boat owner to participate in recreational boating, there are fewer visits to the craft than if the waters were open and the climate was favorable for year-around boating.

With the limited boating season, the commercial marina owner must maximize his income during the short boating season and minimize his costs of operation. If the

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[1]Information provided by Mr. Keith Wilson, Chief, Michigan State Waterways Division, in a presentation at Michigan State University (April 15, 1974).

marina owner can determine where the craft owners' dollars are going for the boating activity, he can develop his site to provide services and facilities that return the greatest income.

A third group of individuals that would be able to utilize the expenditure data would be the prospective craft purchaser. The tabulated data would indicate the average amount of money it would take to own and operate a craft related to the type (motor/sail) and the size of the craft. Before a study of this type, the prospective craft buyer would know the cost of the craft, but little about the cost of slip rental, winter storage, maintenance, fuel costs, etc. With the completion of this study, information on total recreational boating expenditures is now available for those wishing to enter the boating market.

Recommendations for Further Study

An area which requires further work in determining the total boating expenditures is that of computing the actual travel cost incurred by the craft owners for each trip they make to their craft (both during and after the boating season). The question on trip expenditures was asked each craft owner but the responses that were returned were so inaccurate (i.e., $3.00 for 200 mile round trip) that it was decided not to include these responses in computing "trip related" and total expenditures. In a follow-up examination of that data not utilized specifically

in this thesis, a national average figure for cost-per-mile for automobiles can be applied to the figures on miles between the craft owner's home and slip rental site to achieve a more accurate figure than those provided by the craft owner on the questionnaire.

An additional area in which research can be carried out is relating expenditures made by the craft owners and the type of marina (commercial, municipal, private) at which they keep their craft. Again, the data has been collected through the questionnaire on expenditures, allowing for further analysis without additional data collection.

Another area that can be worked on with available data gathered by this study is to predict future expenditure patterns. With information on predicted expenditures, policy decisions can be made as to the extent that future marinas be developed, and existing marinas should be expanded to meet the demand for goods and services by boat owners. It would be advisable that a follow-up expenditure study be carried out to determine the fluctuation in recreational boating expenditures between boating seasons to help predict the reliability of projected future expenditures by boaters.

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Michigan Waterways Division. Interview with Mr. Keith Wilson and Mr. James Oakwood held on January 24, 1973.

Michigan State University. Interview with Dr. James Stapleton, Chairman of the Statistics Department, to determine the study sample size. Held June 13, 1973.

APPENDICES

APPENDIX A

MICHIGAN WATERWAYS DIVISION

LETTER OF INTRODUCTION

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

Stevens T. Mason Building
Lansing, Michigan 48926
A. GENE GAZLAY, Director

May 3, 1973

Serial No. 850-73
File No. A 12.5

TO WHOM IT MAY CONCERN:

The Michigan State Waterways Commission of the Department of Natural Resources is considering a marina complex in the St. Joseph-Benton Harbor area. The Commission has asked Michigan State University to prepare an economic analysis of such a project. An important aspect of this study is to contact marinas in the vicinity of the project being considered.

Mr. Tom Warner has been assigned by the University to make these contacts. Your cooperation in answering his questions would be greatly appreciated.

Sincerely yours,

Keith Wilson

Keith Wilson
Director

KW:jow

APPENDIX B

LETTER OF TRANSMITTAL AND EXPENDITURE QUESTIONNAIRE

MICHIGAN STATE UNIVERSITY EAST LANSING · MICHIGAN 48823

DEPARTMENT OF PARK AND RECREATION RESOURCES · NATURAL RESOURCES BUILDING

June, 1973

Dear Boatowner:

The Department of Park and Recreation Resources at Michigan State University is conducting a research project for the state of Michigan's Waterways Commission. The purpose of this project is to obtain information for the Commission to be used in developing future marinas which will better meet boater's needs. We feel that the best way of determining what boaters desire in future marinas is to contact as many boaters as possible and ask them to provide their preferences. Unfortunately, it is not feasible to contact every boater who uses Michigan marinas for this information, so we have been forced to select a representative sample of boaters for this purpose. You have been selected from a rapidly growing list of boaters to provide some information that will have a substantial impact on the future quality of boating in Michigan.

You will be receiving a questionnaire designed to obtain the answers the Waterways Commission needs to plan future marina facilities, in a few days. Since we are sending out only a limited number of these questionnaires, your cooperation in completing and returning the questionnaire is crucial since each of your responses will be multiplied to take into account the boaters we have not contacted for this information. All responses will, of course, be treated in strict confidence.

Upon receipt, the information you supply on the questionnaire will be coded for computer processing without identifying its source and then the questionnaire itself will be destroyed. From this point on all information will be completely anonymous.

We have worked diligently to compile a concise and straightforward questionnaire which will require a minimum of your time and effort to complete. In conclusion, we can not over emphasize the importance of receiving a completed questionnaire from you.

Sincerely yours,

Louis F. Twardzik
Professor and Chairman

Donald F. Holecek
Assistant Professor &
Principal Investigator

BOATING EXPENDITURE QUESTIONNAIRE

Dear Boat Owner:

This questionnaire, as indicated in the previously mailed letter of transmittal, has been sent to you to aid us in a study of extended marina site development for the State of Michigan's Waterways Commission. It is hoped that through your response, representative data on boating expenditures can be gathered: this information to be used in computing the type and extent of development at future marina sites.

All responses made by you on this questionnaire will remain strictly confidential, following rigid University policies.

To return the completed questionnaire, please use the stamped envelope that was sent with the questionnaire.

Recreation Research and Planning Unit
Michigan State University

FOR OFFICE USE

MARINA CODE [1] [2]

ID NO. [3] [4] [5]

CARD NO. [6] 1

1. [7]
2. [8]
3. [9]
4. [10]
5. [11]
6. [12]
7. [13]
8. [14] [15] [16] [17] [18] H [19] [20] M
9. [21]
10. [22]

CRAFT INFORMATION

1. Type of craft: (check one) 1_____Motor Cruiser 2_____Sailing Craft

2. Centerline length of craft: _____Feet _____Inches

3. Hull material: (check one) 1_____Wood 3_____Fiberglas
2_____Steel 4_____Aluminum
5_____Other

4. Number of engines: (check one) 1_____One 3_____One with auxiliary outboard engine
2_____Two 4_____Two with auxiliary outboard engine
5_____One auxiliary engine only

5. On-board over-night accomodations: (check the number your craft will accomodate)

1_____None	6_____Six
2_____Two	7_____Seven
3_____Three	8_____Eight
4_____Four	9_____Nine
5_____Five	10_____Ten
	11_____Over ten

6. Does your craft have a galley? (check one) 1_____Yes 2_____No

7. Does your craft have restroom facilities? (check one)
1_____Yes 2_____No

CRAFT OPERATIONS/RELATED TRIP INFORMATION

The term "slip rental site" in this questionnaire will refer to the marina or yacht club where you currently rent a seasonal slip for your craft, along with the surrounding city or town.

8. Distance between your home address and the marina location where your craft is kept during the boating season:
(complete both) _____Miles _____Estimated travel time

9. Where is your craft stored during the non-boating season?
(check appropriate answer) 1_____Home address
2_____"slip rental site"
3_____Boat yard or marina other than "slip rental site"
(If you checked number 3/name the site below)

_____
site name city state

10. Is your craft stored: (check one) 1_____Inside a building
2_____Outside

CRAFT OPERATIONS/RELATED TRIP INFORMATION

11. How often do you visit your craft while it is stored? _____Days

12. What percent of the visits to your stored craft is for:
1_____Maintenance on craft
2_____Security check

13. Is pre-launch maintenance performed on your craft at its storage location? (check one) 1_____Yes 2_____No (if no, list location where pre-launch maintenance is carried out)

_____
site name city state

14. What percent of the total pre-launch maintenance is done by: (complete both)
1_____You(including family and friends)
2_____Hired labor

15. How many days each boating season is your craft utilized? (exclude visits in which maintenance was the prime objective)
1. By you and your immediate family._____Cruising trips _____ Docked use
2. By relatives._____Cruising trips _____Docked use
3. By friends._____Cruising trips _____Docked use

16. Average length of time out of port/per cruising trip:
_____Days and/or Hours_____

17. Average number of persons on the craft per cruising trip:_____

18. While at the "slip rental site", how many meals are: (list in percentages)
1_____Prepared and eaten on the craft.
2_____Purchased carry-out meals eaten on the craft.
3_____Meals eaten at restaurants, snack shops, etc...

19. Approximately how long is your craft kept in the water during the boating season? _____Months and_____Days

20. What is the work breakdown for storage preparation? (list in percentages)
1_____Work done by you(family and friends included)
2_____Hired labor

CRAFT RELATED EXPENSES

Answer the following questions to the nearest dollar. If actual figures are not available, list your best possible estimate.

21. Pre-launch maintenance costs: (individual break down and total figure)

1.$_____Hull repair
2.$_____Radio equipment
3.$_____Shaft & Propeller
4.$_____Galley equipment
5.$_____Re-finish wood trim
6.$_____Engine repair
7.$_____Electrical systems
8.$_____Rudder
9.$_____Chrome fittings
10.$_____Masts
11.$_____Sails
12.$_____Riggings

Other maintenance costs(list below)
13.$_____/_____
14.$_____/_____

15.$_____TOTAL

22. What is the launching fee for your craft? $_____

23. Seasonal slip rental fee: $_____(Total cost)

24. Purchases of boating equipment/1972 season
(list amount spent for each item in the proper column)

LIST ON NEXT PAGE

FOR OFFICE USE

11. [ ] (23)
12. [ ] [ ] (24, 25) MAI
[ ] [ ] (26, 27) SEC
13. [ ] (28)

14. [ ] [ ] (29, 30) YOU
[ ] [ ] (31, 32) H.L
15. [ ] [ ] (33, 34)
[ ] [ ] (35, 36) YOU
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16. [ ] [ ] [ ] (49)
17. [ ] (50, 51, 52)
18. [ ] [ ] [ ] (54, 55)
[ ] [ ] (56, 57)
19. [ ] M [ ] D (58, 59, 60)
20. [ ] [ ] [ ] (62, 63, 64, 65)
21. [ ][ ][ ][(67, 68, 69, 7)
[ ] [ ][ ][(71, 72, 73)
[ ] [ ] [ ] (74, 75, 76)
[ ] [ ] [ ] (77, 78, 79)
[ ] [ ] [ ]

DUPLICATE COLS FROM CARD I

CARD [2] 7 8
21. CON'T[ ][ ] (10, 11, 12, 13, 14)
[ ][ ][ ][ ][ ]
(16, 17, 18, 19, 20)
[ ][ ][ ][ ][ ]
(22, 23, 24, 25, 26)
[ ][ ][ ][ ][ ]
(28, 29, 30, 31, 32)
[ ][ ][ ][ ][ ]
(34, 35, 36)
22. [ ] [ ] [ ]
(37, 38, 39)
23. [ ] [ ] [ ]

CRAFT RELATED EXPENSES

24. Purchases of boating equipment/1972 season/Con't:

ITEM	PURCHASE SITE "SLIP RENTAL SITE"	HOME ADDRESS	OTHER
1.Charting equip	$_____	$_____	$_____
2. Deck furniture	$_____	$_____	$_____
3.Extinguishers	$_____	$_____	$_____
4.Flags	$_____	$_____	$_____
5.Galley equip.	$_____	$_____	$_____
6.Life vests	$_____	$_____	$_____
7.Lights	$_____	$_____	$_____
8.Lines	$_____	$_____	$_____
9.Radio equip.	$_____	$_____	$_____
Other items: (list)			
10._____	$_____	$_____	$_____
11._____	$_____	$_____	$_____
12.TOTALS	$_____	$_____	$_____

25. Estimated seasonal expenditures on fuel and oil: $_____.

26. In-season maintenance costs (estimated total): (this figure to reflect expenditures for haul-outs and launching due to maintenance) $_____.

27. Cost for craft haul-out (end of season): $_____.

28. Storage preparation costs (estimated total): $_____.

29. Cost for off-season boat storage: $_____.

30. Effluent pump-out costs (seasonal expenditure): $_____.

31. What is your annual expenditure for boat insurance? $_____.

32. What was the cost of your craft? (total cost)
$_____Purchased new
$_____Purchased used

TRIP RELATED EXPENSES

33. Estimated travel expenditure to and from your "slip rental site": (per trip) $_____.

34. Average seasonal boating related food expenditures:

ITEM	LOCATION WHERE PURCHASED: PURCHASED AT HOME	PURCHASED AT SLIP RENTAL SITE	EN ROUTE	TOTALS
1. Groceries	$_____	$_____	$_____	$_____
2. Alcoholic beverages	$_____	$_____	$_____	$_____
3. Meals purchased at restaurants, snack shops, etc...		$_____	$_____	$_____

35. Seasonal expenditures for off-craft lodging (while enroute or at the "slip rental site")

1. For you and your immediate family	$_____ En route	$_____	"Slip rental site
2. invited quests	$_____ En route	$_____	"Slip rental site

FOR OFFICE USE

24/1.[40][41][42]
[43][44][45][46][47][48]
2.[49][50][51]
[52][53][54][55][56][57]
3.[58][59][60]
[61][62][63][64][65][66]
4.[67][68][69]
[70][71][72][73][74][75]

DUPLICATE COLS 1-5 FROM CARD I
CARD [3]

24/CON'T5[7][8][9]
[10][11][12][13][14][15]
6.[16][17][18]
[19][20][21][22][23][24]
7.[25][26][27]
[28][29][30][31][32][33]
8.[34][35][36]
[37][38][39][40][41][42]
9.[43][44][45]
[46][47][48][49][50][51]
10.[52][53][54]
[55][56][57][58][59][60]
11.[61][62][63]
[64][65][66][67][68][69]
12.[70][71][72]
[73][74][75][76][77][78]

DUPLICATE COLS 1-5 FROM CARD I
CARD[4]

25.[7][8][9][10]
26.[11][12][13][14]
27.[15][16][17]

FOR OFFICE USE

28.[18][19][20][21]
29.[22][23][24]
30.[25][26][27]
31.[28][29][30]

32.
[31][32][33][34][35][36]
[37][38][39][40][41][42]
33.[43][44][45]

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[52][53][54][55][56][57]
2[58][59][60][61][62][63]
[64][65][66][67][68][69]

3[70][71][72][73][74][75]
[76][77][78]

DUPLICATE COLS 1-5 FROM CARD I
CARD [5]

35.
[7][8][9][10][11][12]
[13][14][15][16][17][18]

TRIP RELATED EXPENSES

36. Recreational equipment expenditures: (1972-boating related)

ITEM	Purchased at home	Purchased at "slip rental site"
1.Fishing equipment	$_____	$_____
2.Water skiing equipment	$_____	$_____
3.Skin/SCUBA equipment	$_____	$_____
Other purchases (list)		
4._____	$_____	$_____
5._____	$_____	$_____
6.TOTALS	$_____	$_____

37. Expenditures for non-boating recreational activities while at the "slip rental site" (for your family during the boating season)

1.Golfing $_____ 4.Bowling $_____
2.Tennis $_____ 5.Spectator sports $_____
3.Movies $_____ 6._____ $_____
7._____ $_____ others (list)
8.TOTAL EXPENDITURE $_____

38. Seasonal clothing expenditures: (boating related)
(list amounts spent) 1.$_____Home address
2.$_____En route
3.$_____"Slip rental site"

39. Total seasonal laundry costs at the "slip rental site": $_____.

CRAFT OWNER INFORMATION

40. Age of craft owner: _____

41. Education level of craft owner/list grade or degree last completed: _____.

42. Occupation of craft owner/_____

43. Number of persons in your immediate family? _____.

44. Annual family income: (check one)

1._____Less than $10,000
2._____$10,001 to 12,500
3._____$12,501 to 15,000
4._____$15,001 to 17,500
5._____$17,501 to 20,000
6._____$20,001 to 22,000
7._____$22,001 to 25,000
8._____$25,001 to 27,500
9._____$27,501 to 30,000
10._____$30,001 to 32,500
11._____$32,501 to 35,000
12._____$35,001 to 37,500
13._____37,5001 to 40,000
14._____$40,001 to 42,500
15._____$42,501 to 45,000
16._____$45,001 to 47,500
17._____$47,501 to 50,000
18._____$50,001 and over

FOR OFFICE USE

36./1 [19][20][21][22][23][24]
2 [25][26][27][28][29][30]
3 [31][32][33][34][35][36]
4 [37][38][39][40][41][42]
5 [43][44][45][46][47][48]
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37.
1 [55][56][57]
2 [58][59][60]
3 [61][62][63]
4 [64][65][66]
5 [67][68][69]
6 [70][71][72]
7 [73][74][75]
8 [76][77][78]

DUPLICATE COLS 1-
FROM CARD I

CARD [6]

38./1 [7][8][9]
2 [10][11][12]
3 [13][14][15]
39. [16][17][18]
40. [19][20]
41. [21]
42. [22]
43. [23]
44. [24]

APPENDIX C

FOLLOW-UP LETTER OF TRANSMITTAL

AND "THANK YOU" POST CARD

MICHIGAN STATE UNIVERSITY east lansing • michigan 48824

department of park and recreation resources • natural resources building

August 17, 1973

Dear Boat Owner:

Several weeks ago a questionnaire dealing with boating expenditures was mailed through our research and planning office to your address. Due to any number of possible problems (away from home on vacation, did not receive the questionnaire, postal service not returning the questionnaire to us, etc...) it is vital for the research project and future improved marina development in the state that we send a follow-up copy of the questionnaire to you for your response.

Since the time of the original mailing a sizable number of questionnaires have been filled out and returned; but we must point out here that each boat owner who receives a questionnaire in this survey, due to the large boating population, is representing not only himself but a great many other boaters.

At your earliest convenience, please fill out the questionnaire as completely as possible and mail it to our office using the stamped return envelope. THANK YOU FOR YOUR COOPERATION!

Sincerely,

Donald F. Holecek
Assistant Professor &
Principal Investigator

FOLLOW-UP
"THANK YOU" POST CARD

Dept. of Park & Recreation Resources
Recreation Research & Planning Unit
131 Natural Resources Bldg.
Michigan State University
East Lansing, Mi. 48824

CRAFT OWNER'S
NAME AND ADDRESS

Dear Boat Owner. August 31, 1973

We would like to take this opportunity to thank you for cooperating with us in the Boating Expenditure survey. We have already received a large percentage of returns for the questionnaire and we feel that with this information, new and improved steps can be taken to develop future boating facilities in the State of Michigan.

THANKS AGAIN!

Sincerely,

Donald F. Holecek
Principal Investigator

P.S. If you have not returned your questionnaire at this time please do so at your earliest convenience. If you did not receive a questionnaire, please contact our office immediately so that one can be sent to your address!

APPENDIX D

LEAST SQUARES PLOT DIAGRAMS (CRAFT AND TRIP EXPENDITURES)

CRAFT EXPENDITURES

INTERCEPT (A) 638.86

SLOPE (B) 98.62

SIMPLE CORRELATION
.438

STD. ERR. ESTIMATE
1062.98

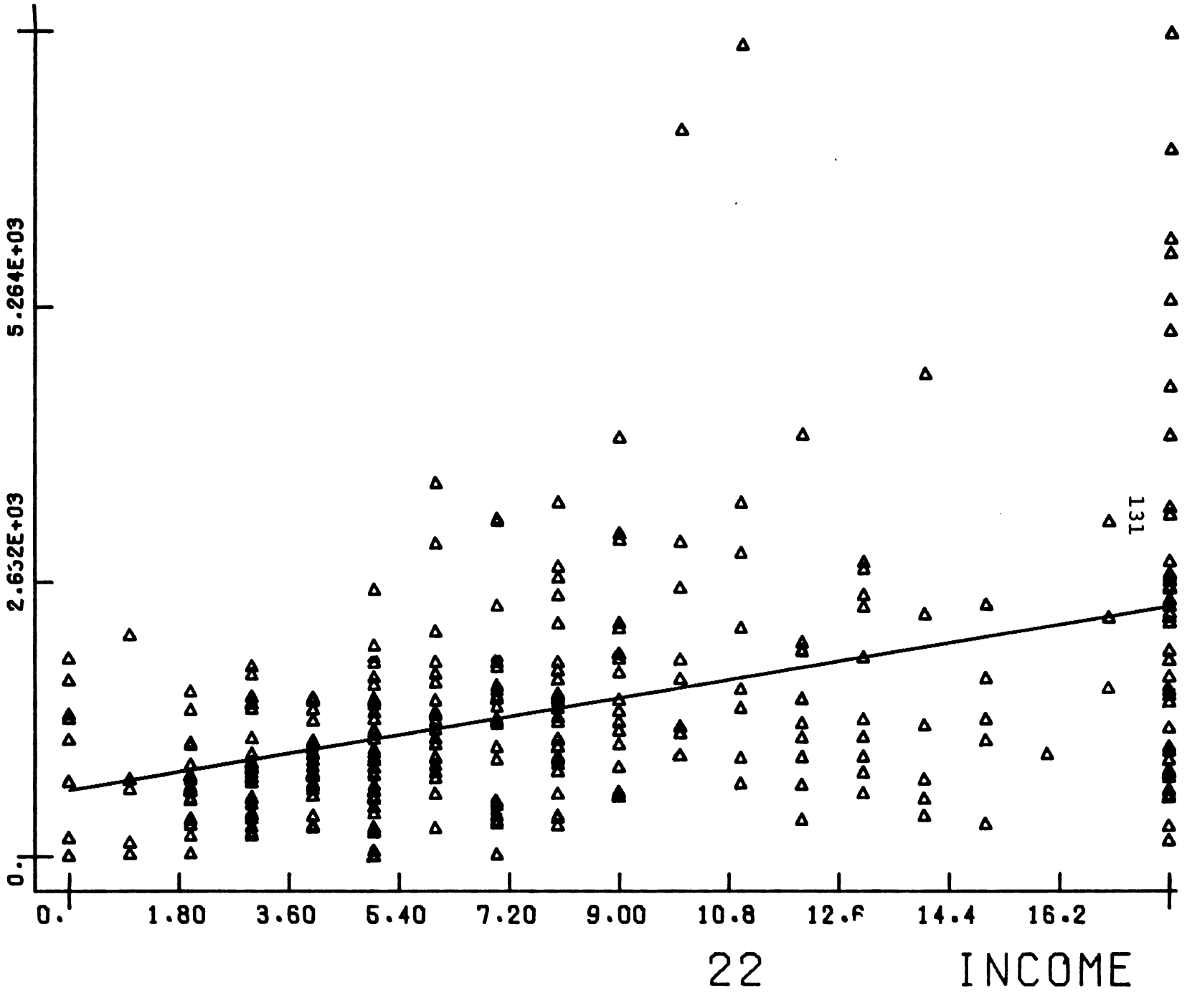
STD. ERR. SLOPE
11.48

T OF SLOPE
8.59

F OF SLOPE
73.75

DENOM. D.F.
310

SIG. OF F
0.0005



TRIP EXPENDITURES

INTERCEPT (A) 405.95

SLOPE (B) 26.43

SIMPLE CORRELATION
239

STD. ERR. ESTIMATE
563.17

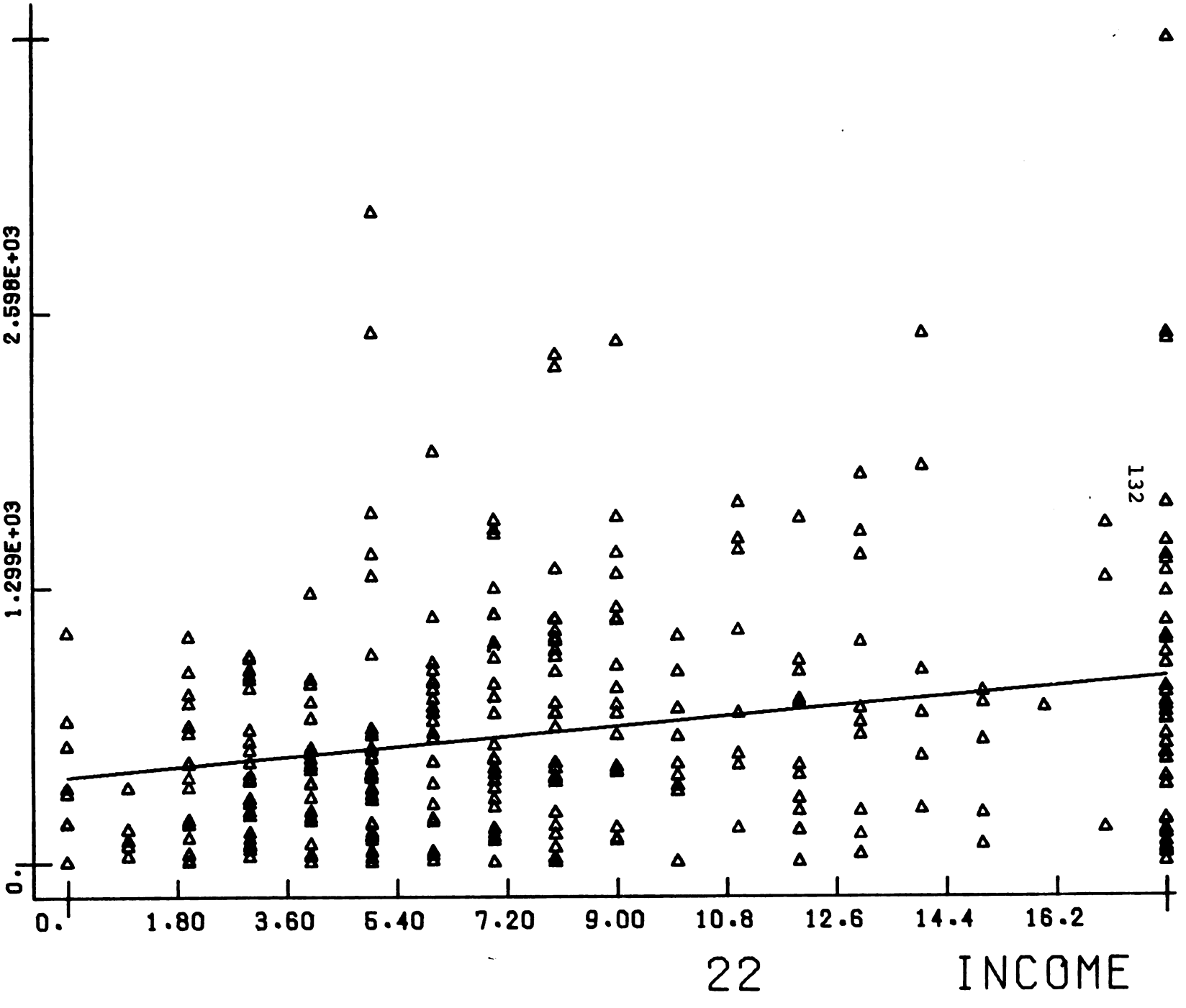
STD. ERR. SLOPE
.08

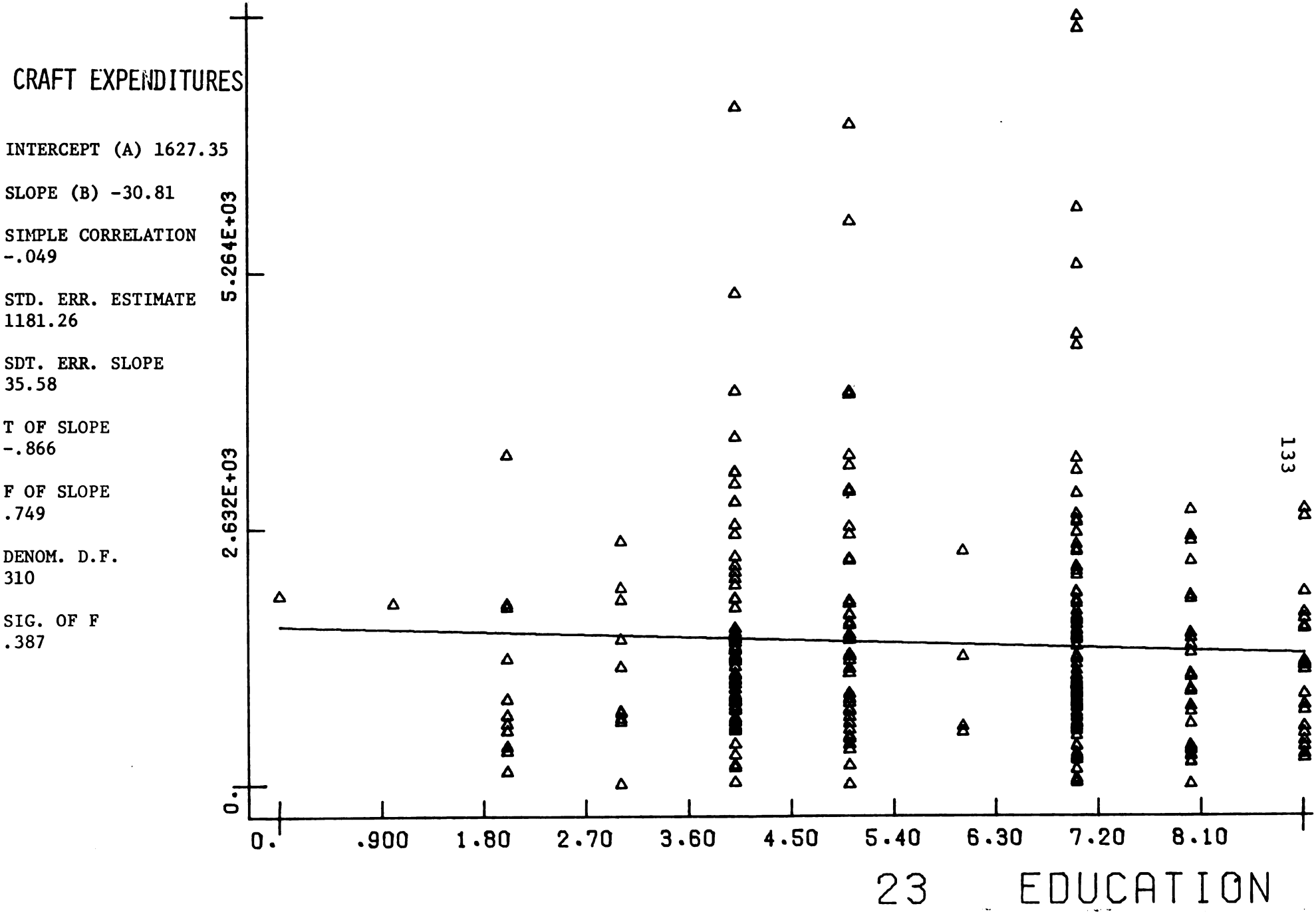
OF SLOPE
.34

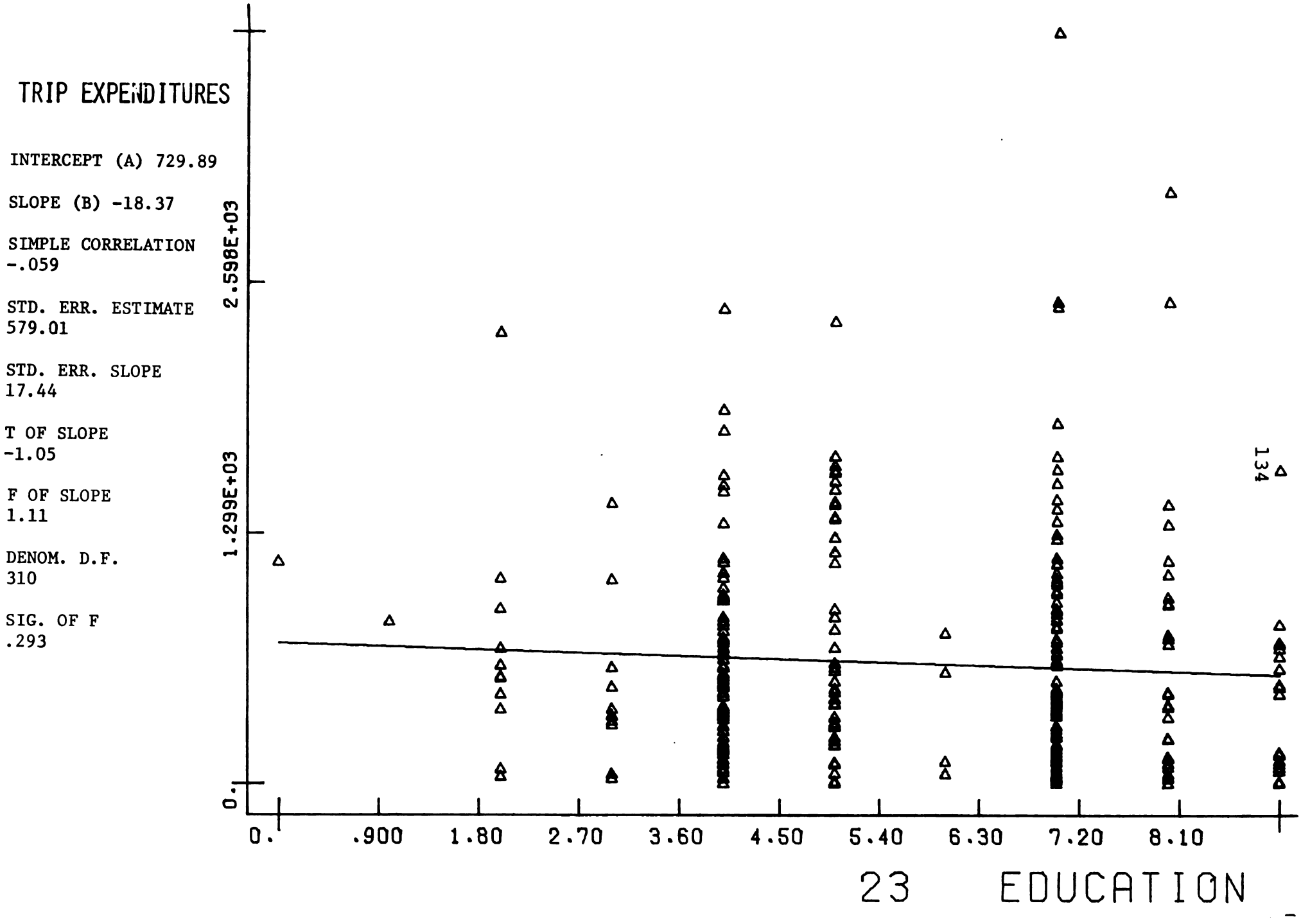
OF SLOPE
8.87

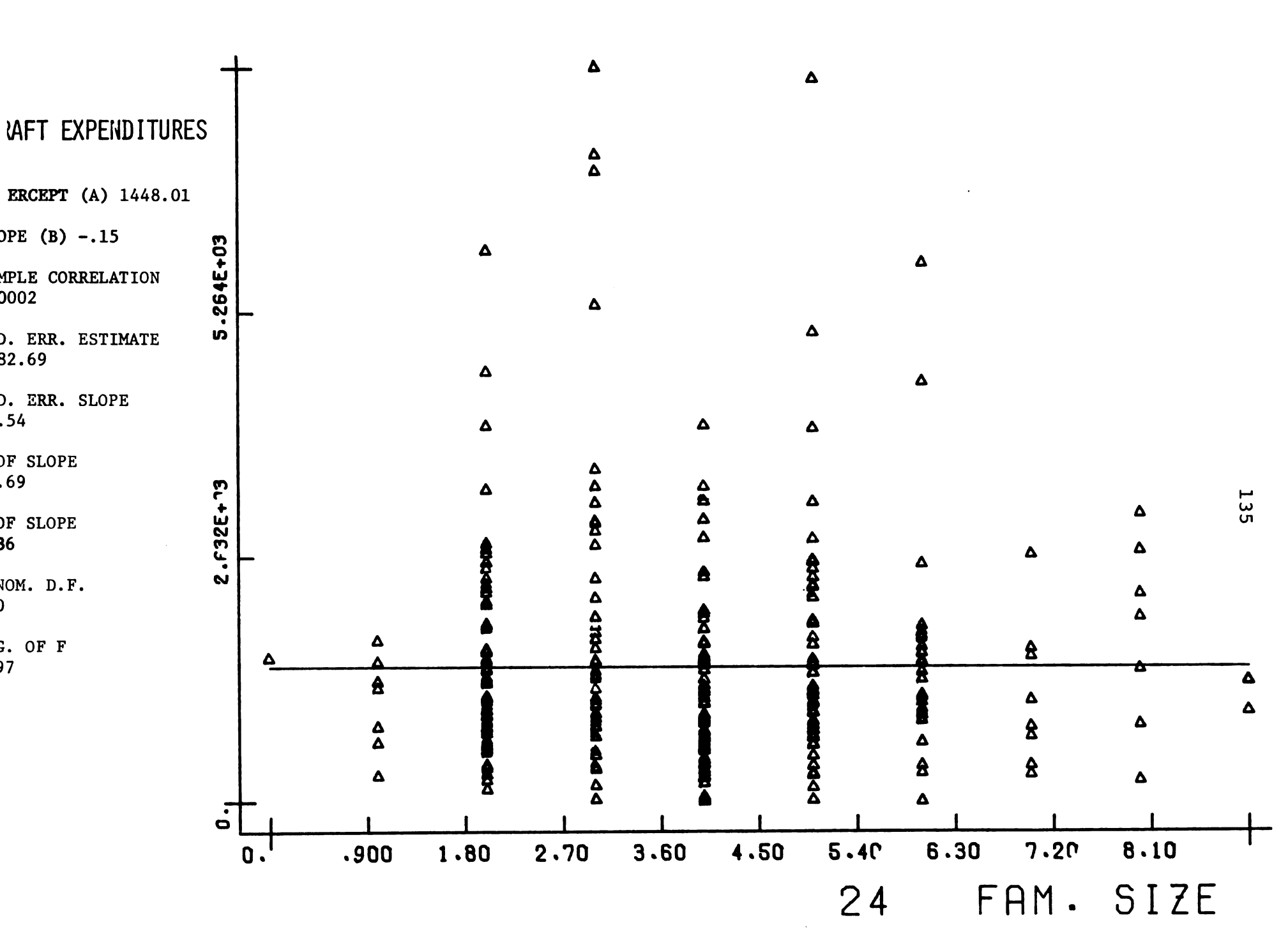
ENOM. D.F.
10

IG. OF F
.0005




CRAFT EXPENDITURES
INTERCEPT (A) 1627.35
SLOPE (B) -30.81
SIMPLE CORRELATION
-.049
STD. ERR. ESTIMATE
1181.26
SDT. ERR. SLOPE
35.58
T OF SLOPE
-.866
F OF SLOPE
.749
DENOM. D.F.
310
SIG. OF F
.387
5.264E+03
2.632E+03
0.
0.
.900
1.80
2.70
3.60
4.50
5.40
6.30
7.20
8.10
133
23 EDUCATION


TRIP EXPENDITURES
INTERCEPT (A) 729.89
SLOPE (B) -18.37
SIMPLE CORRELATION
-.059
STD. ERR. ESTIMATE
579.01
STD. ERR. SLOPE
17.44
T OF SLOPE
-1.05
F OF SLOPE
1.11
DENOM. D.F.
310
SIG. OF F
.293
2.598E+03
1.299E+03
0.
0.
.900
1.80
2.70
3.60
4.50
5.40
6.30
7.20
8.10
134
23 EDUCATION


AFT EXPENDITURES
ERCEPT (A) 1448.01
OPE (B) -.15
MPLE CORRELATION
0002
D. ERR. ESTIMATE
82.69
D. ERR. SLOPE
.54
OF SLOPE
.69
OF SLOPE
36
NOM. D.F.
0
G. OF F
97
5.264E+03
2.632E+03
0.
0.
.900
1.80
2.70
3.60
4.50
5.40
6.30
7.20
8.10
24 FAM. SIZE
135

RIP EXPENDITURES

NTERCEPT (A) 592.99

LOPE (B) 7.69

IMPLE CORRELATION
022

TD ERR. ESTIMATE
79.91

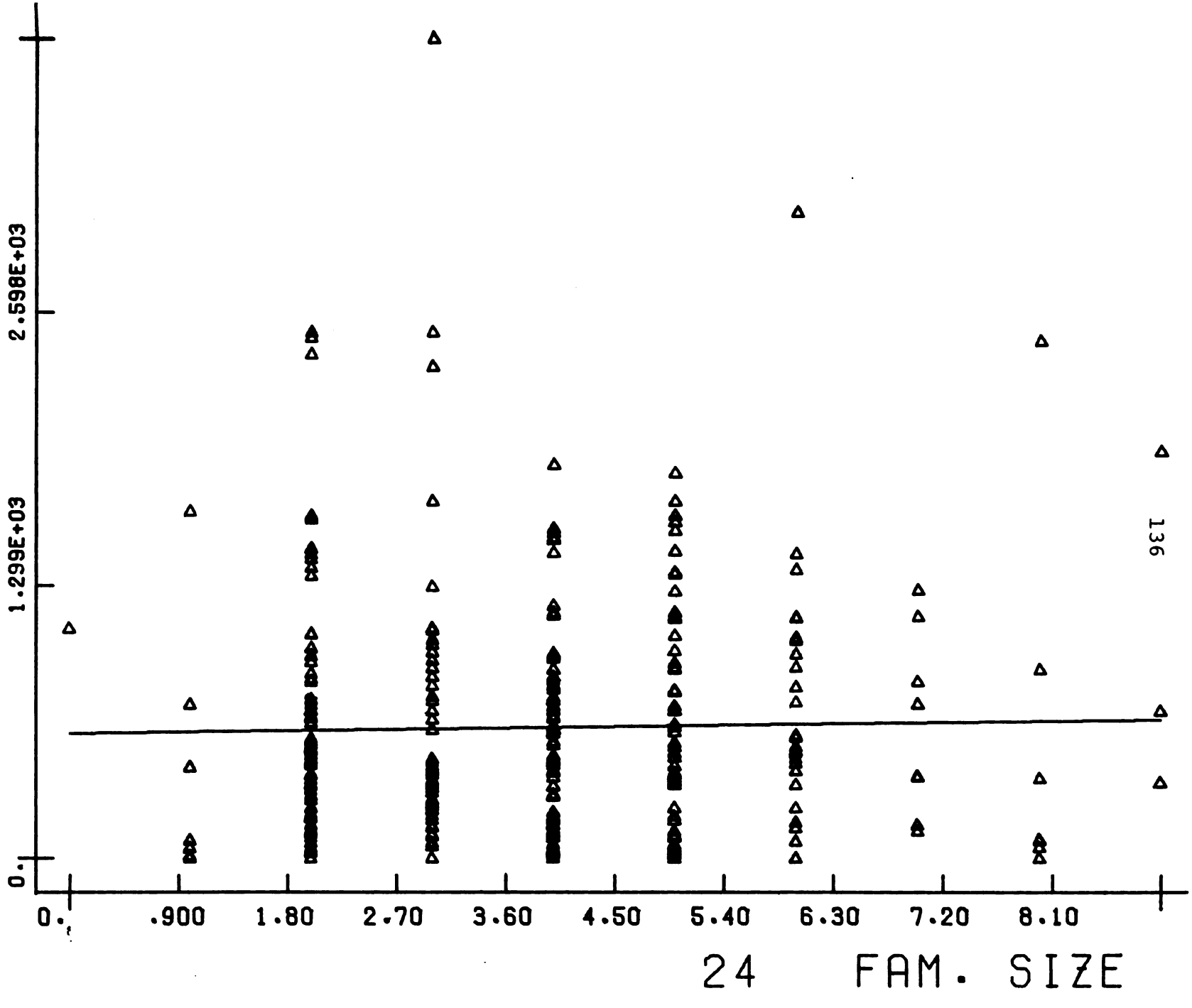
TD. ERR. SLOPE
.88

OF SLOPE
887

OF SLOPE
50

NOM. D.F.
0

G. OF F.
99



CRAFT EXPENDITURES

NTERCEPT (A) 969.57

LOPE (B) 10.23

IMPLE CORRELATION
086

TD. ERR. ESTIMATE
178.28

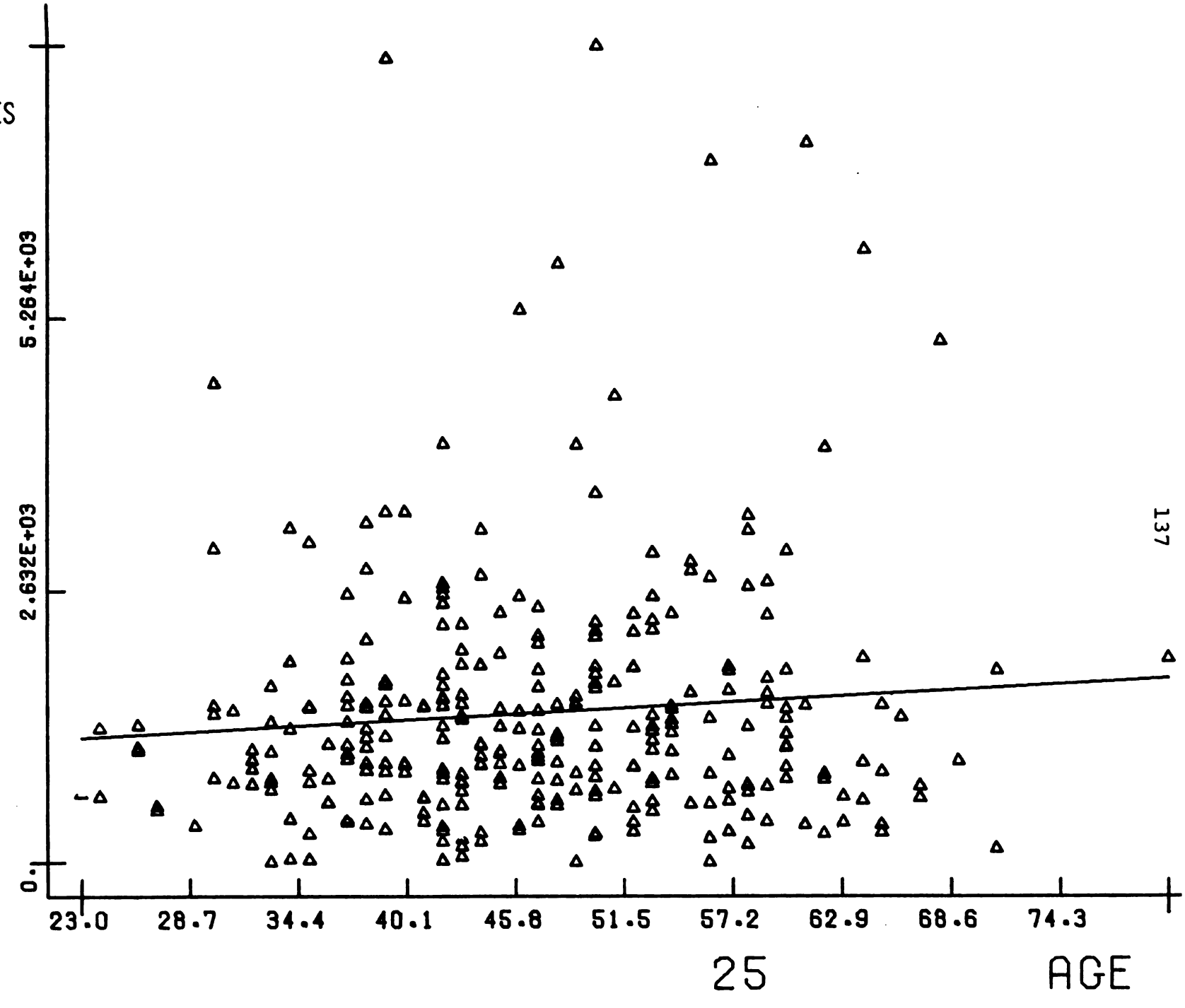
TD. ERR. SLOPE
.72

OF SLOPE
.52

OF SLOPE
.32

ENOM. D.F.
10

IG. OF F
129



TRIP EXPENDITURES

INTERCEPT (A) 816.39

SLOPE (B) -4.15

SIMPLE CORRELATION
-.071

STD. ERR. ESTIMATE
678.57

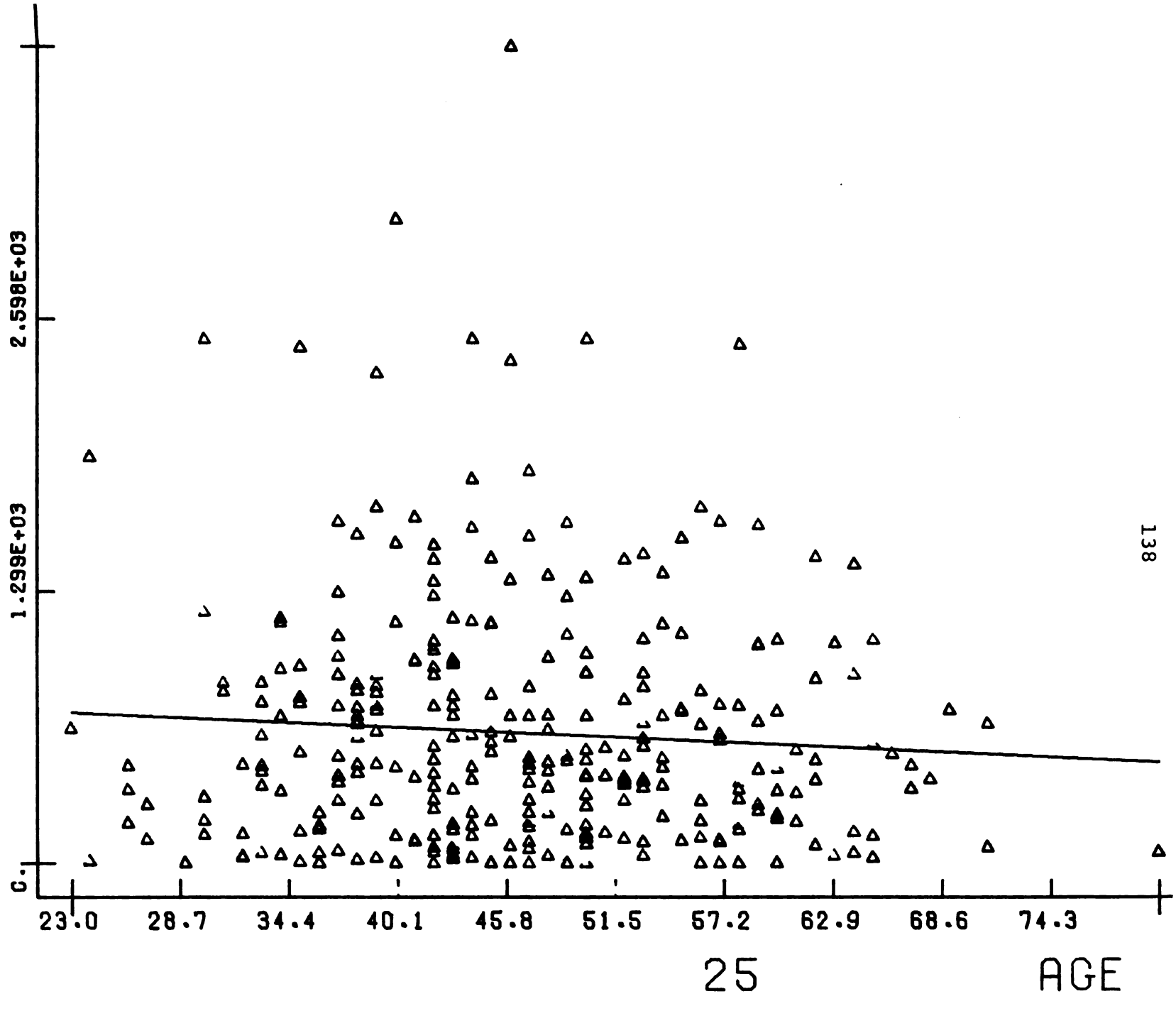
STD. ERR. SLOPE
3.30

T OF SLOPE
-1.26

F OF SLOPE
1.58

DENOM. D.F.
810

SIG. OF F.
.209



CRAFT EXPENDITURES

INTERCEPT (A) 1281.10

SLOPE (B) 81.98

SIMPLE CORRELATION
.112

ST.ERR. ESTIMATE
1175.31

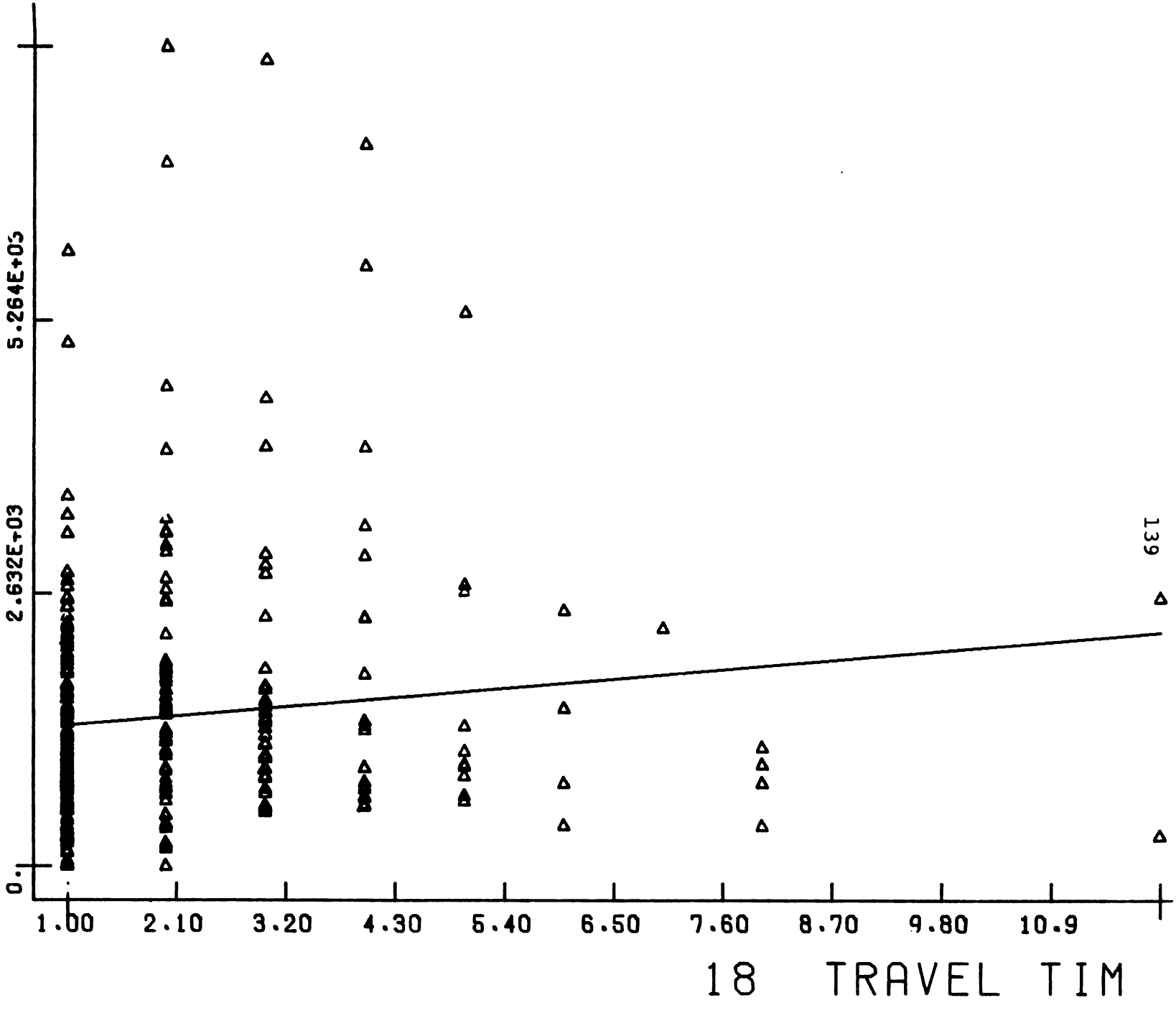
ST. ERR.SLOPE
41.48

T OF SLOPE
1.97

F OF SLOPE
3.91

DENOM. D.F.
310

SIG. OF F
049



TRIP EXPENDITURES

NTERCEPT (A) 532.53

LOPE (B) 44.40

IMPLE CORRELATION
123

TD. ERR. ESTIMATE
75.63

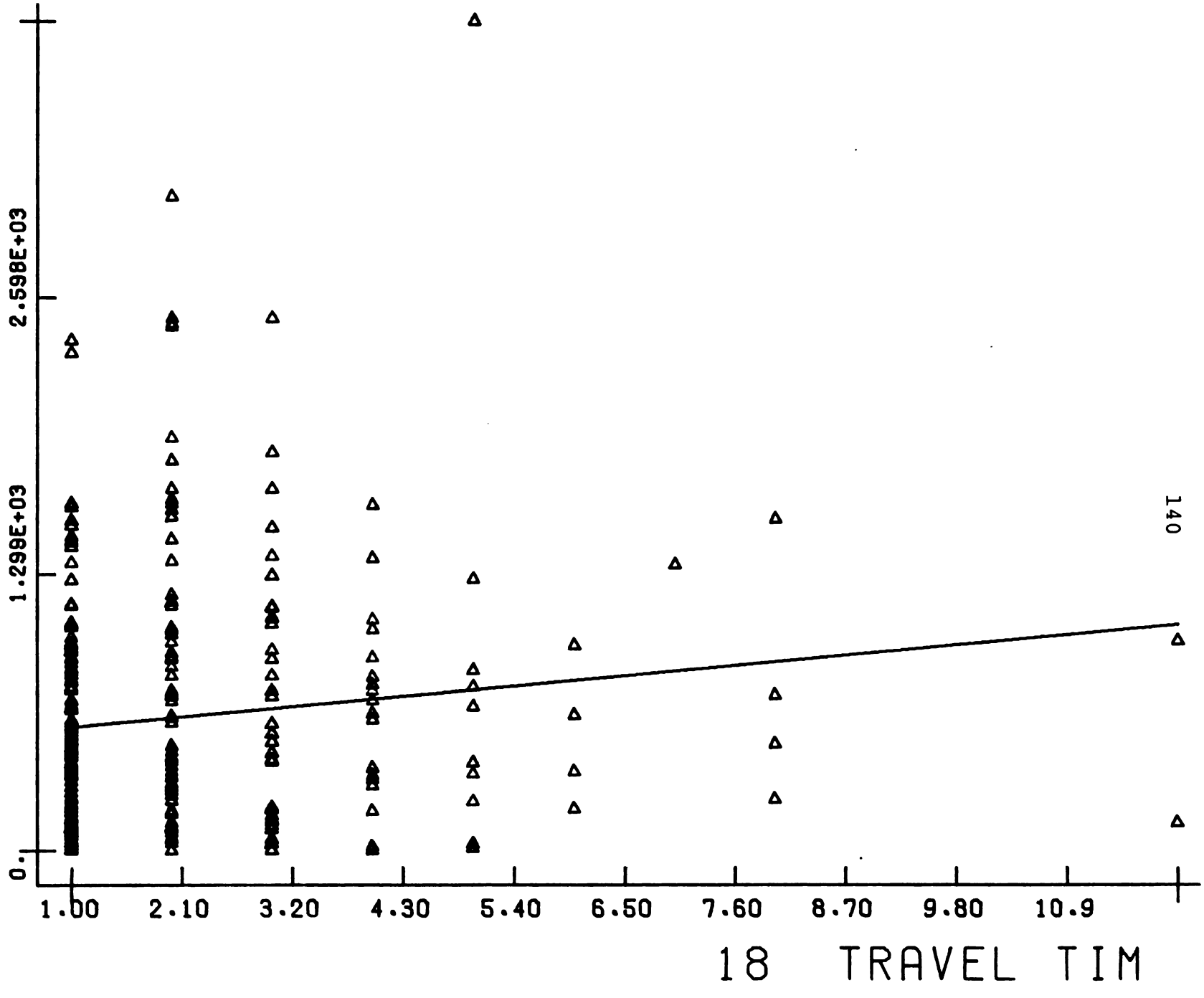
TD. ERR. SLOPE
0.32

OF SLOPE
19

OF SLOPE
78

ENOM. D.F.
0

G. OF F
30



CRAFT EXPENDITURES

NTERCEPT (A) 1058.17

LOPE (B) 6.88

IMPLE CORRELATION
:05

TD. ERR. ESTIMATE
157.57

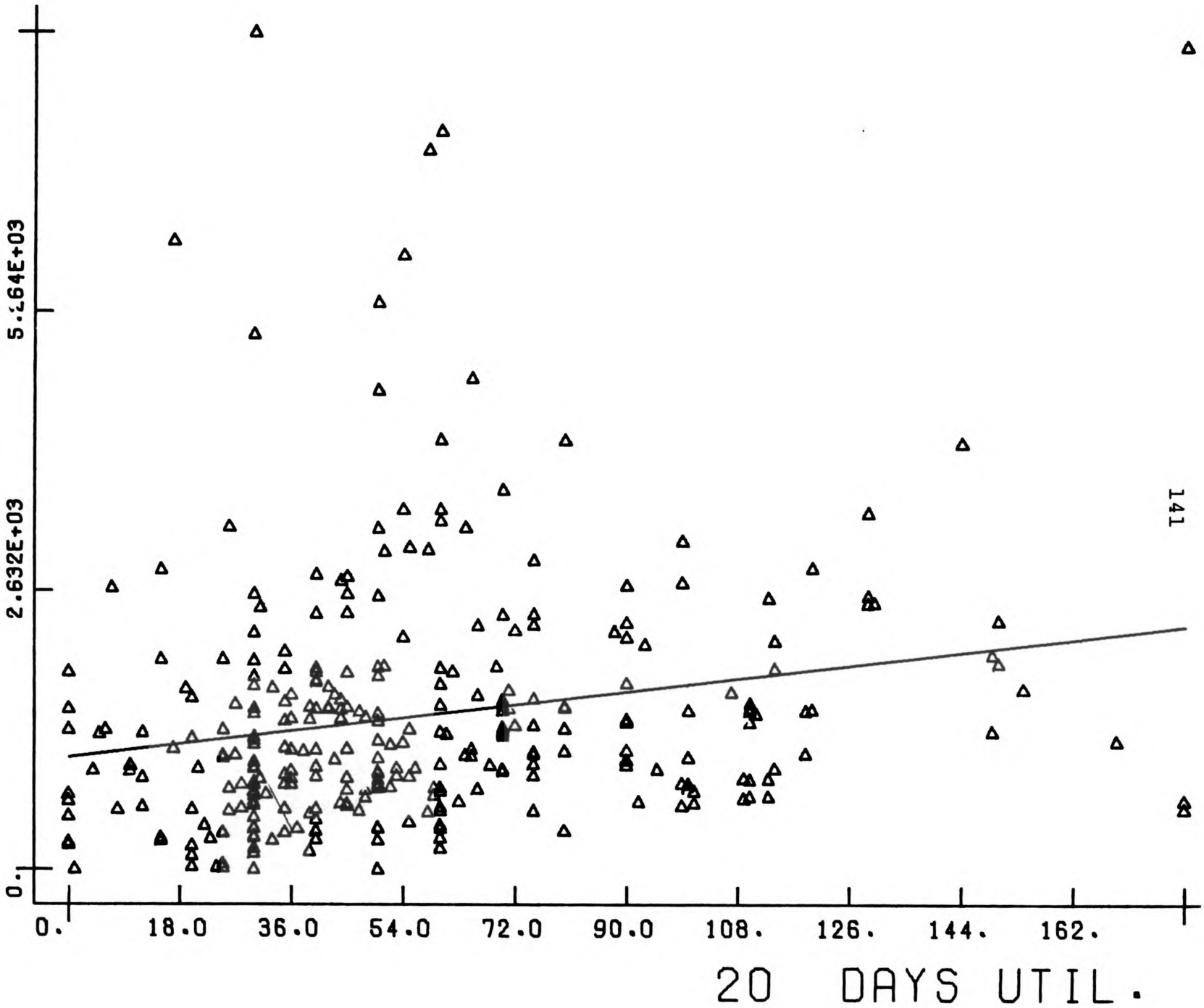
TD. ERR SLOPE
.86

OF SLOPE
69

OF SLOPE
3.60

NOM. D.F.
0

G. OF F
0005



RIP EXPENDITURES

TERCEPT (A) 332.46

OPE (B) 5.12

MPLE CORRELATION
12

D. ERR. ESTIMATE
1.18

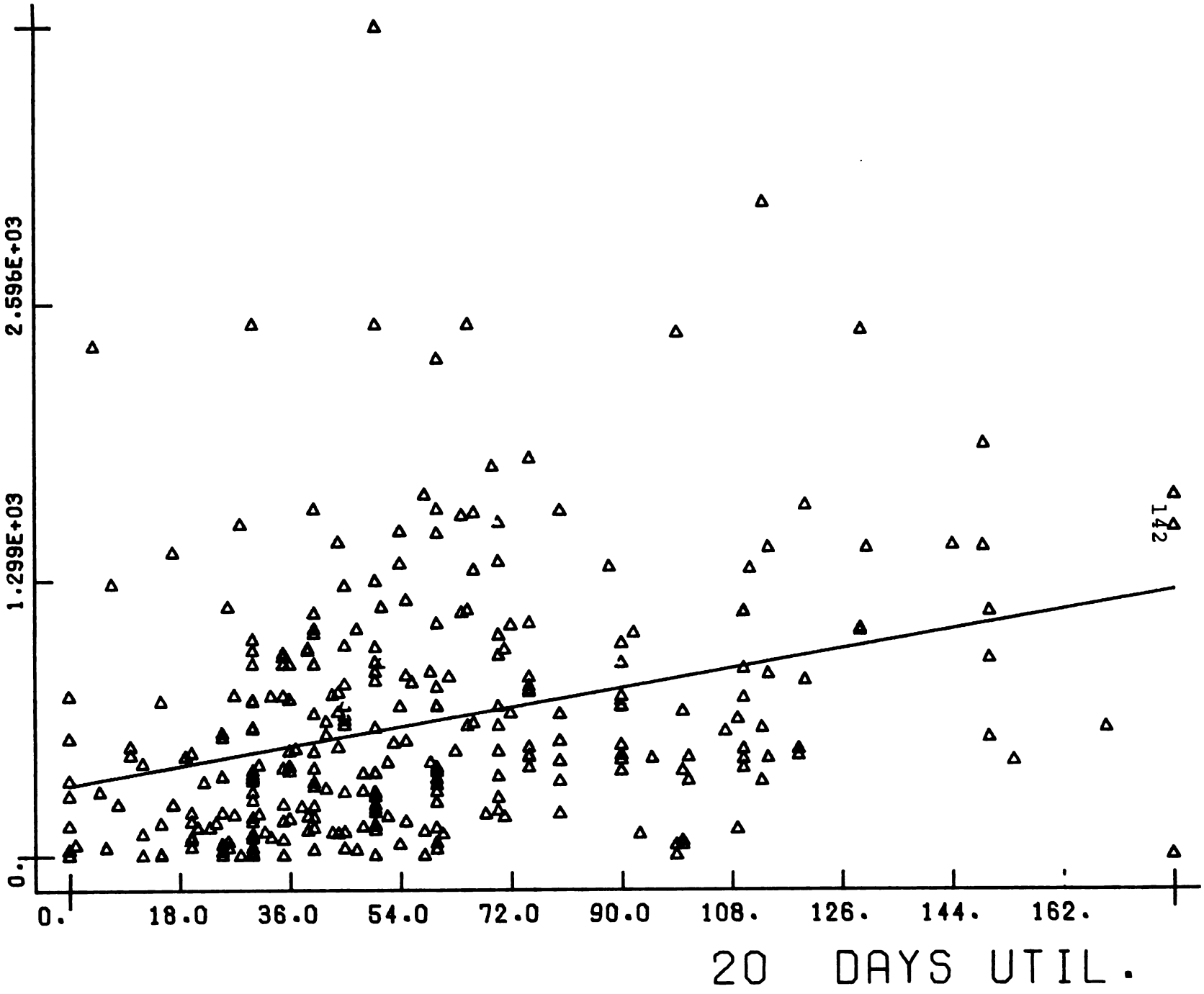
D. ERR. SLOPE
39

OF SLOPE
77

OF SLOPE
32

NOM. D.F.
0

E. OF F
0005



CRAFT EXPENDITURES

NTERCEPT (A) 692.73

LOPE (B) 4.53

IMPLE CORRELATION
138

TD. ERR. ESTIMATE
171.30

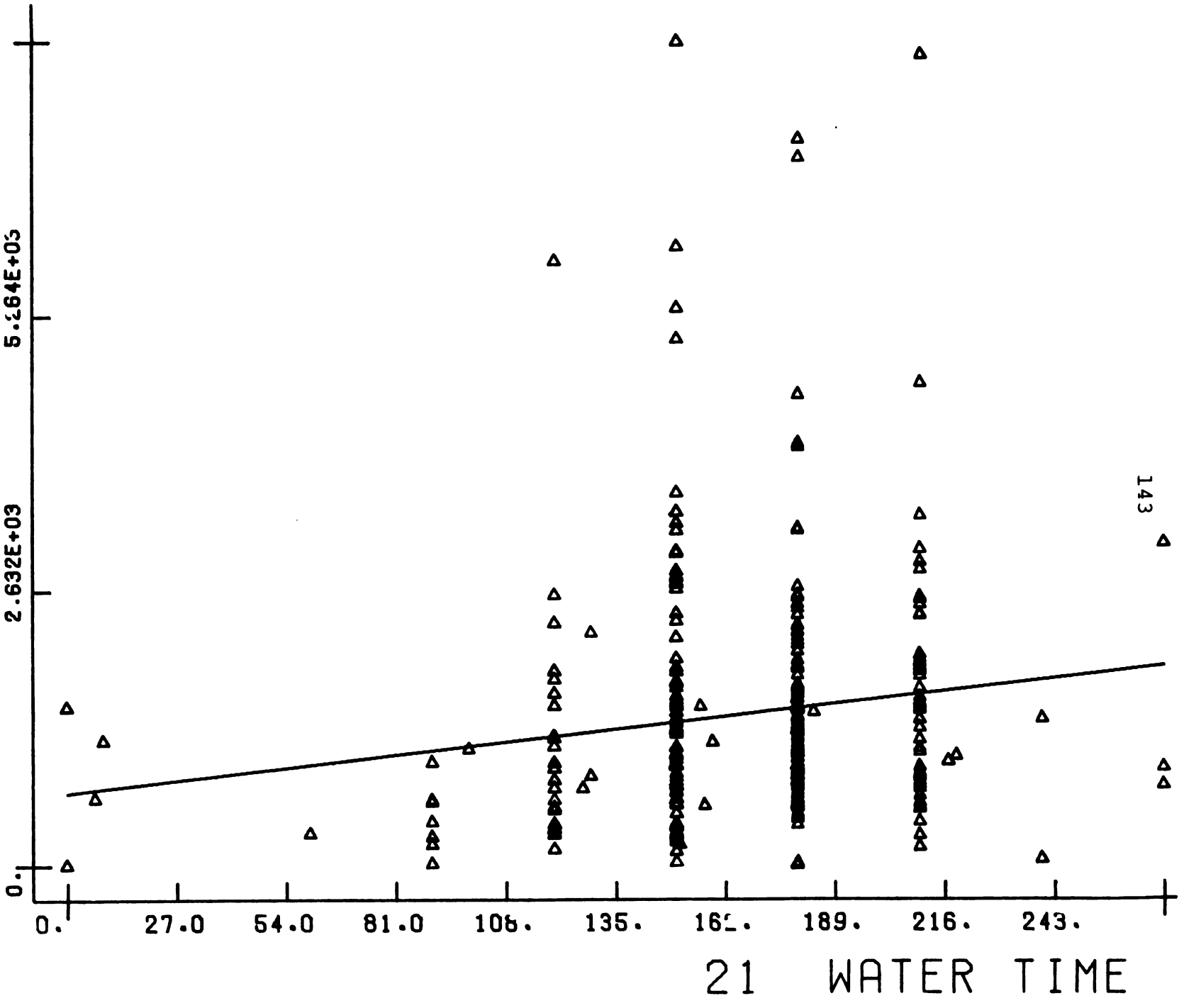
TD. ERR. SLOPE
.84

OF SLOPE
.46

OF SLOPE
.06

ENOM. D.F.
10

IG OF F
014



RIP EXPENDITURES

TERCEPT (A) -128.47

OPE (B) 4.51

MPLE CORRELATION
81

D. ERR. ESTIMATE
6.69

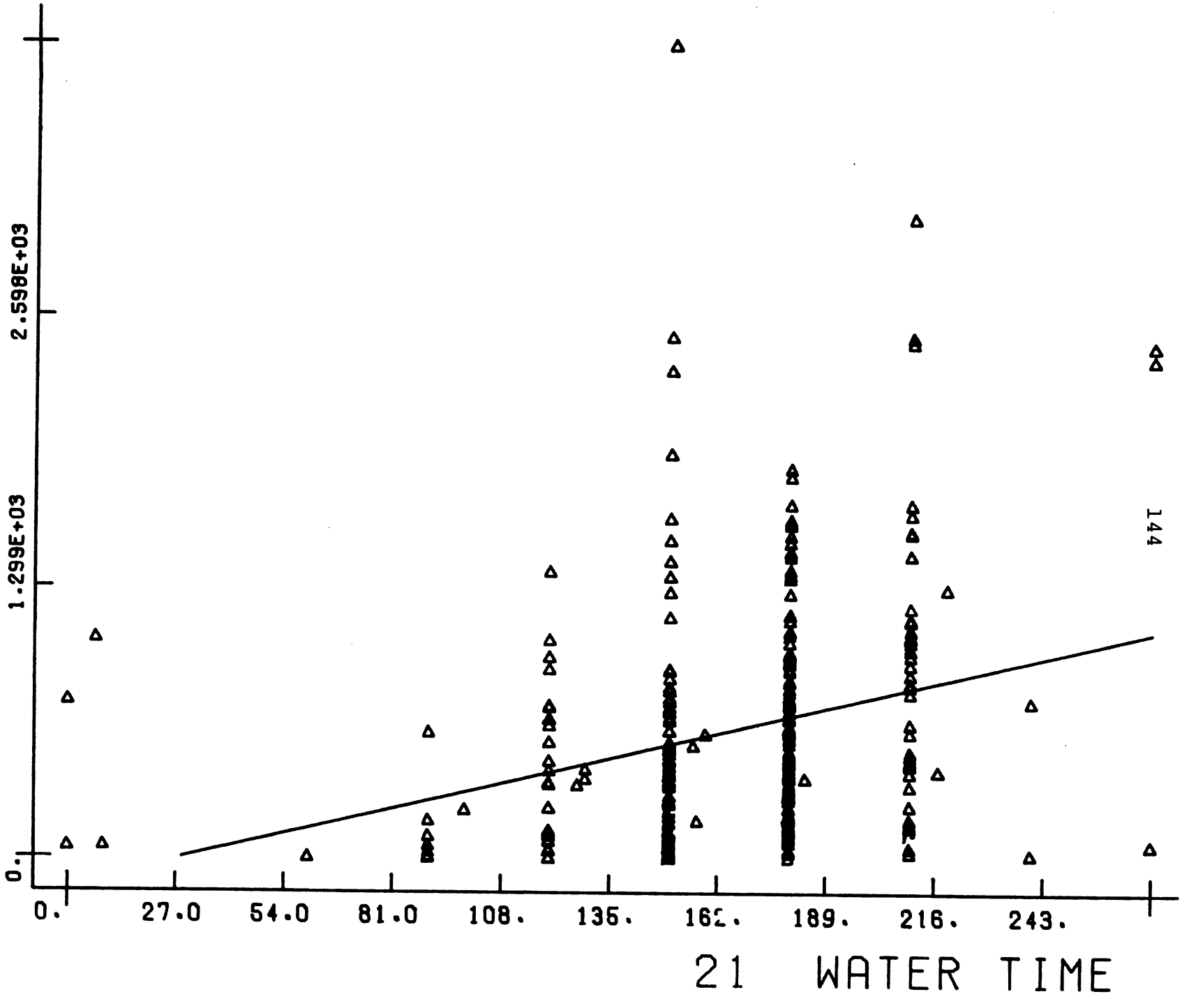
D. ERR. SLOPE
76

OF SLOPE
15

OF SLOPE
.56

NOM. D.F.
0

G. OF F
0005



CRAFT EXPENDITURES

NTERCEPT (A) 2546.36

LOPE (B) -14.64

IMPLE CORRELATION
.443

TD. ERR. ESTIMATE
060.06

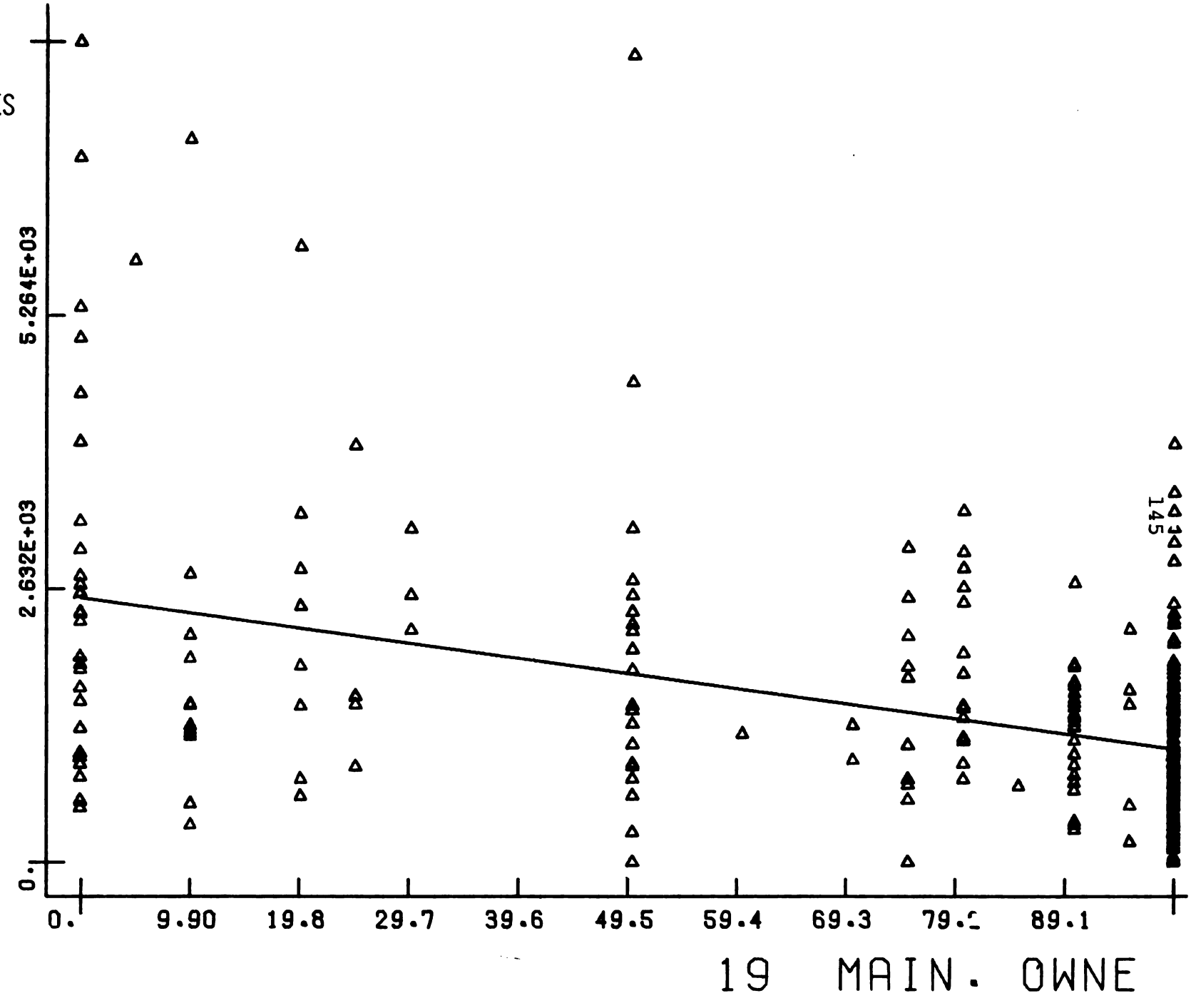
TD. ERR. SLOPE
.68

OF SLOPE
3.71

OF SLOPE
.87

NOM. D.F.
0

G. OF F
0005



TRIP EXPENDITURES

NTERCEPT (A) 791.91

LOPE (B) -2.26

IMPLE CORRELATION
.139

TD. ERR. ESTIMATE
74.39

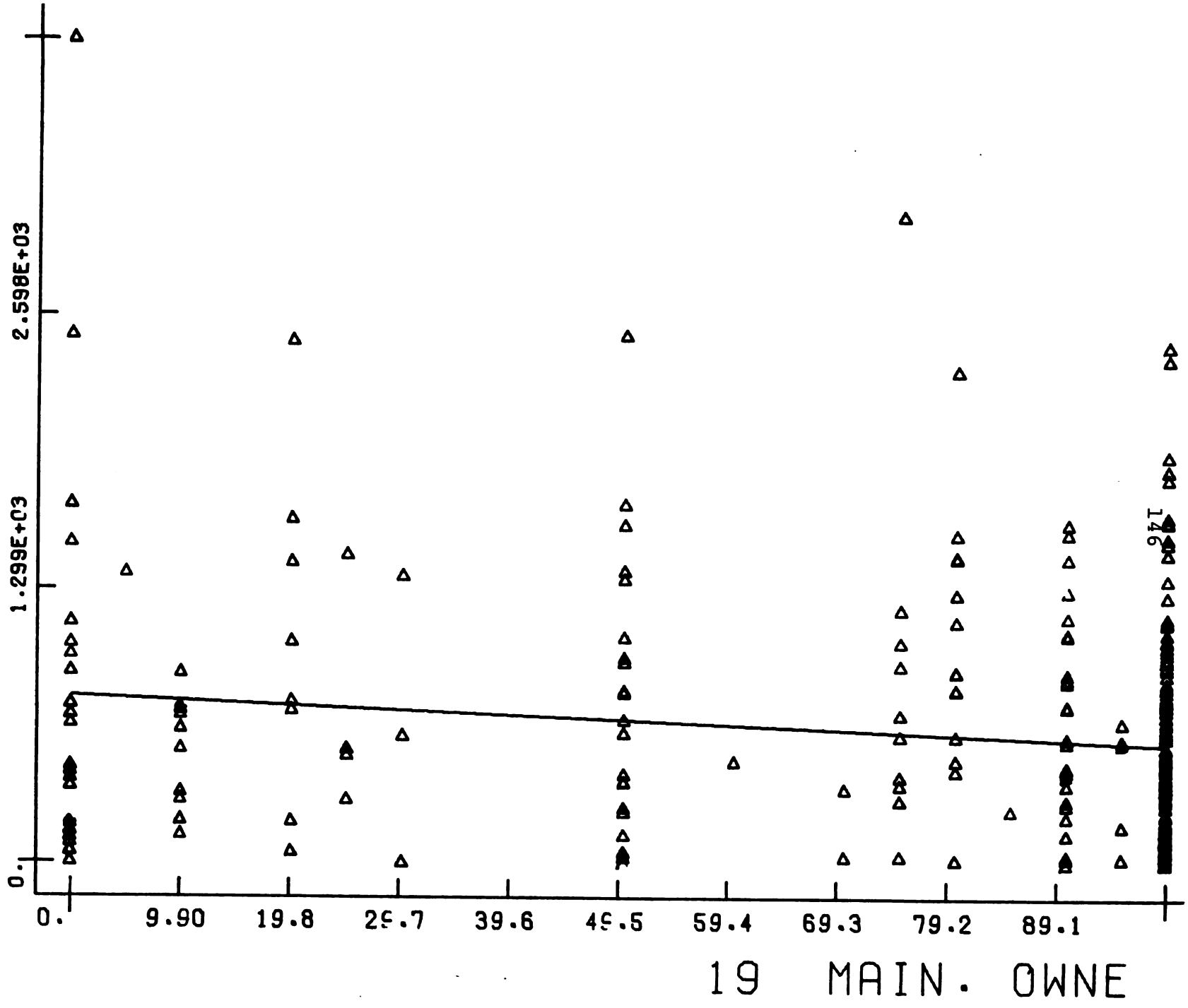
TD. ERR. SLOPE
010

OF SLOPE
2.48

OF SLOPE
.13

ENOM. D.F.
10

IG. OF F.
014



APPENDIX E

MULTIPLE REGRESSION ANALYSIS FIGURES

(TOTAL, CRAFT, TRIP EXPENDITURES)

TABLE E-1

MULTIPLE REGRESSION ANALYSIS
(Y_1 = Total Expenditures)

Equation:

$$Y_1 = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + b_9x_9 + b_{10}x_{10} + b_{11}x_{11}$$

Variable Designation:

Y_1 = Total expenditures
$*x_1$ = Craft type (motor/sail)
$*x_2$ = Craft length (20-30')
$*x_3$ = Craft length (30-45')
$*x_4$ = Craft length (45'+)
x_5 = Travel time (home to marina)
x_6 = Maintenance by owner
x_7 = Days craft utilized
x_8 = Income (family)
x_9 = Family size
x_{10} = Age of craft owner
x_{11} = Occupation of craft owner

Computed Values for Variables: (R^2 = .5023 / F = 30.28/ Sig. = .0005)

	Regression Coefficients	Std. Error	TB
a	2121		
x_1	-388	148	-2.6**
x_2	Value contained in constant due to singularity.*		
x_3	938	141	6.7**
x_4	3251	385	8.4**
x_5	80	41	1.9
x_6	-8	2	-3.4**
x_7	9	2	4.9**
x_8	63	15	4.1**
x_9	-76	40	-1.9
x_{10}	-14	7	-2.2**
x_{11}	-4	15	- .28

*Dummy variables. **Sig. @ .05.

TABLE E-2

MULTIPLE REGRESSION ANALYSIS
(Y_2 = Craft Related Expenditures)

Equation:

$$Y_2 = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + b_9x_9 + b_{10}x_{10} + b_{11}x_{11}$$

Variable Designation:

Y_2 = Craft expenditures
*x_1 = Craft type (motor/sail)
*x_2 = Craft length (20-30')
*x_3 = Craft length (30-45')
*x_4 = Craft length (45'+)
x_5 = Travel time (home to marina)
x_6 = Maintenance by owner
x_7 = Days craft utilized
x_8 = Income (family)
x_9 = Family size
x_{10} = Age of craft owner
x_{11} = Occupation of craft owner

Computed Values for Variables: (R^2 = .5528 / F = 30.09 / Sig. = .0005)

	Regression Coefficients	Std. Error	TB
a	1577		
x_1	-243	106	-2.3**
x_2	Value contained in constant due to singularity.*		
x_3	709	101	7.1**
x_4	2948	275	10.7**
x_5	38	29	1.3
x_6	-7	2	-4.7**
x_7	5	1	3.5**
x_8	44	11	4.0**
x_9	-57	29	-2.0**
x_{10}	-7	5	-1.5
x_{11}	1	11	.13

*Dummy variables. **Sig. @ .05.

TABLE E-3

MULTIPLE REGRESSION ANALYSIS
(Y_3 = Trip Related Expenditures)

Equation:

$$Y_3 = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_5x_6 + b_7x_7 + b_8x_8 + b_9x_9 + b_{10}x_{10} + b_{11}x_{11}$$

Variable Designation:

Y_3 = Trip expenditures
*x_1 = Craft type (motor/sail)
*x_2 = Craft length (20-30')
*x_3 = Craft length (30-45')
*x_4 = Craft length (45'+)
x_5 = Travel time (home to marina)
x_6 = Maintenance by owner
x_7 = Days craft utilized
x_8 = Income (family)
x_9 = Family size
x_{10} = Age of craft owner
x_{11} = Occupation of craft owner

Computed Values for Variables: (R^2 = .2385 / F = 9.39 / Sig. = .0005)

	Regression Coefficients	Std. Error	TB
a	544		
x_1	-145	68	-2.14**
x_2	Value contained in constant due to singularity.*		
x_3	229	64	3.56**
x_4	304	176	1.73
x_5	42	19	2.20**
x_6	-.16	1	-.16
x_7	5	.9	5.17**
x_8	19	7	2.69**
x_9	-18	18	-.99
x_{10}	-7	3	-2.36**
x_{11}	-6	7	-.82

*Dummy variables. **Sig. @ .05.