

LOAN COPY ONLY

MICHU-T-80-006

C. 2



CIRCULATING COPY
Sea Grant Depository

SHIPWRECK vs. NONSHIPWRECK SCUBA DIVERS: CHARACTERISTICS, BEHAVIOR, AND EXPENDITURE PATTERNS

by
Donald F. Holecek
and
Susan J. Lothrop

NATIONAL SEA GRANT DEPOSITORY
PELL LIBRARY BUILDING
URI, NARRAGANSETT BAY CAMPUS
NARRAGANSETT, RI 02882

December 1980
MICHU-SG-80-205

SHIPWRECK vs. NONSHIPWRECK
SCUBA DIVERS
CHARACTERISTICS, BEHAVIOR,
AND EXPENDITURE PATTERNS

Donald F. Holecek, Associate Professor
Department of Park and Recreation Resources
Michigan State University

and

Susan J. Lothrop, *Waterways Division*
Michigan Department of Natural Resources
and former Research Assistant,
Department of Park and Recreation Resources
Michigan State University

December 1980

Michigan Sea Grant
Publications Office
2200 Bonisteel Blvd.
Ann Arbor, Mi. 48109

This work was supported by
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
Grant # RCZ-10 to the
MICHIGAN SEA GRANT PROGRAM

Single copies free, bulk orders \$.70/ea.

INTRODUCTION

An estimated 3000 shipwrecks lie in Michigan's Great Lakes Waters.¹ The historical, anthropological, scientific and recreational values of these shipwrecks are not widely recognized. Although it is known that Michigan's shipwrecks attract recreational scuba divers,² little information relating to this use and these users is available. Thus, a survey of scuba divers who reside in the Michigan-Ohio-Indiana area was undertaken during the summer of 1978 to develop information relevant to planning for the future use of Michigan's shipwreck resources. In this report, respondents are grouped into shipwreck and nonshipwreck diving sub-populations and compared in terms of demographics, behavior, and expenditure patterns.³

SAMPLE POPULATION AND PROCEDURES

A listing of divers was obtained from List Management, Inc. of New York City. Taken primarily from National Association of Underwater Instructors (NAUI) information banks, this list consists of more than 11,000 divers residing in the three states who paid approximately \$100 for a scuba diving course, and invested an additional \$100 in diving equipment between

¹Warner, Thomas D. and Holecek, Donald F., "Underwater Parks: An Unexplored Recreation Frontier?", Parks and Recreation, 13 (November 1978) 20.

²Divers attitudes towards government regulation of underwater resources were also surveyed. That data can be found in: Holecek, Donald F. and Lethrop, Susan J. "Attitudes of a Scuba Diving Population Concerning Government Regulation of Underwater Resources." in-press, Michigan Sea Grant Technical Report.

³A scuba diver is one who uses portable breathing devices to enable free underwater swimming.

1972 and 1977. The divers on this list may not be representative of the general diving population. In comparison to the general diving populations, this list probably includes more individuals new to scuba diving who may be younger as well. Since addresses were not updated, this list tends to further favor inclusion of the newer diver because newer listings are more likely to be current than older ones, and/or divers who do not change their residence frequently.

From this list, 800 divers were selected randomly to receive a questionnaire. A greater proportion of divers was chosen from Michigan than from Ohio and Indiana. The survey was conducted over an eight week period during the summer of 1978. The first group of questionnaires was mailed on July 14, 1978. To counter possible bias (e.g., newer and/or younger scuba divers, and divers who do not change their residence often), respondents were asked to suggest other divers to whom questionnaires could be, and subsequently were, sent. On August 2, 1978, a reminder postcard was sent to divers who had not responded to the initial mailing, and on August 14, 1978, a second mailing of the questionnaire was made. Questionnaires received after September 8, 1978, were not included in the survey results because computer analysis was initiated on that date.

A total of 956 questionnaires were ultimately mailed (800 to individuals from the purchased list and 156 to divers identified by respondents) of which 836 (40%) were returned. An additional 200 questionnaires (21%) were returned unopened due to incorrect or nonforwardable address. Thus, out of the 756 presumably delivered questionnaires, 51% were returned by September 8, 1978.

As mentioned previously, there are three potential sources of bias in the results which follow. The list from which subjects were chosen may include a greater

number of younger, recently certified divers than does the general diving population. Second, 21% of the individuals selected to respond did not receive an opportunity to respond because their questionnaire was not deliverable. These potential respondents are likely more mobile than respondents and may differ in other respects as well. Finally, 49% of the divers who actually received the questionnaire did not return it, and it is conceivable that these divers could differ from responding divers.

DISCUSSION

In this report, "shipwreck divers" refers to those divers who dive shipwrecks in Michigan.⁴

Socio-Economic Characteristics

The state of residence for the sampled population is shown in Table 1. Because a greater proportion of the sample was drawn from Michigan divers, it is not surprising that the majority of the respondents are from Michigan. The information contained in Table 1 is useful in assessing the popularity of shipwreck diving. About one out of every four respondents (27%) classified themselves as shipwreck divers; however, shipwreck diving is not equally popular in each of the three states. About 40% of Michigan divers participate in shipwreck diving while only about 13% of the divers from Ohio and Indiana enjoy this activity. Proximity to shipwrecks rather than preference may account for the varying popularity of shipwreck diving from state to state.

⁴The questionnaire contained the following question: "Do you dive shipwrecks in Michigan?" All respondents answering this question in the affirmative were classified as shipwreck divers.

Table 1 State of Residence of Responding Divers*

State of Residence	All Respondents		Nonshipwreck Divers		Shipwreck Divers	
	Number	Percent	Number	Percent	Number	Percent
Michigan	197	53.7	117	43.9	80	80.0
Ohio	114	31.1	102	38.2	12	12.0
Indiana	31	8.4	25	9.3	6	6.0
Other states	25	6.8	23	8.6	2	2.0
TOTAL	367	100.0	267	100.0	100	100.0

*This table cannot be used to judge the relative popularity of diving between these states because proportionally more Michigan divers were selected to receive questionnaires.

The majority of divers are single (55%) males (86%) between 21 and 30 years of age (63%). These results are fairly consistent with the 1977 survey of divers conducted by Skin Diver magazine. Although slightly more of the respondents to the magazine survey were married, scuba diving was found to be dominated by single males between 25 and 35 years of age.

All but 4% of the responding divers completed high school; the majority (76.1%) had at least some college education (see Table 2). Skin Diver found that 72.2% of its respondents had some college education. Probably the most significant difference between shipwreck and nonshipwreck diver educational achievements is that 22.8% only of the former have earned a college degree while 40.6% of nonshipwreck divers have graduated from college.

Gross household income for the divers is reported in Table 3. The 1977 Skin Diver survey found the average household income of the responding divers to be \$23,220. Our respondents average household income was considerably less (\$17,687). The average gross income is slightly higher for shipwreck divers, but the difference between them and nonshipwreck divers is not statistically significant. A possible explanation for this difference in household incomes will be suggested by the information on occupation to be discussed next.

Table 4 presents information collected on the occupations of responding divers. More shipwreck than nonshipwreck divers are employed as managers, craftsmen and operatives. On the other hand, more nonshipwreck divers are students and/or are unemployed, and it may be the low earnings of these two groups which lower the average household income for the nonshipwreck diver group of respondents.

In summary, the responding divers overall appear to be fairly typical of the general population in this region with respect to income, occupation and education. Divers tend to be relatively young and predominately unmarried. There is little to distinguish the shipwreck

Table 2 Highest Level of Education Achieved by Responding Divers

Highest Level of Education	All Respondents Number Percent	Nonshipwreck Divers Number Percent	Shipwreck Divers Number Percent
Some High School	15 4.0	10 3.7	5 5.0
High School	74 19.9	48 17.7	26 25.7
Some College (includes associate degree)	150 40.4	103 38.0	47 46.5
B.A./B.S.	87 23.4	71 26.2	16 15.8
M.A./M.S.	31 8.3	26 9.6	5 5.0
Professional Degree (M.D., D.D.S., etc.)	12 3.2	10 3.7	2 2.0
Ph.D.	3 0.8	3 1.1	0 0.0
TOTAL	372 100.0	271 100.0	101 100.0

Table 3 Household Gross Income of Responding Divers

Household Gross Income	All Respondents Number Percent	Nonshipwreck Divers Number Percent	Shipwreck Divers Number Percent
\$ 0 - \$ 5,000	51 14.6	43 17.1	8 8.2
5,001 - 10,000	40 11.5	27 10.7	13 13.4
10,001 - 15,000	66 18.9	47 18.7	19 19.6
15,001 - 20,000	63 18.1	45 17.8	18 18.6
20,001 - 25,000	50 14.3	37 14.7	13 13.4
25,001 - 30,000	32 9.1	20 7.9	12 12.4
30,001 - 35,000	15 4.3	9 3.6	6 6.2
35,001 - 40,000	7 2.0	3 1.2	4 4.1
over 40,000	25 7.2	21 8.3	4 4.1
TOTAL	349 100.0	252 100.0	97 100.0
Average Household Income	\$17,687	\$17,322	\$18,635
Difference Between the Means		\$1,313	

Pretests did not indicate that a significant number of divers would have household gross incomes of over \$40,000. In order to derive an estimate for average household income it was necessary to arbitrarily establish an upper boundary for this income class. An upper limit of \$45,000 was selected.

Table 4 Occupation of Responding Divers

Job Category	All Respondents		Nonshipwreck Divers		Shipwreck Divers	
	Number	Percent	Number	Percent	Number	Percent
Professional/Technical	96	26.3	72	27.2	24	23.7
Managerial/Administrative	40	11.0	25	9.5	15	14.9
Sales/Clerical	24	6.6	17	6.5	7	6.9
Craftsmen	24	6.6	11	4.2	13	12.9
Operative/Laborer	58	15.9	39	14.7	19	18.8
Farmer	2	.5	2	.8	0	0.0
Service	37	10.1	28	10.6	9	8.9
Retired	1	.3	1	.4	0	0.0
Student	64	17.5	52	19.7	12	11.9
Self-Employed	7	1.9	5	1.9	2	2.0
Unemployed	12	3.3	12	4.5	0	0.0
TOTAL	365	100.0	264	100.0	101	100.0

from the nonshipwreck divers though the former tend less frequently to be college graduates and earn more than the latter.

General Diving Information

All respondents were asked a number of questions pertaining to four aspects of diving: 1) certification status 2) years of diving experience, 3) preference of maximum diving depth, and 4) level of investment in equipment. Their responses were coded and analyzed, and the results are presented below.

Table 5 indicates the level of certification achieved by the sample population. Although 98% of the responding divers are certified, shipwreck divers have achieved significantly higher levels of certification. This may indicate that shipwreck divers are more serious about their sport than their nonshipwreck diving counterparts.

Another important factor in assessing a divers overall competency is his or her years of diving experience. Years of diving experience reported by respondents are presented in Table 6. In general, divers have been involved in diving for an average of 5.3 years. Shipwreck divers have been diving for a longer period of time than nonshipwreck divers. The fact that nearly 60% of the respondents have been diving for less than four years is worth noting. This result suggests that: 1) the sport has grown very quickly in recent years, 2) diving is a sport exhibiting a high dropout rate, and/or 3) the sample included a disproportionate number of individuals new to the sport. As the bulk of respondents was drawn from a list of individuals who likely began diving between 1972 and 1977, it is logical to assume that this study's responding population is less experienced than the general diving population. However, there is considerable opinion* to

*When these results were presented and discussed during the Institute most of the audience present agreed that a high dropout rate was a characteristic of the sport.

Table 5 Highest Level of Diver Certification Achieved by Responding Divers

Level of Certification	<u>All Respondents</u> Number Percent	<u>Nonshipwreck Divers</u> Number Percent	<u>Shipwreck Divers</u> Number Percent
Skin Diver	5 1.4	5 1.9	0 0.0
Basic Scuba Diver	155 41.9	131 48.7	24 23.8
Openwater/Sport Diver	121 32.7	85 31.6	36 35.6
Advanced/Specialty Diver	41 11.1	29 10.8	12 11.9
Assistant Instructor	15 4.1	6 2.2	9 8.9
Instructor	21 5.6	7 2.6	14 13.9
Commercial/Professional Diver	12 3.2	6 2.2	6 5.9
TOTAL	370 100.0	269 100.0	101 100.0

Table 6 Number of Years Responding Divers Had Been Involved in Diving

Number of Years	<u>All Respondents</u>		<u>Nonshipwreck Divers</u>		<u>Shipwreck Divers</u>	
	Number	Percent	Number	Percent	Number	Percent
0 to 4 years	216	58.5	170	63.4	46	45.5
5 to 8 years	103	28.0	72	26.9	31	30.7
9 to 12 years	21	5.7	16	5.9	5	5.0
13 to 16 years	11	3.0	5	1.8	6	5.9
17 to 20 years	10	2.7	2	.8	8	7.9
21 to 24 years	2	.5	1	.4	1	1.0
25 to 29 years	5	1.4	1	.4	4	4.0
30 to 33 years	1	.2	1	.4	0	0.0
TOTAL	369	100.0	268	100.0	101	100.0
Average Number of years	5.3 years		4.6 years		7.3 years *	
Difference Between the Means			2.7 years *			

* Significant at $\alpha = .05$

support a high dropout rate for scuba diving, and it is not possible to eliminate rapid growth in participation as also being important. Unfortunately, it is not possible to determine scientifically the relative importance of each of these factors in explaining the relatively short duration of involvement in diving found for this group of divers.

Although shipwreck divers, on the average, prefer to dive to a slightly greater maximum depth (86.14 feet vs. 74.64 feet) than their nonshipwreck diving counterparts, the average difference is not statistically significant as can be seen in Table 7. Furthermore, the vast majority of responding divers prefer diving depths of less than 100 feet, but the percentage of shipwreck divers willing to dive deeper than 100 feet is more than double that for nonshipwreck divers.

Investment in diving equipment was selected as another factor worth investigating as it would be of value in assessing both the economic importance of the sport and possibly the relative interest in diving. As can be seen in Table 8, the shipwreck divers average investment in diving equipment is more than double the amount invested by the nonshipwreck diver. At least part of the difference can be explained by the fact that 89% of the shipwreck divers claim to own their diving equipment whereas only 55% of the nonshipwreck divers own their equipment. Thus, the nonshipwreck diver who owns his/her equipment probably has only slightly less invested in diving equipment than does the shipwreck diver.

A final area of interest involving financial investment in scuba diving involves chartering boats for diving trips. Asked if they had ever chartered a boat for a diving excursion, 71.3% of the shipwreck divers responded positively compared to only 38.2% of the nonshipwreck divers. In summary, the information given in Tables 5 through 8 indicates that shipwreck

Table 7 Maximum Depth to which Responding Divers Preferred to Dive

Maximum Depth	All Respondents Number Percent	Nonshipwreck Divers Number Percent	Shipwreck Divers Number Percent
0-50 feet	121 33.2	99 37.4	22 22.2
51-100 feet	184 50.6	133 50.1	51 51.5
101-150 feet	53 14.6	28 10.6	25 25.3
151-200 feet	3 .8	2 .8	1 1.0
over 200 feet	3 .8	3 1.1	- -
TOTAL	364 100.0	265 100.0	99 100.0

Average Maximum Depth

77.77 feet

74.64 feet

86.14 feet

Difference Between the Means

11.5 feet

Table 8 Level of Investment in Diving Equipment Reported by Responding Divers

Money Invested	All Respondents		Nonshipwreck Divers		Shipwreck Divers	
	Number	Percent	Number	Percent	Number	Percent
Less than \$50	48	12.8	47	17.2	1	1.0
\$ 51 - \$ 199	63	16.8	56	20.4	7	6.9
\$ 200 - \$ 350	39	10.4	35	12.8	4	4.0
\$ 351 - \$ 500	48	12.8	42	15.3	6	5.9
\$ 501 - \$ 650	34	9.1	23	8.4	11	10.9
\$ 651 - \$ 800	41	11.0	22	8.0	19	18.8
\$ 801 - \$ 950	14	3.7	9	3.3	5	5.0
\$ 951 - \$1,100	21	5.6	14	5.1	7	6.9
\$1,101 - \$1,250	11	2.9	6	2.2	5	5.0
\$1,251 - \$1,400	8	2.1	5	1.8	3	3.0
over \$1,400	48	12.8	15	5.5	33	32.6
TOTAL	375	100.0	274	100.0	101	100.0

Average Amount of Money Invested¹ \$580.41

\$448.50

\$938.28

Difference Between the Means

\$489.78*

¹Pretests, did not indicate that a significant number of divers would have invested more than \$1400 in diving equipment. In order to facilitate analysis, it was necessary to arbitrarily establish an upper limit of \$1550. The result of this limitation may make the amount of money invested in diving equipment somewhat conservative.

*Significant at $\alpha = .05$

divers have devoted more time to diving training, spent more years diving, and have invested more money in the sport than their nonshipwreck counterparts.

Shipwreck Diving Information

The 101 respondents involved in diving shipwrecks in Michigan were asked questions concerning 1) how they locate and gain access to wrecks, 2) where they prefer to dive shipwrecks in Michigan, and 3) their objectives in diving shipwrecks.

The majority of shipwreck divers (74.3%) have been diving shipwrecks for less than five years.* Most frequently, they rely on the knowledge of friends and relatives to locate shipwreck dive sites. Newsletters are the least used information source for locating shipwrecks, but this may be a result of a lack of newsletters pertaining to this subject. A complete tabulation of how divers acquire knowledge of shipwreck locations is presented in Table 9.

The information given in Table 10 shows how divers gain access to shipwrecks. Privately owned boats are used most often. Yet, "charter boat," "club's or friend's boat," and even simply "walking in" appear to be fairly popular means of accessing shipwrecks.

The respondents listed 177 favorite shipwreck dive sites; however, different divers frequently listed some of the same sites. Even after taking into account multiple listings of the same sites, the remaining list was far too long for convenient reporting. In order to facilitate reporting, sites were grouped into and reported by the Michigan Depart-

*Five years is likely a low estimate of years of involvement for the total shipwreck diving population because sampling in this study favored inclusion of respondents with fewer years of experience.

Table 9 How Divers who Dive Shipwrecks in Michigan Acquire Knowledge of Shipwreck Locations

Means of Location Shipwrecks	Number	Percent
Newsletters		
yes	7	6.9
no	94	93.1
Magazines		
yes	13	12.9
no	88	87.1
Friends/Relatives		
yes	67	66.3
no	34	33.7
Charter Boat Crews		
yes	37	36.6
no	64	63.4
Club Members		
yes	37	36.6
no	64	63.4
Local Residents in Divesite Area		
yes	40	39.6
no	61	60.4

Table 10 How Divers who Dive Shipwrecks in Michigan Gain Access to Shipwrecks

Means of Gaining Access to Shipwrecks	Number	Percent
Charter Boat		
yes	41	41.6
no	60	59.4
Personally Owned Boat		
yes	55	54.5
no	46	45.5
Clubs' or Friends' Boat		
yes	43	42.6
no	58	57.8
Walk In		
yes	37	36.6
no	64	63.4

ment of Natural Resources 17 standard recreation planning regions. Figure 1 illustrates the percentage of total responses each of these areas received.

It is interesting to compare these responses to some suggested underwater park sites (shaded areas of Figure 1 which are numbered 1-11)⁴. Since four prime⁵ suggested park sites (shaded areas #3, 4, 5, and 6 in Figure 1) are located off the coast of the two recreation planning regions in Michigan's northern lower peninsula, it was expected that the majority of divers would choose these regions as their favorite areas for diving shipwrecks. About 35% of the divers did choose these regions; however, 23% of the divers selected the southeastern most region, making it the single most popular area. A possible reason for this area's popularity is its proximity to the most populated area of the state. Shipwreck divers may dive this area more frequently than others reputed to be of higher quality simply because it is closer to their homes. Planners of underwater park-historical preserves need to examine this hypothesis in greater depth. If the time and financial savings involved in diving closer to home outweigh higher quality opportunities at greater distances, then development of park-preserves should proceed accordingly.

A final question posed to the shipwreck divers concerns their objectives in diving wrecks. Treasures, photography, and personal/professional research are priorities to some divers, but 86% agree that they dive wrecks just to look at them. A tabulation of divers objectives in diving shipwrecks is given in Table 11.

⁴"Shipwreck Lovers Push for Lake Parks", Detroit Free Press, December 1, 1975.

⁵Prime is used here in a subjective sense based upon the authors knowledge of the quality of shipwrecks present in these areas in comparison to other areas.

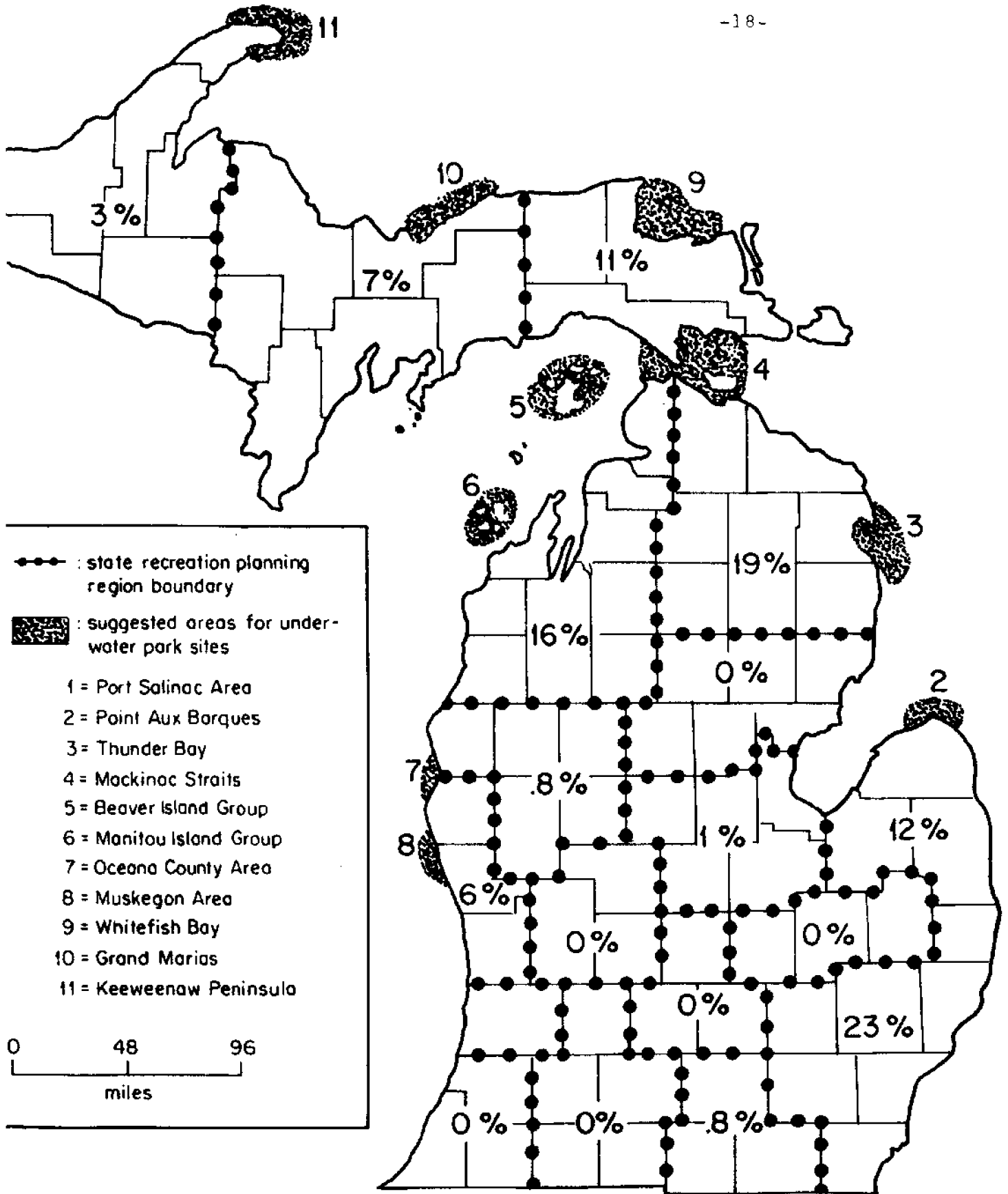


FIGURE 1. Sample Shipwreck Diver's Favorite Areas to Dive Wrecks in Michigan. Designation of areas based on State Recreation Planning Regions.

Table 11 Shipwreck Divers Objectives in Diving Shipwrecks

Objectives	Number	Percent
Treasure/Trophy		
yes	30	29.7
no	71	70.3
Photography		
yes	27	26.7
no	74	73.3
Personal/Professional Research		
yes	19	18.8
No	82	81.2
Just to look at the wrecks		
yes	36	35.1
no	15	14.9

Table 12 Responding Divers' Views on the Role of State Government in Controlling Shipwreck Salvage Activities

Extent of Government Control	All Respondents		Nonshipwreck Divers		Shipwreck Divers	
	Number selecting options	Percent	Number selecting options	Percent	Number selecting options	Percent
Minimal Control	41	14.0	31	14.2	10	13.7
Allow salvage of items that can only be taken without tools	32	11.0	20	9.1	12	16.4
Ban all salvage in selected areas	54	18.5	36	16.4	18	24.7
Require permits to salvage anything of historical or recreational value	108	37.0	90	41.1	18	24.7
Allow salvage without restriction or permit in all but designated areas	57	19.5	42	19.2	15	20.5
TOTAL	292	100.0	219	100.0	73	100.0

Expenditure Patterns

For some time now, planner-policymakers have recognized the value of systematic impact assessment of policy alternatives. The objective of such assessments is basically to identify those alternative uses of scarce resources which are most beneficial to society. Economic impact is usually included in these assessments. One objective of this study is to produce some data needed to begin to estimate the economic impact of the sport of scuba diving.

To ascertain spending patterns, divers who were actively involved in scuba diving in 1977, were asked to fill in a table pertaining to each individual diving trip. They were asked to give such information as: 1) list of trips taken in 1977, 2) number of people in each diving party, and 3) a breakdown of personal expenditures per trip.

Nonshipwreck divers and shipwreck divers differ significantly in most areas concerning general diving trip characteristics. As shown in Table 13, shipwreck divers took more trips in 1977, traveled a greater number of miles from home to the dive site area, and participated in the activity with a greater number of people in the diving party. Shipwreck divers also probably spent more nights away from home on diving trips.

The expenditure patterns of the two diving subpopulations are shown in Table 14. Shipwreck divers spend slightly more money annually in all but one category (hotel/motel accommodations); however, Figure 2 presents information which suggests that both groups of divers allocate their total annual expenditures similarly. Average per trip expenditures total \$103.38 for shipwreck divers and \$111.68 for nonshipwreck divers since both groups of divers spend about \$100 per trip this leads to the conclusion that differences in total expenditures result from the number of trips taken per year rather than expenditures per trip.

Table 13 1977 Diving Trip Information from Nonshipwreck Divers and Shipwreck Divers

	Number of Cases	Sample Means	Difference Between the Means
Number of Trips in 1977			
Nonshipwreck Divers	108	2.26	
Shipwreck Divers	60	3.68	1.42*
Total Number of Miles from Place of Residence to Divesite Area			
Nonshipwreck Divers	108	898.77	
Shipwreck Divers	60	1475.81	577.04*
Total Number of Nights Spent Away from Home on Diving Trips			
Nonshipwreck Divers	108	7	
Shipwreck Divers	60	11	4
Total Number of People in Diving Party			
Nonshipwreck Divers	108	12	
Shipwreck Divers	60	26	14*

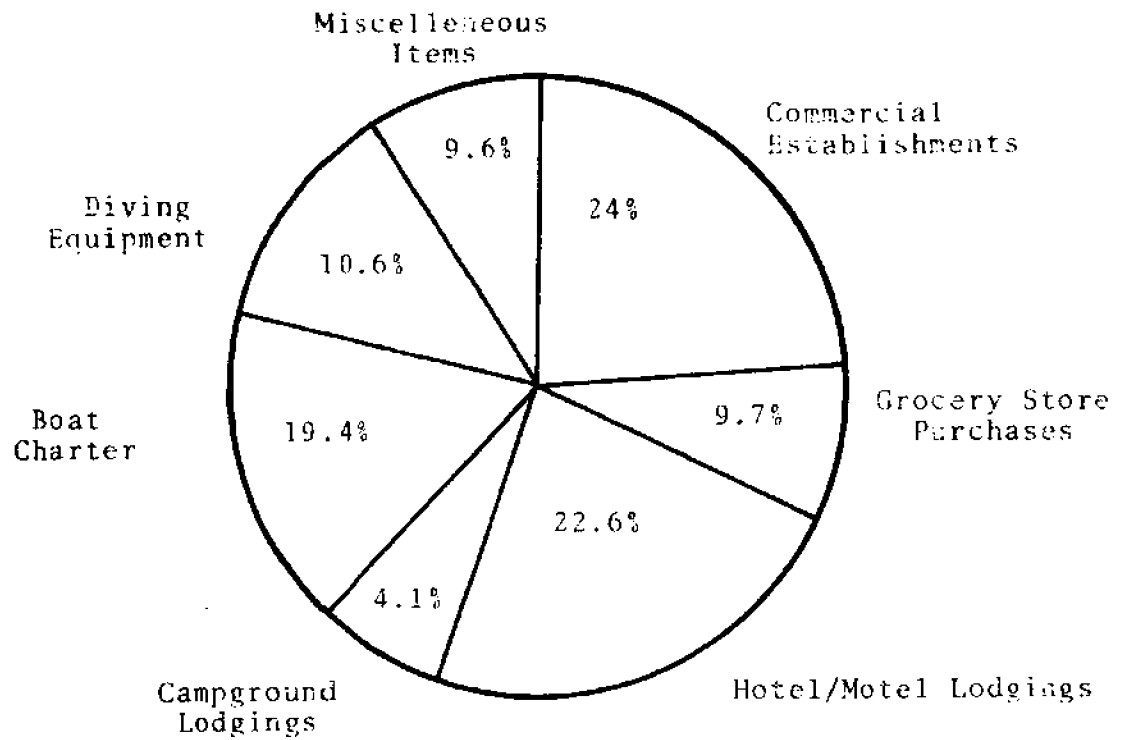
*Significant at $\alpha = .05$

Table 14 Expenditure Patterns of Nonshipwreck Divers and Shipwreck Divers During 1977 Diving Trips

	Number of Cases	Sample Means	Difference Between the Means
Total Expenditures in Commercial Establishments (restaurants, etc.)			
Nonshipwreck Divers	108	\$ 60.24	
Shipwreck Divers	60	\$103.16	\$42.92*
Total Expenditures in Grocery Store Purchase			
Nonshipwreck Divers	108	\$ 24.52	
Shipwreck Divers	60	\$ 46.65	\$22.13*
Total Expenditures in Hotel/Motel Lodgings			
Nonshipwreck Divers	108	\$ 56.93	
Shipwreck Divers	60	\$ 49.68	\$ 7.25
Total Expenditures in Campground Lodgings			
Nonshipwreck Divers	108	\$ 10.39	
Shipwreck Divers	70	\$ 18.01	\$ 7.62
Total Expenditures on Boat Charter			
Nonshipwreck Divers	108	\$ 48.96	
Shipwreck Divers	60	\$ 70.31	\$21.35
Total Expenditures on Diving Equipment			
Nonshipwreck Divers	108	\$ 26.73	
Shipwreck Divers	60	\$ 27.28	\$.55
Total Expenditures on Miscellaneous Items			
Nonshipwreck Divers	108	\$ 24.62	
Shipwreck Divers	60	\$ 65.37	\$40.75
<hr/>			
TOTAL EXPENDITURES ON DIVING TRIPS IN 1977			
Nonshipwreck Divers	108	\$252.39	
Shipwreck Divers	60	\$380.45	\$128.06

*Significant at $\alpha = .05$

Nonshipwreck Divers



Shipwreck Divers

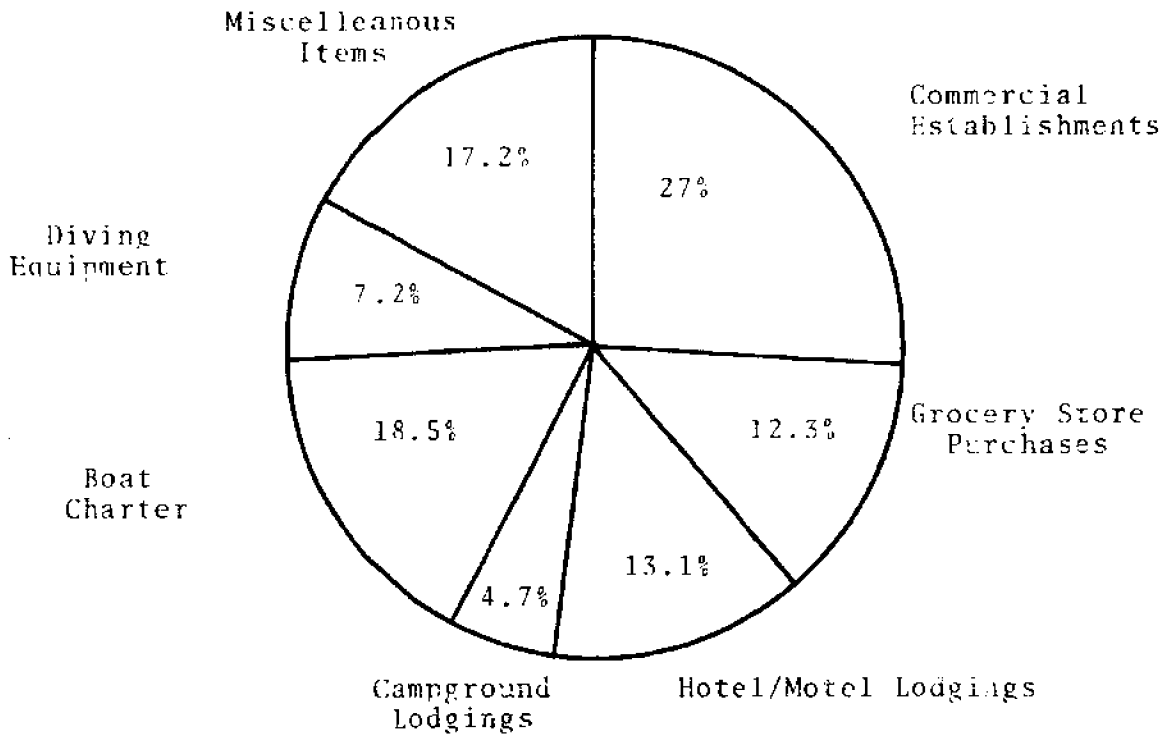


Figure 2 How the shipwreck and nonshipwreck diving subpopulations allocate their expenditures per diving trip.

It is now possible to develop some preliminary estimates of the economic impact of scuba diving which can be refined as more information becomes available. Listed below are some of the data and assumptions which will be used to generate these estimates.

1. The list from which the sample was taken contains 11,000 names. These divers reside in Michigan, northern Ohio and northern Indiana. This does not include all divers in these regions because it covers the period from 1972-77. If one is willing to assume that the number of divers on the list who do not dive in Michigan is equal to the number of divers not included on the list who do dive in Michigan is about equal, then 11,000 may be a reasonable estimate of Michigan's diving population's size.
2. The average respondent in this study reported an investment of \$600 in diving equipment.
3. The average respondent in this study reported spending about \$300 per year per diving trip.
4. The "rule of thumb" estimate of the multiplier impact of tourist expenditures is about 2.0.

Thus, the total investment in equipment by divers who dive in Michigan is \$6,000,000. The annual expenditure on dive trips for this population is \$3,300,000. Since these expenditures are made while divers are away from home, their impact falls upon the communities where they are spent, and these initial expenditures stimulate subsequent rounds of spending by those who receive them. Thus, the total impact of these expenditures is: $\$3,300,000$ in the first round \times 2.0 (the tourism multiplier) = $\$6,600,000$. It should be noted that some unknown

portion of diver trip expenditures are made outside Michigan. Although the above are but crude estimates, they do provide some insight into the magnitude of the economic impacts of scuba diving in Michigan.

CONCLUSIONS

This report is based on a survey which investigated the general characteristics, diving habits and expenditure patterns of scuba divers in the Michigan-Ohio-Indiana area.

Survey results indicate that scuba diving is dominated by young, well-educated males with fairly high levels of discretionary income. In general, the divers have been involved in this sport for approximately five years, prefer a diving depth of 75 feet, and have invested approximately \$500 in diving equipment. Shipwreck divers differ somewhat from these general patterns. They have been diving for a greater number of years, have achieved higher levels of certification and have invested slightly more money in diving equipment. The fact that shipwreck divers devote more time and invest more dollars in training and pursuing scuba diving further suggests a sincere interest in this particular aspect of the sport.

Finally, the data were interpreted to provide some preliminary estimates of the economic importance of scuba diving in Michigan. However, in order to present a complete picture, the archaeological, scientific and recreational value of shipwrecks must also be considered. No information concerning the cost side of the ledger has been included. Thus, there is need for considerably more data before a comprehensive economic analysis can be made. Only then, can we determine the best use for Michigan's shipwreck resources.

REFERENCES

McDiarmid, Hugh, "Shipwreck Lovers Push for Lake Parks." Detroit Free Press. December 1, 1975, Section A, p. 34.

Nie, Norman H., et. al. Statistical Package for the Social Sciences. 2nd edition. New York: McGraw-Hill Book Company, 1979.

Warner, Thomas D. and Holecek, Donald F., "Underwater Parks: An Unexplored Recreation Frontier?" Parks and Recreation, (November 1978).

"77 Reader Survey", Skin Diver Magazine, 1977.

Holecek, Donald F. and Lothrop, Susan J. "Attitudes of a Scuba Diving Population Concerning Government Regulation of Underwater Resources".

