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Recreation and the Zebra Mussel in Lake Erie, Ohio

Jorge V. Vilaplana  
and  
Leroy J. Hushak\*

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AGR. ECON. & RURAL SOC.  
RESEARCH CENTER  
110 EX. BLDG. 100  
COLUMBUS, OHIO 43210

The Ohio Sea Grant College Program  
Department of Agricultural Economics and Rural Sociology  
Ohio Agricultural Research and Development Center  
The Ohio State University

\* Graduate Research Associate and Professor.  
Department of Agricultural Economics and Rural Sociology  
The Ohio State University, Columbus, Ohio 43210.

## RECREATION AND THE ZEBRA MUSSEL IN LAKE ERIE, OHIO

The state of Ohio offers a wide variety of recreational opportunities to its residents and tourists. With several state parks, large amusement parks and many inland lakes and rivers, as well as a long shore along Lake Erie, recreationists find choices to satisfy almost all tastes.

Ohio's Lake Erie coastal areas support a range of recreational activities. Fishing, pleasure boating, swimming and sightseeing are among the many water-based attractions. These attractions, along with amusement parks, new and improved shopping areas, and parks, represent the core of the region's growing tourism industry.

For the past few years, increasing concern about the potential impact on recreational activities and other water-based industries of a non-native species called the zebra mussel has motivated researchers to take a closer look at the mussel. Inadvertently introduced to the Great Lakes in the mid-eighties, the zebra mussel reproduces very rapidly and has few natural enemies in the local ecosystem. Although ducks and some fish species feed on the zebra mussel, their impact on the mussel population is very small.

In addition to disrupting the food chain and destroying spawning habitats, the zebra mussel will attach to anything, causing damage to boats, water intakes, and other aquatic structures. These characteristics portray the zebra mussel as a potential threat to Ohio's north coast economy, despite a beneficial side effect due of the organism's ability to filter water at a rate of 1 liter per day, enhancing water clarity.

In 1991, a survey was developed with two objectives:

- i- To gather information on recreation participation in Ohio and particularly at Lake Erie.
- ii- To assess current perceptions of the zebra mussel and its effects on recreational activities.

A random sample of licensed Ohio drivers was obtained from The Ohio Bureau of Motor Vehicles. A mail questionnaire was developed and sent out to two thousand Ohio residents by July, 1991. As a reminder, a second round of questionnaires was mailed in August, 1991. From the original number, 141 questionnaires were returned by the U.S. Postal Service as not deliverable. This resulted in a total of 1859 questionnaires delivered, out of which 460 were returned, with 439 usable giving a response rate of 24 percent. Unless otherwise specified, any reference to the sample size from now on will be to those 439 respondents.

### Characteristics of the Sample

A large proportion of those responding to the survey reside within an hour's drive of Lake Erie. Forty-eight percent of the respondents reported residing in a contiguous 20 county area clustered about the Lake's shore. Of these Northern Ohio residents, 65 percent reside in the urban areas of greater Cleveland, Lorain, Akron, Youngstown, and Toledo. An additional 19 percent of the respondents reside in the urban areas of Columbus and Cincinnati. About 40 percent of the respondents, reported visits to Lake Erie in 1989. A similar results was obtained for visits in 1990.

Slightly more men responded than women (55 percent). A majority of those responding were married (69 percent), and the mean age of respondents was 41 years. On the average, respondents had two years of education beyond high school and reported an average income of \$41,300 per household. Further information on income, occupation, education, and number of dependents is shown in Figures 1, 2, 3, and 4.

Twenty-five percent of respondents, or 109, reported owning a boat, with 60 percent of the boats suitable for use on Lake Erie. Boats averaged 11.5 years old, with the mean year of purchase being 1984, and a mean cost of \$7,266. This suggests that some of the boats purchased were used. Seventy-eight percent of the boat owners use their boats for fishing.

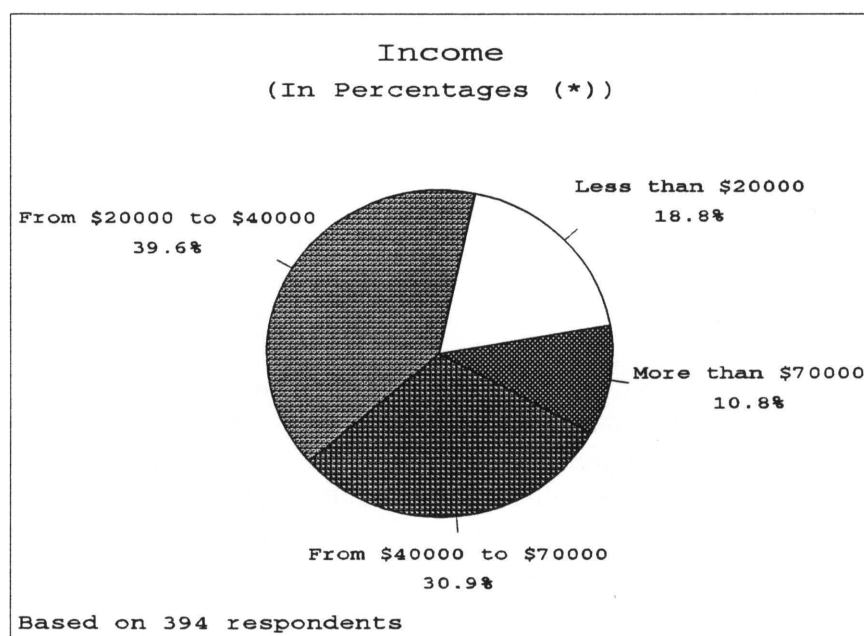


Figure 1

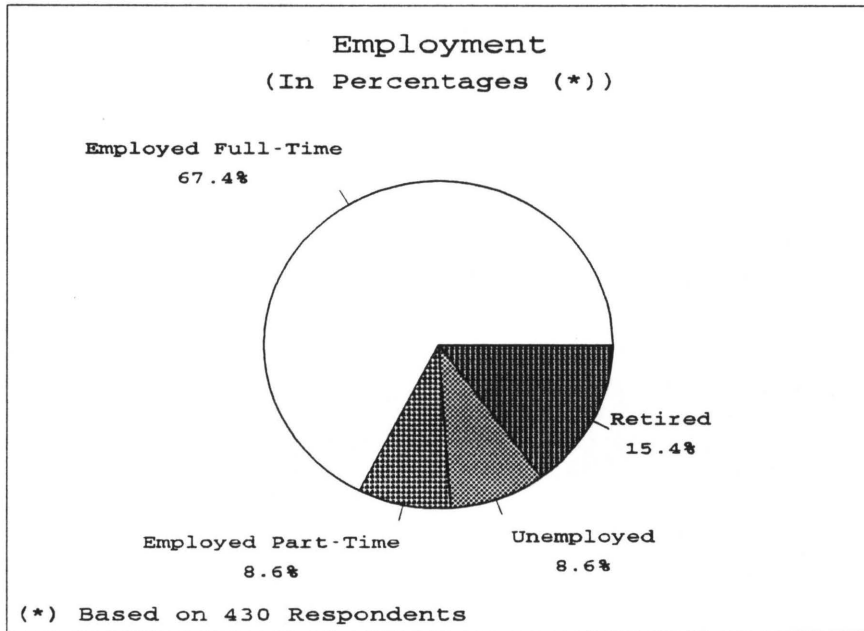


Figure 2

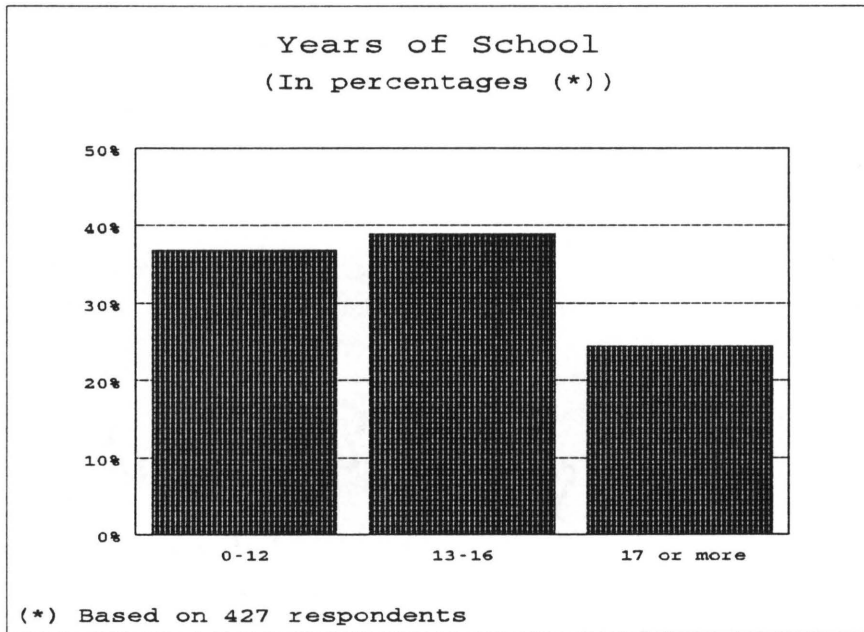
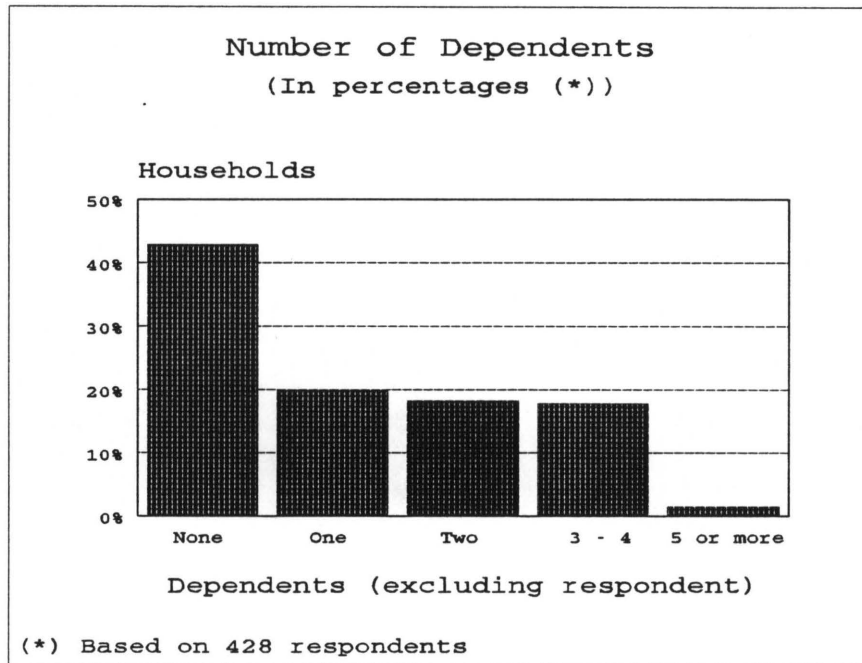


Figure 3



**Figure 4**

### Recreation in Ohio

Respondents were asked how often they had participated in various recreation activities in Ohio during 1990. The most popular activities were shopping (80 percent of the respondents reported at least one outing in 1990), sightseeing (68 percent), and picnicking (68 percent). Moderate participation rates were reported for amusement parks (56 percent reported at least one outing in 1990), swimming (49 percent), sunbathing (47 percent), fishing (45 percent), and pleasure boating (44 percent). When classified by gender, 433 usable responses for this question were obtained, out of which 193 were females and 240 were males. Table 1 describes the participation on the above mentioned activities by gender.

Table 1 Recreation Participation in Ohio for 1990, in Percentages.

Activity	Participated one or more times (%)		Participated ten or more times (%)		Participated thirty or more times (%)	
	Male	Female	Male	Female	Male	Female
Shopping	76.7	83.9	47.9	63.2	22.1	32.6
Sightseeing	71.3	65.3	20.4	32.1	5.4	3.6
Picnicking	69.2	65.8	14.6	30.4	2.1	4.2
Amusement Parks	54.6	58.0	4.6	1.6	1.3	0.0
Swimming	51.7	45.1	17.1	18.1	4.2	6.7
Sunbathing	43.8	46.6	17.9	35.8	5	4.7
Fishing	55.4	32.1	25.8	9.3	10.8	3.1
Pleasure Boating	46.7	34.7	14.2	7.8	4.6	2.6

Based on a sample on 193 females and 240 males.

Local sites were the most popular choice for water-based activities with 26 percent of the respondents visiting local sites on a frequent or exclusive basis over the past three years, as shown in Table 2. Nineteen percent of the respondents reported frequent or exclusive use of Lake Erie for their water-based recreation. Also, Ohio state parks were a very close third choice with 18 percent visiting them frequently. Inland lakes and private ponds were used frequently or exclusively by 15 and 11 percent of the respondents, respectively.

Table 2 Frequency of Participation at Selected Water-Based Sites

Site	Frequency of Use (*)					
	Frequent or always		Seldom or sometimes		Never	
Local Sites	113	26%	174	40%	152	35%
Lake Erie	82	19%	169	38%	188	43%
Ohio State Parks	80	18%	206	47%	153	35%
Inland Lakes	67	15%	152	35%	220	50%
Private Ponds	48	11%	154	35%	237	54%

(\*) Based on 439 respondents.

By and large, people were satisfied or neutral about the outdoor recreation opportunities available in Ohio. Of the six most popular outdoor activities--sightseeing, picnicking, swimming, fishing, sunbathing, and pleasure boating--two showed relatively higher levels of dissatisfaction. Seventeen percent (out of 408) of respondents were dissatisfied with swimming opportunities, and 13 percent (out of 416) reported dissatisfaction with the availability of fishing opportunities. Picnicking and sightseeing were the most highly rated--68 percent (out of 414) were satisfied with picnicking opportunities, and 62 percent (out of 408) were satisfied with sightseeing opportunities.

Generally, respondents planned to continue participating in their favorite activities at the same or greater frequencies in 1991 as suggested by a typical sixty percent response in most activities. Not surprisingly, the two activities with which respondents were most satisfied, sightseeing and picnicking, showed the greatest increases in planned participation. On the other hand, fishing and pleasure boating participants are somewhat more likely to decrease their participation in 1991 as there are more planning to decrease participation than to increase it. While 20 percent of respondents (out of 408) had indicated dissatisfaction with the swimming opportunities available in Ohio, 26 percent of respondents (out of 408) indicated that they planned to increase swimming participation in 1991. Some activities that according to the survey will experience a large decrease in participation are trapping, sailing, hunting, and sunbathing.

### Recreation and Lake Erie

As presented in Table 2, 19 percent of respondents reported visiting Ohio's Lake Erie sites on a frequent-to-always basis with an additional 38 percent visiting the Lake sometimes for the three years prior to the survey. Other Lake Erie sites, (in Michigan, Pennsylvania, New York) were visited by 19 percent of the population sample at least sometimes. Canadian Lake Erie sites were visited by only 6 percent of the respondents in the sample on a sometimes or frequent basis. Table 3 summarizes visits to Lake Erie for the years 1989 and 1990 and expected visits in 1991. Forty-one percent of the sample population had visited Lake Erie in 1989. Eighty-four percent of these visitors returned in 1990, and 86 percent expected to visit Lake Erie in 1991.

The results indicate a 5.5 percent increase in recreational visitors from 1989 to 1990 and an expected increase of 18.2 percent from 1990 to 1991. The mean number of trips remained fairly constant during 1989 and 1990, with a slight decrease reflected in trips expected in 1991. Mean length of stay increased from 1.84 days to 2.35 days in 1990.

Table 3 Visits to Lake Erie, 1989-1991

Group	Visits in 1989		Visits in 1990		Expected Visits in 1991	
Total Sample (n=439)	182	41.5%	192	43.7%	227	51.7%
Visitors in 1989 (n=182)	182	100%	153	84.1%	154	86.2%
Visitors in 1990 (n=192)	153	79.7%	192	100%	165	85.9%
Expected 1991 visitors (n=227)	154	67.8%	165	72.7%	227	100%
Mean number of trips	11.19		11.16		9.65	
Mean number of days per trip	1.84		2.35		Not Asked	

Respondents who had visited Lake Erie, or planned to visit in 1991 were asked about their assessment on some selected amenities. Picnic areas, restaurants, visits to the Islands and swimming beaches were highly rated as very important or somewhat important in making a decision about places to visit at the Lake. On the other hand, fish cleaning facilities, lounges, launch facilities, bait stores and marinas were indicated as being considerably less important.

Sightseeing (70 percent), picnicking (63 percent), shopping (57 percent), amusement parks (56 percent), swimming (52 percent), and fishing (51 percent) were the activities most frequently engaged in when visiting Lake Erie. Differences in the number of respondents to these questions and those who reported visits in 1989 and/or 1990 suggests that people who did not visit Lake Erie during those two years answered the question, perhaps recalling earlier visits.

A similar ordering is obtained for Ohio in general, the only difference being that shopping takes first place (80 percent). Even though the Lake Erie area's amusement parks were attended by 56 percent of the respondents, only 6 percent made more than 5 return trips. For 1990, participants in water-based activities such as fishing, sailing, swimming, and pleasure boating reported making more than fifty percent of their trips to Lake Erie.

Two hundred and seventy six of the respondents reported none or very seldom as frequency of visits to Lake Erie and 163 responded visiting the Lake on a frequent to always basis. However, the proportion of those who reported ten or more outdoor recreational trips is two times higher for those who visited Lake Erie, suggesting that those who visit the Lake are also lovers of the outdoors.

Also, when classifying respondents by whether they go fishing to Lake Erie or not, there is no major difference in terms of their plans to increase or decrease participation.



However, those who fish at Lake Erie are more likely to go fishing to other U.S. and Canadian Lake Erie sites as well as to other Great Lakes.

The average respondent had been visiting Lake Erie since 1969, with 45 percent returning every year and 63 percent returning most years. Twelve percent reported visiting Lake Erie "very seldom" since their first visit. Responding visitors travelled anywhere from 0 to 360 miles to get to their favorite Lake Erie site, with a mean distance of 79 miles. Figure 5 shows the distribution of the distance travelled by Lake Erie's visitors and Figure 6 shows the distribution of trip's length for these same visitors.

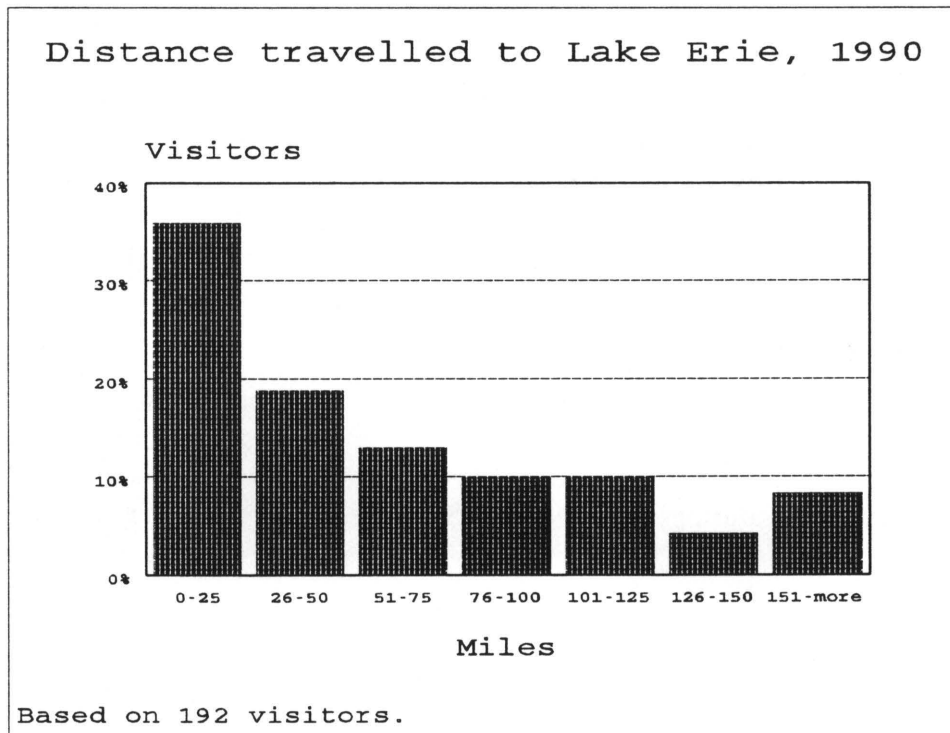
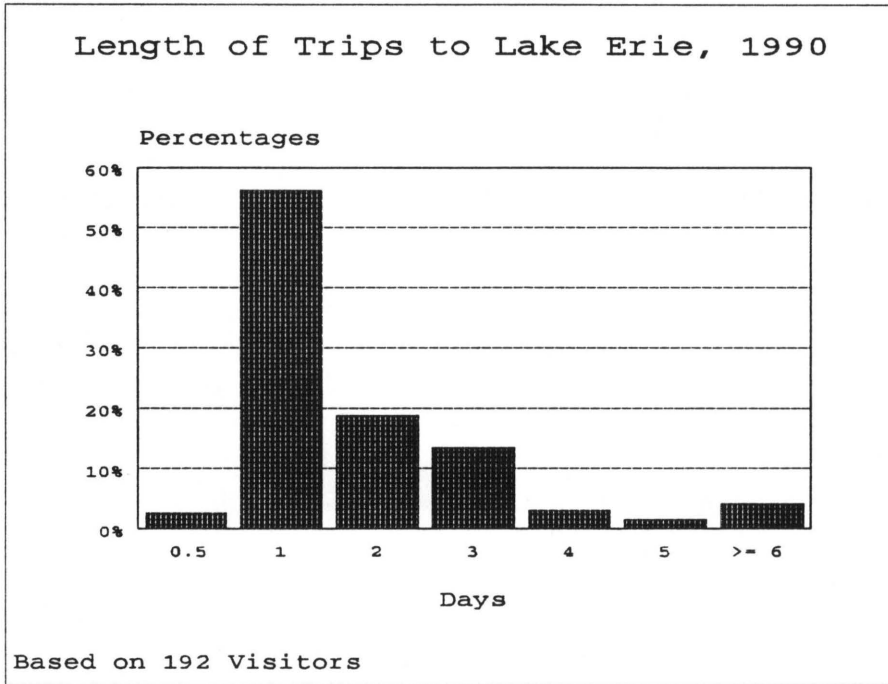
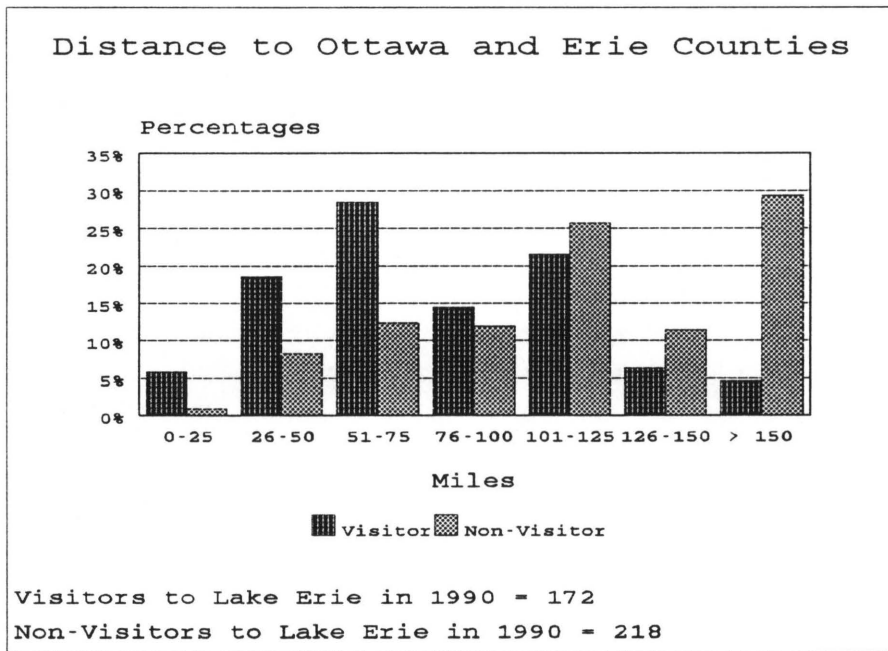


Figure 5



**Figure 6**



**Figure 7**

The questionnaire did not request any information on origin and destination for the trips to Lake Erie. However, it is possible to estimate the distance to certain Counties on Lake Erie's shore using the zip codes reported by the respondents. A region comprising Ottawa and Erie counties shows the smallest deviation from the distances reported in the answers to the survey. The distribution of distances between zip codes of the respondents and this Two-County Region is presented in Figure 7, reporting visitors and non-visitors to Lake Erie.

As can be seen in Figure 7, up until 100 miles from the Lake, the proportion of respondents who visited Lake Erie in 1990 is larger than for those who did not. However, beyond the 100 miles mark, there is a shift and non-visitor to the Lake become the larger share among respondents.

### Zebra Mussel and Recreation

Respondents were asked about their knowledge of and contact with the zebra mussel in Lake Erie. Out of 285 that responded to the question, 76 percent had heard of the zebra mussel. Also, 43 percent out of 225 had personally seen one. Of those having only heard of the zebra mussel, 2 respondents indicated that the organism was responsible for a decrease in the amount of time they spent recreating at Lake Erie. Of those having actually seen a zebra mussel, 11 respondents (11 percent) indicated that the amount of time spent at Lake Erie had decreased. These 11 respondents cited an average decrease in time spent of 38 percent. Two respondents who had seen a zebra mussel indicated that they had increased the amount of time spent at Lake Erie by an average of 10 percent.

Boat owners (109 or 25 percent of the sample) were asked to document any expenses they had incurred that were explicitly caused by the zebra mussel. Fourteen respondents (13 percent) reported expenditures for protective paints, with an average cost of \$94. Another 4 people cited additional maintenance at an average cost of \$171. A single respondent reported \$50 in damages directly attributable to the zebra mussel. Finally, increases in insurance costs were reported by 3 boat owners at an average increase of \$207.

Respondents were then asked to rate how the quality of various recreation activities had changed based upon what they had seen or heard regarding the zebra mussel. Table 4 summarizes their responses for six water-based activities (in order of frequency of participation).

Table 4 Perceived Change in Quality of Selected Water-Based Activities Due to the Zebra Mussel

Activity	Quality					
	Worse		Same		Better	
	n	share	n	share	n	share
Sightseeing (N=171)	17	10.0%	151	88.3%	3	1.8%
Swimming (N=171)	55	32.2%	112	65.5%	4	2.3%
Fishing (N=185)	94	50.8%	90	48.6%	3	0.5%
Pleasure boating (N=77)	23	29.9%	51	66.6%	3	3.9%
Sailing (N=170)	46	27.1%	123	72.4%	1	0.6%
Waterskiing (N=170)	50	29.4%	118	69.4%	2	1.2%

### Summary

Recreationist in Ohio seem to be satisfied with the opportunities available. Participation rate, in most of the activities evaluated, shows a tendency to grow. Some attention, however, should be paid to swimming facilities as respondents indicated dissatisfaction with the current choices available.

The results of the survey show that more than fifty percent of those who use Lake Erie as a recreational site live within fifty miles from the Lake. This may explain the mean number of visits of close to 11 trips and an average trip duration of approximately two days, suggesting visits during the weekends through late spring and summer. Also, the results show that within a hundred miles from the Lake, the proportion of those who visit is larger than those who do not go to the Lake. This situation reverses for distances beyond a hundred miles.

Lake Erie seems to be highly valued by those who love the outdoors, as indicated by the doubling of the number of outdoor recreational trips in absolute and relative terms as compared to those that do not visit the Lake.

Approximately fifty percent of those who reported fishing in Ohio fish at Lake Erie. This result highlights the importance of Lake Erie's fisheries and the importance of their adequate management. Also, close to fifty percent of the Lake visitors reported a worsening of the quality of fishing at the Lake, as indicated in Table 4.

Despite its beneficial impact as a water filter, a large number of respondents who had knowledge about the zebra mussel reported negative perceptions about its impact on water-based activities. However, it appears that few visitors have changed their visits to the Lake in response to perceived lower quality of activities or have incurred increased recreational costs. Further study of visitors perceptions and behavior and study of the economic effects of the zebra mussel on other users of Lake Erie is required to understand the full economic impact of the zebra mussel.