



Ohio Sea Grant College Program

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# Economic evaluation of the Lorain County artificial reef in 1992: An overview

*Sophia J. Glenn, David O. Kelch, & Leroy J. Hushak*  
Ohio Sea Grant College Program  
The Ohio State University

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Technical Summary  
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**Ohio Sea Grant College Program**

The Ohio State University  
1314 Kinnear Road  
Columbus, OH 43212-1194  
TEL 614/292-8949  
FAX 614/292-4364

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## **Economic Evaluation of the Lorain County Artificial Reef 1992: An Overview**

**Sophia J. Glenn, David Kelch, and Leroy Hushak**

### **I. Introduction**

This report provides an overview of Lorain County visitors involved in water-related activities and their use of the Lorain County artificial reef. Included is information on the participants' activities at recreational sites on Lake Erie, in Lorain County, and at the artificial reef. Information on boat usage, fishing, and scuba diving activities, expectations and views of the respondents are also given.

The sample consists of participants who were originally contacted in Lorain County at a marina or public boat launch ramp. The major purpose of the study is to assess the economic values and impacts of the artificial reef in Lorain County. Therefore, we have focused the survey questions on recreational activities and the utilization of the reef during 1992, prior to 1992, and the expected use in 1993.

During April to October 1992 we contacted approximately 850 individuals in Lorain County who stated that they were willing to participate in our survey. During February, 1993 these individuals were sent surveys. Later the same month a second survey was sent to those who did not respond to the first. A random prize drawing was also included as an incentive to increase the response rate. A total of 466 questionnaires were returned for a response rate of 55 percent.

### **II. Demographic Characteristics**

All of the respondents were contacted in Lorain County, and 52 percent of the respondents lived in this county. The second largest group, 23 percent, came from Cuyahoga County followed by Summit, Medina, Wayne, and Stark Counties (Table 1); 6 percent came from more distant locations.

**Table 1. Residential Locations of Respondents by County**

Lorain	Cuyahoga	Summit	Medina	Wayne	Stark
52.4%	22.8%	7.0%	5.0%	3.9%	3.1%

The respondents ages ranged from 23 to 82 years with an average age of 51. Approximately 60 percent were between the ages of 38 and 65. The average household size was 2.7 persons and the largest household was eight. Seventy-nine percent of the respondents were married, 10 percent were single, 9 percent divorced, and 2 percent widowed. About 98 percent of the respondents were male.

About 41 percent of the respondents had an education above the high school level and 49 percent had received their high school diploma or GED (General Educational Development Test) (Table 2).

**Table 2. Respondents Education Distribution**

Primary	High School/GED	Technical School/ Associate Degree	B.S/B.A.	Graduate Professional/School
10.2%	48.6%	22.4%	12.9%	5.9%

About 17 percent of the respondents had annual gross incomes below \$20,000; 64 percent had annual incomes between \$20,000 and \$60,000. More than 19 percent had incomes above \$60,000 (Table 3). Sixty percent of the respondents had full-time jobs and 32 percent were retired. The remaining 8 percent were either unemployed, employed part-time, or seasonally employed.

**Table 3. Distribution of Total Annual Gross Income of Respondents' Households**

Income in Thousands of Dollars

less than \$10	\$10 to \$19	\$20 to \$29	\$30 to \$39
3.2%	14.0%	19.5%	16.5%
\$40 to \$49	\$50 to \$59	\$60 to \$89	> \$90
15.6%	11.9%	13.2%	6.2%

### III. Outdoor Recreation at Lake Erie

Because respondents were contacted at a Lorain County site, all respondents made at least one recreational trip to U.S. sites at Lake Erie during 1992. There was an average of 28 trips taken with an average of 1.5 days each trip. In addition to one or more visits to Lorain County sites, 74 percent visited western Lake Erie (Ottawa or Erie counties) and 42 percent visited sites in Cuyahoga County.

Of all survey respondents, 93 percent stated that they had visited U.S. recreational sites at Lake Erie during 1991. The average number of trips reported was 25 and the average length was 1.5 days each visit. Approximately 90 percent of the respondents indicated they would visit U.S. Lake Erie recreation sites during 1993 and that they expected to make an average of 28 trips.

**Table 4. Activity Participation During 1992 at Lake Erie and in Lorain County**

Activities	% Participation at Lake Erie	% Participation in Lorain County
Fishing	95.5	89.7
Pleasure Boating	50.0	40.1
Sight-Seeing	30.9	10.7
Swimming	28.3	20.8
Shopping	18.7	10.3
Amusement Park	17.4	2.3
Water-Skiing	17.4	12.4
Sunbathing	18.2	14.6
Picnicking	14.4	10.1
Camping	13.7	4.3

Table 4 summarizes the activities and participation rates in activities at U.S. Lake Erie sites and in Lorain County. About 96 percent of the survey respondents went fishing at Lake Erie, and about one half participated in pleasure boating. Sight-seeing and swimming activities also had high participation rates. In Lorain County, fishing, pleasure boating, swimming, and sunbathing activities had the highest participation rates. About 3 percent of respondents reported scuba diving; all except one went scuba diving in Lorain County.

The respondents were also asked about quality changes occurring at U.S. Lake Erie recreational sites. Table 5 shows awareness of these changes and changes in satisfaction due to these changes. Changes in water clarity had the highest percent of respondents reporting an increase in satisfaction of 69 percent. Second, 40 percent reported an increase in satisfaction due to the addition of the artificial reef. Perceived changes in beach pollution and the Flats of Cleveland also had relatively large numbers reporting increases in satisfaction.

Respondents reported reduced satisfaction most frequently for the introduction of the white perch species (52%) followed by the introduction of zebra mussels (37%). Changes in fish contamination advisories, general water contamination, and pollution also found relatively large numbers reporting reduced satisfaction.

**Table 5. Changes in Recreational Satisfaction Due to New Species, Environmental Quality Changes, and New Recreational Activities**

Species, Environmental, or Activity Change	% of Respondents Aware of Changes	Satisfaction % Decrease	Satisfaction % Same	Satisfaction % Increased
Spiny Water Flea	20.4	7.3	11.8	1.3
Zebra Mussel	83.9	36.9	31.3	15.7
White Perch	86.7	51.7	25.1	9.9
Fresh Water Ruffe	14.2	7.1	6.2	0.9
Water Clarity	91.0	4.7	17.8	68.5
Beach Pollution	71.0	15.9	34.8	20.4
Beach Congestion	59.0	10.7	39.5	8.8
Artificial Reefs	76.4	3.4	33.5	39.5
Water Level Changes	74.5	10.1	49.8	14.6
Fish Contamination	74.5	21.7	39.9	13.3
Contaminants and Pollutants	72.1	24.7	30.5	17.0
Jet Express	37.6	1.7	18.5	17.4
Dinner Cruises	34.1	0.9	24.0	9.2
Lake Cruises	41.0	0.6	26.6	13.7
Ship Museums	41.9	0.6	30.3	11.0
Historical Sites	48.3	1.1	34.5	12.7
Improved Amusement Parks	47.6	1.5	28.8	17.4
Maumee State Park	22.1	0.4	13.5	8.2
More Shopping Outlets	40.1	4.3	23.6	12.2
The Flats, Cleveland	52.4	8.2	22.1	22.1

## **Use of Boats at Lake Erie**

Nearly 82 percent of the respondents owned a boat and 43 percent of these boat owners used their boats in other bodies of water in addition to Lake Erie. Boat owners used their boats on average 37 times during 1992. Respondents used their boats 78 percent of the time for fishing, followed by 17 percent for pleasure boating. The remaining 5 percent was divided among waterskiing, diving, and business.

Within Lorain County, 66 percent of boat owners trailer their boats; 34 percent dock or dry-rack theirs. Of those reporting ramp use, 79 percent used public ramps to launch their boats, 8 percent used privately owned marinas, and 12 percent used both. Also, 54 percent of these ramp users characterized the public ramps as crowded or congested. Forty-one percent responded that they experienced problems parking their car or trailer at these sites. When respondents were asked if they would be willing to use a launch ramp further from the lake if parking and congestion were better, 64 percent indicated *yes*.

About 36 percent of boat owners used public ramps 11 to 25 times in 1992, 35 percent used ramps 1 to 10 times, and the balance used ramps more than 25 times. Nearly 42 percent of respondents used the public ramps occasionally, 32 percent used them on weekends, and 27 percent used them daily.

We asked respondents to pick three facilities they would most like to see at public ramp sites. The most desirable facility was the addition of restrooms (49%). Bait and tackle supplies was the next most highly requested item (44%), followed by fuel sales (26%), fish cleaning facilities (26%), day-use dock facilities (26%), and concessions (23%).

## **IV. Recreational Trips to Lorain County**

### **Trip Related Issues**

During 1992, respondents made an average of 20 trips to Lorain County with an average trip duration of 1.4 days. The average distance traveled was 35 miles. Because 52 percent of the respondents were from Lorain County, most of them were located near one of the recreational sites in Lorain County.

More than 75 percent of the respondents reported recreational trips to Lorain County during 1991. An average of 22 trips were made with trip duration of approximately two days. About 75 percent expected to make approximately 25 trips to Lorain County during 1993.

The average year in which respondents made their first recreational trip to Lorain County was 1975. About 76 percent of the participants indicated that they had visited Lorain County every year since their first visit.

The typical group contained three people and 52 percent of these groups stayed overnight. More than 18 percent of respondents indicated that they stayed at home or in a cottage and 17 percent indicated that they stayed on their boat overnight. The average party of 3 staying 1.4 days spent an average of \$252 each trip, of which 29 percent was spent at home prior to the trip and 71 percent on-site during the trip. The largest expenditures were gas and oil for boat (22%), fishing equipment/gear and bait (16%), and boating supplies and repairs (15%).

### **Fishing and Scuba Diving Trips**

Of the individuals who reported their recreational trips to Lorain County during 1992, 94 percent reported fishing and/or scuba diving. Table 6 summarizes the number of trips and their duration for scuba diving, fishing, and combined fishing and diving activities during 1992. For example, 388 respondents reported an average of 19.7 fishing trips to Lorain County during 1992. Fewer respondents (367) reported their trip duration which averaged 1.5 days.

**Table 6. Scuba Diving and/or Fishing Trips and Trip Duration for Lorain County, 1992**

Activities	Number of Trips		Trip Duration (days)	
	Mean	Number of Respondents	Mean	Number of Respondents
Fishing	19.69	388	1.47	367
Scuba Diving	10.20	15	1.42	12
Fishing and Diving	10.09	11	1.33	9

Nearly 92 percent of anglers preferred particular species, such as smallmouth bass or walleye. Nearly 77 percent of the respondents indicated that they practiced catch-and-release fishing on smallmouth bass. The average fishing day was about 6.5 hours. Table 7 reports average catch rates each angler day in Lorain County. For example, 237 respondents reported catching and keeping an average of 17.7 yellow perch each day while 129 anglers reported releasing an average of 10.3 yellow perch each day.



**Table 7. Number of Respondents and Average Number of Fish Kept and Released each Angler Day in Lorain County, 1992**

Species	Number of Fish Kept		Number of Fish Released	
	Mean	Number of Respondents	Mean	Number of Respondents
Walleye	2.9	323	1.7	174
Yellow Perch	17.7	237	10.3	129
Smallmouth Bass	1.8	71	2.1	80
Other	3.3	37	3.1	56

#### **V. Fishing and Scuba Diving Activities at the Lorain County Artificial Reef**

Eighty-seven percent of the respondents who made recreational trips to Lorain County in 1992 knew of the existence of the artificial reef. Sixty percent of these respondents indicated that they found out about the reef by word of mouth and 34 percent indicated knowledge of the reef through Sea Grant information.

Sixty-four percent stated that they went fishing and/or scuba diving on the artificial reef during 1992. The respondents indicated that they liked utilizing the reef because it was closer to shore, the catch was good, and because it was a marked area. More than two-thirds of the respondents traveling less than 40 miles to their Lorain County recreation site used the artificial reef while less than one-half of those traveling 40 or more miles used the reef. Table 8 shows the number of respondents, recreational trips made and the hours spent each day at the reef. For example, 264 respondents reported an average of 7.1 fishing trips to the reef during 1992; 236 respondents reported spending 5.9 hours of their average fishing day on the reef.

When fishing on the reef, 74 percent of the respondents (245) indicated that they fish for a particular species. Many respondents reported targeting more than one species. More anglers reported targeting walleye (203) than smallmouth bass (97) or yellow perch (126) (Table 9). More than 50 percent of the respondents for each species reported targeting it during every season. For example, 52 percent of 126 respondents targeted yellow perch on the reef during summer. Nearly 82 percent of 203 respondents targeted walleye on the reef during the summer.

**Table 8. Trip and Activity Data for Artificial Reef Area, 1992**

Activities	Number of Trips to Reef		Hours Spent at the Reef Each Day	
	Mean	Number of Respondents	Mean	Number of Respondents
Fishing	7.1	246	5.9	236
Scuba Diving	4.0	8	5.3	6
Fishing and Scuba Diving	7.0	3	8.0	3

**Table 9. Number of Respondents and Species Targeted at Reef (Respondents can target one or all species)**

Species	Number of Respondents	Spring %	Summer %	Fall %
Walleye	203	70.0	81.8	67.5
Smallmouth Bass	97	64.9	64.9	55.7
Yellow Perch	126	54.8	51.6	78.6

One hundred seventy respondents, compared to 258 in 1992, indicated that they went fishing and/or scuba diving at the reef prior to 1992. Sixty-five percent of the 170 respondents indicated success when fishing and scuba diving.

Table 10 shows the catch-and-release rates of species at the reef site during 1992. The Lorain County catch-and-release data in Table 7 includes these data from the artificial reef. For example, 102 respondents reported keeping 2.1 walleye and 37 respondents reported releasing 1.9 walleye each angler day while fishing the reef.

Of those respondents who reported harvesting walleye in Lorain County during 1992, about 30 percent reported harvesting walleye from the reef, while 17 percent of those releasing walleye released fish caught on the reef. The harvest and release rates for yellow perch are similar at 27 percent and 21 percent, respectively. The smallmouth bass rates are higher, however. About 34 percent of anglers who harvested smallmouth bass from Lorain County harvested fish from the reef while 42 percent of those releasing smallmouth bass released bass caught on the reef.

**Table 10. Number of Respondents and Average Number of Fish Kept and Released for Fishing Trips (Each Angler Day) on the Artificial Reef**

Species	Number of Fish Caught and Kept		Number of Fish Released	
	Mean	Number of Respondents	Mean	Number of Respondents
Walleye	2.1	102	1.9	37
Yellow Perch	8.6	66	3.9	35
Smallmouth Bass	1.8	26	3.2	44
Rock Bass	1.2	8	2.6	15
Sheepshead	2.2	37	2.5	49
White Perch	4.1	31	2.8	30
White Bass	2.4	25	2.1	21

Of 323 anglers who reported catching and keeping an average of 2.9 walleye each angler day on 20 trips in Lorain County (Table 7), 102 anglers reported keeping 2.1 walleye each angler day on 7.1 trips to the reef (Table 10). If we assume similar group size and trip duration, the reef accounts for about 8 percent of walleye harvest to anglers who fish from Lorain County sites. By the same calculation, the reef also accounts for about 8 percent of the catch-and-release of walleye. For yellow perch, both calculations are less than 5 percent, while the reef accounts for 13 percent of smallmouth bass harvest and 30 percent of smallmouth bass catch-and-release.

## **VI. Conclusions**

The Lorain County artificial reef appears to be an important attraction for visitors to Lorain County. In our sample, predominated by respondents who fish, the artificial reef was used by nearly two thirds of the respondents. The typical respondent made nearly 20 trips to Lorain County sites during 1992, of which 7.1 or 36 percent included going to the reef for at least part of the trip. The Lorain County artificial reef accounts for the largest percent of smallmouth bass harvest (13%) and catch-and-release (30%) as reported by respondents, and the smallest percent of yellow perch (less than 5%). However, the walleye contributes 8 percent to a much larger total harvest and catch-and-release effort than either of the two other species. The walleye is the species targeted on the reef and harvested on the reef by the largest number of respondents.