

VALUING THE OTTAWA RIVER: THE ECONOMIC VALUES AND IMPACTS OF RECREATIONAL BOATING



Prepared for the
Ottawa River Action Group of
the Maumee RAP (Remedial Action Plan)

by
Leroy Hushak, Professor Emeritus
Ohio State University
Columbus, Ohio

and
Mary Bielen, Agent
Ohio Sea Grant Extension
Toledo, Ohio



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FOREWORD

At the outset of this project, steps were in progress that when carried to completion would improve and restore Ottawa River water quality and would identify riverbed areas containing contaminated sediments. The Ottawa River Action Group of the Maumee RAP agree with these actions. A next phase would be dredging river sediments for the purpose of improved navigation for boaters and also for environmental remediation and ecosystem improvement.

The Ottawa River Action Group of the Maumee RAP was interested in a study of the local economic impact of the river's boating activity and the river's recreational value. They wished to determine the impacts of river boating on the area's economy and what monetary contribution local users are willing to make for dredging the river. Ohio State University (OSU) Sea Grant Extension offered to conduct this economic study. The Point Place Business Association and the river boating community also support the study. The Action Group proceeded to obtain a grant and voted for monetary support for the study.

OSU Sea Grant Extension prepared the study format, developed questionnaires, and interviewed boaters and Ottawa River area businesses. Questions presented to boaters included boating trip frequency, purchases, taxes, environmental concerns, opinions, and perceived boating trip frequency if environmental and navigational dredging were to occur.

Local user responses provided positive answers that included support of a monetary contribution for dredging. A summary of these values follows in a digest form in the Executive Summary and in their entirety in the main body of the report.

It is our conviction the study results show sound economic benefits and economic growth potential for the City of Toledo and Ohio by restoring the river's navigability, ecology and recreational use through long-needed dredging.

James Haren, Representative

Ottawa River Action Group (ORAG) Member
Jolly Roger Sailing Club ORAG Representative
Ottawa River Affiliated Yacht Clubs ORAG Representative

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EXECUTIVE SUMMARY

The purpose of this research is to provide the basis to build the necessary local financial support to make dredging of the Ottawa River possible. The study provides input for justification and financial support for both navigational dredging and contaminated sediment dredging. Previous Army Corps of Engineers studies in 1976 and 1991 found sufficient benefit-to-cost ratios existed to justify navigational dredging of the Ottawa River and channel to Lake Erie, but each project lacked a local sponsor to cost share it causing the Corp's deferment to dredge.

The Ottawa River area includes the Ottawa River downstream from the Suder Avenue bridge to the connecting channel in the north Maumee Bay plus Halfway Creek and Hooper Run in Michigan. Of the 16 yacht clubs and marinas, 11 are in Lucas County. The survey questions were addressed to Ottawa River stakeholders who are area residents, club members, marina occupants, and launch site users and businesses.

Existing Conditions

- The use of the lower Ottawa River for activities such as swimming, fishing, and related water activity was banned in the 1990's by the Toledo Department of Health and the Ohio Department of Health.
- Sedimentation and lake hydrologic effects are causing shallow Ottawa River channel depths resulting in diminished boater activity and decreasing dock occupancy.

Research Findings

- **The estimated economic impact from current Ottawa River boater activity to the local economy is \$14 million in total annual sales of which \$8 million is value added from current boaters.** (Reference Figure 4.)
- **The direct economic impact to local area businesses of dredging the Ottawa River and a connecting channel to Lake Erie, for navigational and environmental purposes, is nearly \$5 million of additional annual sales.** Nearly \$3 million of this is additional income from new or higher paying jobs at these businesses at full current capacity use. With increased capacity, the increase in economic activity would be greater. In addition, if the dredging does not occur, the \$14 million in current annual sales, of which \$8 million is current annual income, will erode as navigation of the river becomes more difficult. (Reference Figure 4.)
- **The estimated mean economic value to area boaters and businesses at full use of current capacity of dredging the Ottawa River and a connecting channel to Lake Erie for navigational and environmental purposes is nearly \$750,000.** (Reference Figure 3.)

- **The estimated median economic value to area boaters and businesses of dredging the Ottawa River** and a connecting channel to Lake Erie for navigational and environmental purposes **is over \$400,000** for a 10-year time horizon. Current boaters and businesses are willing to pay a minimum of \$25 and \$100, respectively, per year for 10 years for navigational dredging. (Reference Figure 3.)
- **The Ottawa River boater values both navigational and environmental dredging.** Based on willingness to pay, boaters placed higher value on navigational dredging, but four of the six top ranked new activities respondents indicated they would participate in after the river was dredged involve water contact sports and fishing. (Reference Figure 2.)

Three surveys were conducted to obtain the information to make these estimates of economic impact and economic value. Economic impacts and economic values are not additive, but are two different ways of looking at the effects of dredging. Economic impacts are measures of how the recreational boating expenditures made by boaters' affect sales of local businesses and incomes of employees and property owners. Economic value measures the satisfaction recreational boaters obtain from their sport. It is the "willingness to pay" for boating over and above, or in excess of, what they spend to participate.

Recommendations

The Ottawa River Action Group of the Maumee RAP proposes to build local support for dredging the Ottawa River by presenting the results of this research to boaters, businesses and other stakeholders, as well as local, state, and federal government representatives and by pursuing the following actions in its dredging strategy over the next 18-24 months:

- Identify and obtain a local government sponsor to provide partial financial support for a dredging project. This will involve communicating with local and state officials initially and on a regular basis as progress is made.
- Develop a local revenue program for dredging with area marinas and yacht clubs based on current boaters willingness to pay for dredging. Initial steps include communicating with stakeholders to strengthen their willingness to join in a local sponsor partnership for environmental and navigational dredging. This will involve communicating with the stakeholder partnership as a whole, rather than target special interests.
- Request and develop the support of the Toledo Lucas County Port Authority Seaport Division for providing local disposal facilities for Ottawa River dredged material.
- Request and develop the financial support of the Army Corps of Engineers after local sponsorship has been determined and a commitment made.
- Expand the support base for this project by seeking the involvement of new people representing the Ohio Division of Watercraft, banking community, colleges and universities, economic development agencies, and other private and public sector participation.
- Advertise progress and positive stakeholder attributes to the media.

VALUING THE OTTAWA RIVER: THE ECONOMIC VALUES AND IMPACTS OF RECREATIONAL BOATING

INTRODUCTION

Purpose of Study

The purpose of this research is to provide the basis to build the necessary local financial support to make dredging of the Ottawa River possible. The study provides input for justification and financial support for navigational dredging and environmental remediation of the Ottawa River. Previous Army Corps of Engineers studies (1976, 1991) found sufficient benefits-to-costs ratios existed to justify navigational dredging, but each study lacked a required local sponsor to cost share the project resulting in the Corps deferment to dredge.

This study provides quantified estimates of the positive economic impact of current Ottawa River boating activity and the additional economic impact that would occur if the river were dredged. It also provides quantified estimates of the positive economic value of the Ottawa River resource to current boaters and area businesses and the additional economic value to potential new boaters and area businesses if the river were dredged.

Background of the Ottawa River Navigational and Environmental Conditions

The Ottawa River is 41 miles long and has a drainage basin of 178 square miles in Ohio and Michigan. The lower section of the river (river miles 1-9) is located primarily within the city of Toledo, Lucas County, Ohio except for an extensive broad estuary leading to the mouth in the north Maumee Bay which is in Erie County, Michigan. Marinas and yacht clubs as well as residential docks are located downstream from Suder Avenue, primarily below river mile 2. This area plus Halfway Creek and Hooper Run in Michigan is referred to as the “Ottawa River area” throughout this report.

Ottawa River community residents, businesses and other stakeholders face two critical problems related to Lake Erie. During periods of low lake levels and resulting shallow depths in the Ottawa River, passage by all but small boats with the shallowest draft is prohibited. Even during periods of higher lake levels, river depths often restrict the classes of pleasure craft able to safely navigate the river. In addition, the water quality of the Ottawa River is classified as highly polluted in the lower reach, which washes into the mouth of the river, and into Lake Erie. Pollution derives from leaching industrial and municipal landfills, abandoned industrial sites, and combined storm and sanitary sewer overflows located in the lower reach. The use of the lower Ottawa River for activities such as swimming, fishing, and related water activity was banned in the 1990’s by the Toledo Department of Health and the Ohio Department of Health. In order to build local and other support for addressing these issues, economic information is needed by stakeholders.

Background of the Ottawa River Action Group

The Ottawa River Action Group developed as a cooperative effort between citizens, industry, and government to address these environmental problems and the resulting negative impact on the local economy. One of several focuses of the Action Group is investigating the possibility of dredging the river downstream of Suder Avenue for improved navigation.

Dredging of contaminated sediments primarily concentrated upstream of Suder Avenue is also under consideration as a possible course of action, although other methods of remediation are being considered by various local, state, and federal agencies involved with Ottawa River remediation activities. The upstream pollution will need to be addressed as part of any downstream navigational dredging plan.

The group meets regularly and operates as part of a larger coalition called the Maumee River Remedial Action Plan, or Maumee RAP. This larger organization is also a coalition of citizens, businesses, stakeholders and local governments attempting to restore the health of the Maumee River and Bay ecosystem. In 1985, the lower Maumee River basin was classified as an “Area of Concern” along with 42 other Great Lakes areas. This designation from the International Joint Commission (IJC) was assigned to geographic areas with degraded water quality. The Maumee RAP formed to identify sources of water quality problems and to implement activities that restore beneficial uses of these bodies of water. The Maumee RAP also oversees and supports a number of other Action Groups concerned with environmental restoration, preservation and remediation.

Brief Description of the Ottawa River Boating and Marine Trades Industry

The Ottawa River area, consisting of facilities on the Ottawa River plus those on Halfway Creek and Hooper Run in Michigan, is comprised of 16 marinas or yacht clubs, two boat launch ramps, one public and one private, and 60 additional businesses serving recreational boaters. Of the 16 marinas and yacht clubs, 11 are on the Ottawa River, one of which, Lost Peninsula, is in Michigan, and five serve Halfway Creek and Hooper Run in Michigan. The marinas and yacht clubs on the Ottawa River have a total of 1,642 slips or docks, 908 at Ohio facilities and 734 at Lost Peninsula in Michigan. The Halfway Creek and Hooper Run marinas in Michigan have 530 slips, providing a total of 2,172 slips for area boaters.

The two launch ramps are located in Michigan. The private launch ramp is at State Line Marina where boaters must pay a fee to launch their boats; 1,000 launches were estimated during 1998. The public ramp is at Halfway Creek where attendants were present on weekends from Memorial Day through August 23. When an attendant is present, a launch or ramp fee is charged. The attendants recorded 984 boat launches on weekends during 1998. Since boaters use the public ramp during the week and on weekends before and after the attendants are present, we assume that the number of launches during unattended periods is equal to those during attended weekends, yielding an estimated 2,000 launches during 1998. The total boat launches during 1998 is estimated at 3,000 for the two ramps.

A total of 77 businesses serving the Ottawa River area were identified by the co-investigator with the assistance of members of the Ottawa River Action Group. When surveyed, one of the businesses no longer existed because of the death of the owner.

Past Army Corps of Engineers Studies & Findings

Ottawa River area residents have long desired dredging of the Ottawa River and a channel into Lake Erie. The Army Corps of Engineers, as the primary federal agency responsible for dredging of navigable waters, undertook feasibility studies to determine if a sufficient benefits-to-costs ratio existed to warrant further federal interest in a dredging project.

Both the Detroit District (1976) and the Buffalo District (1991) of the Army Corps of Engineers have undertaken studies in the past. With both studies, the Corps found a sufficient benefits-to-costs ratio existed, but because of a lack of a local sponsor to cost share the project, the Corps terminated their efforts. The identification of a local sponsor, usually a local or state government agency, is key to the progress of the local dredging project. Without this local sponsor, Corps policy dictates deferment.

A local sponsor will be necessary in order for the Action Group to proceed with dredging the river and a channel to Lake Erie. It is therefore critical that the Action Group interest a local government agency in the importance of dredging the Ottawa River. Future strategies for the Action Group in regard to building local public and private sector support for dredging of the river and a connecting channel to Lake Erie are addressed in the *Action Group Recommendations section* at the end of this report.

CURRENT SURVEY RESEARCH PROJECT

Background

In this research project information is developed to support local strategies to address the siltation and pollution problems of the Ottawa River. First, the effects of dredging on the recreational value of boating on the Ottawa River are estimated. Second, the effects of changes in water quality on the recreational value of boating are estimated. And finally the direct economic (sales, income and employment) and fiscal (tax revenue) impacts on the local economy of dredging the Ottawa River for recreational navigation purposes and of water quality changes are estimated.

The purpose of these quantitative estimates is to provide input to the Maumee River (Area Of Concern) RAP (Remedial Action Plan) and, specifically, their Ottawa River Action Group, to build local interest, justification and financial support for environmental remediation and navigational dredging of the river. Stakeholders believe the current river conditions adversely impact the economic, social and environmental climate of the area. It is expected that environmental remediation and navigational dredging of the river will have positive economic and environmental impacts. This in turn will improve the environmental quality of the nearby Maumee Bay portion of Lake Erie.

The results from this project provide information for local residents to better understand the effects of dredging and water quality changes on the recreational value of boating in the area and also on the economic and fiscal impacts of dredging (or not dredging) the Ottawa River. These estimates also help local government and other decision makers to better allocate scarce resources to address the siltation and pollution problems present in the Ottawa River. In addition, this research furthers the Maumee River RAP goals of improving area water quality.

Although the Army Corps of Engineers previously conducted an evaluation of six possible dredging scenarios of the Ottawa River and identified one with a sufficient benefits-to-costs ratio to warrant further Federal interest, research to establish the basis for local support was not conducted. The purpose of this research is to provide the basis to build the necessary local financial support to make dredging of the Ottawa River possible.

Objectives

The general objective of this research is to provide economic information about the effects of dredging the Ottawa River on recreational boating on the Ottawa River and related waters and the resulting impacts on area businesses. In this study, the Ottawa River area includes the Ottawa River plus Halfway Creek and Hooper Run in Southeastern Michigan which would benefit from a dredged channel to Lake Erie for access to the Lake. There are four objectives:

1. Estimate the economic value of dredging the Ottawa River and a connecting channel to Lake Erie to recreational boaters who used the Ottawa River area during 1998.
2. Estimate the economic value of dredging the Ottawa River and a connecting channel to area recreational boaters who would use the Ottawa River area if dredged.
3. Estimate the direct economic and fiscal impacts of dredging the Ottawa River and a connecting channel by recreational boaters who used the Ottawa River area during 1998.
4. Estimate the economic and fiscal impacts of dredging the Ottawa River and a connecting channel by area recreational boaters who would use the Ottawa River area if dredged.

Research Methods

To accomplish these general objectives, three surveys were conducted:

1. A survey of 301 recreational boaters who used the Ottawa River area during the 1998 boating season, called the *contact survey* or CS.
2. A survey of 300 recreational boaters who resided within the Ottawa River area during the 1998 boating season, called the *participant survey* or PS.
3. A survey of 77 area recreational businesses who serve the Ottawa River area.

Economic values and economic and fiscal impacts are not additive, but are two different ways of looking at the effects of dredging. Economic value measures the satisfaction recreational boaters obtain from their sport. It is the "willingness to pay" for boating over and above, or in excess of, what they spend to participate in recreational boating. The contingent value approach is used to estimate economic values from responses to the *Improving the Ottawa River Resource section (questions 22-26)* of the two questionnaires. Economic impacts, on the other hand, are measures of how the recreational boating expenditures made by boaters affect a local or regional economy and the resulting effects on employment, and income to labor, management and property. Economic impact estimates are limited to direct impacts; multiplier impacts are not estimated in this study.

Often, economic values are State or National in scope because participants in an activity or users of a resource are statewide or national in scope. In the present case, most users of the Ottawa River area are people from the local area, so the economic value of dredging the Ottawa River and connecting channel to Lake Erie is generated locally. Economic impacts are nearly

always local even when economic values are state or national in scope. It is local businesses and their employees who are most affected by changes in use of a resource, even a national resource.

Overview of Surveys

Three surveys were conducted. For each survey, sample members received up to three mailings. First, they were mailed a copy of the questionnaire with cover letters from the Ottawa River Action Group and from the principal investigator along with a return envelope. If they did not respond within two weeks, they were mailed a post card reminding them to return their surveys. If they did not respond after four weeks, they were mailed a second questionnaire with a letter from the principal investigator and a return envelope. Action group members also followed up with area businesses to increase the response rate for the business survey.

A total of 301 recreational boaters who used the Ottawa River during 1998 were contacted at sites in Ohio and Michigan during late May through July of the 1998 boating season and asked for their address. These boaters then received the respective mailings on October 22, November 5 and November 19. Of the 301 boaters, 110 returned questionnaires for a response rate of 37 percent; 12 questionnaires could not be delivered. This survey is referred to as the *contact survey* (CS) throughout the report.

The second boater survey, called the *participant survey* (PS), was sent to 300 area boaters randomly selected from boat registration lists in Ohio and Michigan. Of the 300 boaters, 200 were randomly selected from Lucas (150), Fulton (25) and Wood (25) Counties, and 100 from Monroe County, Michigan. There were over 21,000 registered boats in these three Ohio counties and 11,000 in Monroe County, Michigan. Mailings were made on October 22, November 2 and November 19. A total of 58 responses were received for a response rate of 19 percent; 13 questionnaires could not be delivered.

A total of 77 area businesses were identified as recreation oriented, of which one was out of business at the time of the survey. The business owners/managers received mailings on October 13, October 27 and November 10, after which the co-investigator and members of the Action Group followed up with personal calls to increase the response rate. A total of 28 questionnaires were returned for a response rate of 37 percent.

Survey Highlights

Boater Surveys

The two boater surveys are highlighted in this section, and differences in respondent characteristics are pointed out. A complete tabulation of the two questionnaires is in Appendices A and B. We look at boat characteristics, trip frequency, boater expenditures, and demographics of boat-owning households.

Boat Characteristics

The typical respondent household in the *contact survey* (CS) owned 1.6 boats compared to 1.7 in the *participant survey* (PS). Respondents who owned more than one boat were asked to report on two boats. In the CS, 108 respondents reported primary boats and 46 reported second boats while in the PS, 55 respondents reported primary boats and 24 reported second boats.

Table 1 highlights boat characteristics reported by the two groups. For example in the CS, the largest group of the primary boats were cabin motor boats (65 percent), and the largest group of the second boats were inflatable (30 percent). In the PS, 27 percent of primary boats were cabin motor boats and 25 percent of second boats were open motor boats. Only 9 personal watercraft were reported in the two surveys combined which reflects the contaminated state of Ottawa River water. Fourteen sailboats were reported in the CS compared to 8 in the PS.

In the *contact (or user) survey*, propulsion systems were equally divided between inboard and inboard/outboard (I/O) drives for the primary craft (35 percent each) but second boats were dominated by outboards with 58 percent. The median length of primary boat was in the 26-32 foot class; the second boat was in the 14-16 foot class. In the *participant (or area boater) survey*, primary boats were comprised of 33 percent I/O and 26 percent outboard while 40 percent of second boats were outboard. The median length of the primary boats was 16-21 feet and of second boats 14-16 feet. The book values of the primary and second boats from the CS are substantially higher than the PS. A majority of CS primary boats are kept at the boating site both in season and off-season while a majority of CS second boats and both primary and second boats in the PS are kept at home.

Table 1: Boat Characteristics

	Contact Survey		Participation Survey	
<i>Characteristics</i>	<i>Primary Boat</i>	<i>Second Boat</i>	<i>Primary Boat</i>	<i>Second Boat</i>
Most frequent boat (%)	Cabin Motor (65)	Inflatable (30)	Cabin Motor (27)	Open Motor (25)
Propulsion-- 1 (%)	I/O (36)	Outboard (58)	I/O (33)	Outboard (40)
Propulsion-- 2 (%)	Inboard (35)	I/O (18)	Outboard (26)	Hand Power (26)
Median length, ft	26-32	14-16	16-21	14-16
Mean book value, \$	26,604	7,408	16,044	3,342
Most frequent location				
In Season (%)	Ottawa River Area (74)	At home (49)	At home (56)	At home (67)
Off-Season (%)	Ottawa River Area (57)	At home (74)	At home (53)	At home (67)
I/O= Inboard/Outboard				

Trip Frequency

The typical *contact survey* (CS) boater reported over 50 household trips during 1998 of which 33, or 66 percent, were to Ottawa River area sites. The typical *participant survey* (PS) boater reported about 26 trips during 1998 of which 5 were to Ottawa River area sites (Table 2). Only 24 of 53 respondents reported trips to the Ottawa River area, making about 11 such trips. However, 20 of 26 PS trips were to Lake Erie. In both surveys, about one in four trips was an overnight trip. The mean and median distances traveled were shorter for the *contact survey* (CS), but in both cases boaters did not travel far to their boating site. Ottawa River area boaters spent the largest amount of time cruising while the *participant survey* respondents spent the most time fishing.

In both surveys, the number of trips varied depending on where the boat was kept during the boating season. The joint response of boaters who answered both questions 13 (location of boat during boating season) and 19 (number of trips to the Ottawa River area) was tabulated. From the CS, 16 respondents kept their primary boat at home and made an average of 38 trips to Ottawa River area sites. This compares with 32 trips for 73 of the CS respondents who kept their primary boat docked at an Ottawa River area marina or club and 30 trips for 9 of the CS respondents who kept their primary boat at a marina or club somewhere else. In the PS, 28 respondents kept their primary boat at home and made an average of 18 trips to all sites. This compares with 8 PS respondents who kept their boat at an Ottawa River area site and made an average of 28 trips, and 16 PS respondents who kept their boat elsewhere and made an average of 41 trips. Thirteen PS respondents who kept their primary boat at home reported making 9 trips on average to Ottawa River area sites. The greatest difference in the two samples is in respondents who kept their primary boat at home; those in the CS made many more trips to Ottawa River area sites than PS respondents made to all sites.

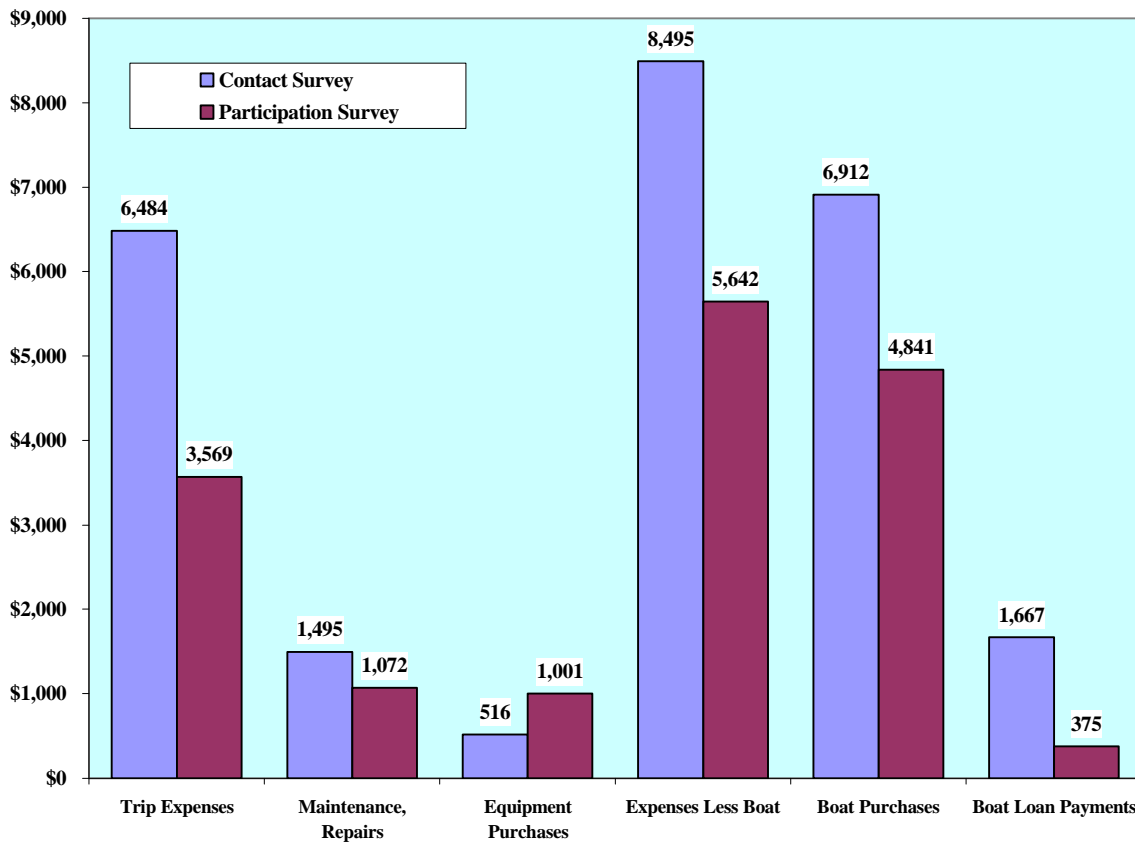
Table 2: Trip Characteristics

	Contact Survey	Participation Survey
Mean trips to Ottawa River Area	32.8	4.9
to other sites	17.7	21.3
Trip duration		
Day trips	29.3*	20.5
Overnight trips	9.6*	7.4
Distance traveled to site, mi.		
Median	less than 10*	10 to 20
Mean	13.6*	22.8
Primary activities (%)	Cruising (38)* Fishing (21)*	Fishing (41) Canoeing etc. (14)
*Ottawa River Area only		

Boater Expenditures

Average trip expenditures per household for Ottawa River area trips from the Ottawa River area *contact survey* (CS) were \$197.39 per trip, and at 32.8 trips per household, nearly \$6,500 per year (Figure 1). In addition, CS boaters spent about \$2,000 on maintenance, fees and repairs, and equipment purchases exclusive of boats, yielding household expenditures of nearly \$8,500 in 1998. By contrast, *participant survey* (PS) households spent \$135.41 per trip, and took 26.4 total trips for total trip expenditures of \$3,569. They spent an additional \$2,080 on maintenance, fees and repairs, and equipment purchases for total expenditures exclusive of boat purchases of nearly \$5,650.

Figure 1: Comparison of Contact and Participant Survey Boater Expenditures



Boat purchases added substantially to total boater expenditures in 1998. On average, user or CS respondents spent \$6,912 purchasing new or used boats compared to \$4,841 for area or PS respondents. Boat loan payments averaged \$1,667 from the CS survey compared to \$375 for PS survey respondents. Boat purchase revenues are only partially captured by boat dealers because about 85 percent of the price of a boat goes to the manufacturer/distributor for new boats or to the previous owner in the case of used boats. The remaining 15 percent of boat purchases from area boat dealers represent services provided by the dealers and are direct economic impacts to the local economy; boat loans contribute to economic activity in the financial sector. Boater expenditures are graphically presented in Figure 1.

Contact survey respondents reported making 74 percent of their boating expenditures within the Ottawa River area. Thirty-four percent of *participant survey* respondents made 46 percent of expenditures within the area, or about 16 percent (0.74×0.46) of all respondent expenditures.

Demographics

Demographic details of the two sets of respondents are in Appendices A and B. The demographic characteristics of the two groups are very similar with respect to age, education level, household size, employment status and income, i.e., the background characteristics of these households are similar.

Business Survey

The *business survey* tabulation is found in Appendix C. The median business responding to the survey had sales of \$100,000 to 300,000 in 1997, or \$200,000 at the mid-point of this sales class. The median sized business is the central or middle business, i.e., of the 26 businesses reporting sales, the median business is the 13th or 14th business when ranked by sales. Using the mid-point of the sales classes, mean sales were about \$492,000. The mean is larger than the median because of 4 large businesses with sales between \$1 and 3 million. The typical business employs 7.3 permanent full-time, seasonal full-time and seasonal part-time people. Over one-half of the respondents reported that over 50 percent of gross revenues in 1997 were derived from Ottawa River area activity.

Property, income, workers comp, and unemployment taxes reported by the 28 responding businesses totaled \$253,441. In addition, 13 of these businesses reported collecting \$228,890 in sales taxes. The mean total book value reported by 17 of the businesses (real property, buildings, docks, equipment, inventory) was nearly \$450,000, with a replacement cost of about \$1 million. Because only 4 to 13 businesses reported itemized tax information, the fiscal contribution of these businesses is not estimated. Water depth and marina dredging needs were two top-ranked limitations to business expansion.

Seventeen responding businesses reported a total of 2,095 slips or docks compared to 2,172 at 16 marinas and yacht clubs reported earlier from a phone survey of marinas and yacht clubs by the co-investigator. Some of the docks reported in the survey are temporary docks which belong to restaurants or other facilities needing temporary dockage for boating customers. Fourteen of the respondents reported an average occupancy rate of 64 percent; three reported a waiting list. However, there is a wide variation in occupancy rates and the larger marinas tend to have higher occupancy rates; Lost Peninsula in particular has over one-third of the total docks and a high occupancy rate. As an alternative an occupancy rate weighted by number of docks was calculated. Thirteen of the 14 respondents reporting occupancy also reported numbers of docks; the weighted average occupancy rate for these 13 respondents is over 78 percent. Several facilities reported low occupancy rates because of low water, a condition which will get worse unless the river is dredged. Total boating households with docked boats in 1998 was estimated at 1,700 ($2,172 \times 0.78 = 1694$).

Key Results

The critical results of the study are those which are used to estimate the economic value and economic impacts of dredging the Ottawa River to current boaters using the river and to the potential of attracting additional boaters. These results are developed by focusing on each of the study objectives. Two results are needed for estimation of economic values and economic impacts of Ottawa River area activity. First, an estimate of Ottawa River area capacity is needed, which is the 2,172 docks reported by marinas, and the 1998 use of that capacity, which is the estimated 78 percent occupancy rate or 1,700 boating households (Table 3).

Second, an estimate of the use and capacity of the two ramps is needed. The estimated use during 1998 is the 3,000 launches estimated above. The average respondent in the *contact survey* (CS) made 33 trips to Ottawa River area sites; those who kept their primary boats at home made an average of 38 trips. Using 38 trips for these respondents, about 80 different CS boating

households account for these launches during 1998 (Table 3). However, *participant survey* (PS) respondents who kept their primary boats at home reported 9 trips to area sites, suggesting over 300 boating households could be making these 3,000 launches. Increased use must come from PS type respondents.

The private ramp does 50 launches per week while the public ramp does 75-80 launches over a 3-day weekend, which makes them appear to be greatly underutilized. The estimated capacity of these two ramps is easily 6,000 launches per year, double the estimated 3,000 in actual use (Table 3). An additional 300 boating households of the PS respondent type could easily be accommodated at these ramps, assuming they don't come at the same time.

Table 3: Values Used to Estimate Ottawa River Area Dock/Ramp Use and Capacity

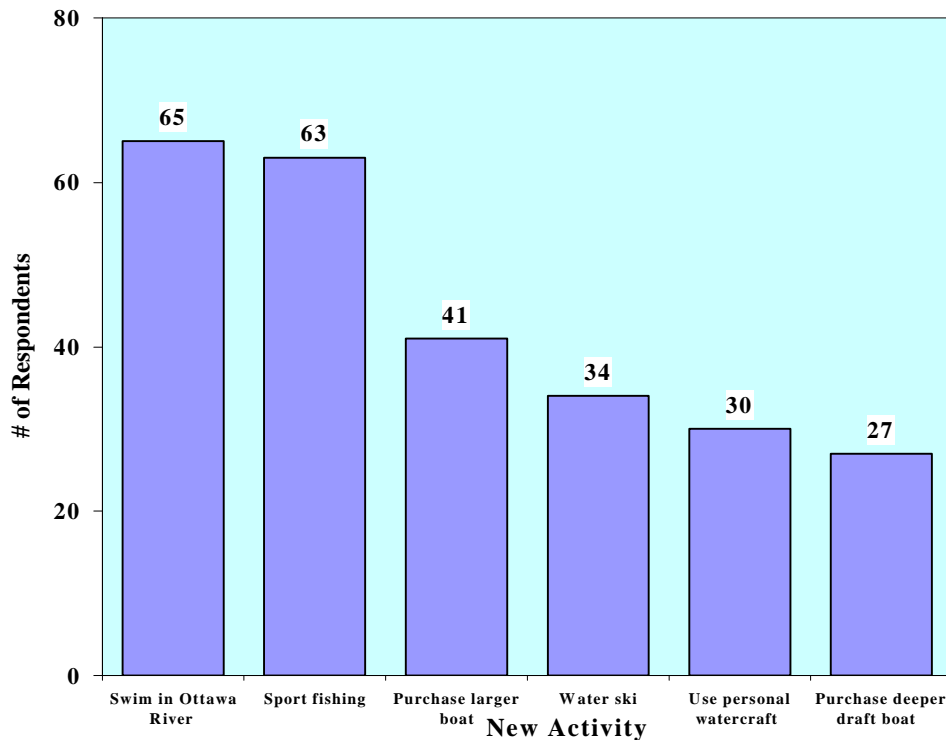
Factors	Value
Dock Capacity	2,172
1998 Dock Occupancy Rate (%)	78
1998 Dock Usage = # of Boater Households Using Docks	1,700
Current Unused Dock Capacity	470
# of Launches at Ramps per Boating Season	3,000
Launch Capacity at Ramps per Boating Season	6,000
Current Unused Launch Capacity	3,000
# of "Contact Survey" Households Using Ramps	80
# of "Participant Survey" Households Using Ramps	300
Total # of Michigan Registered Boats (Monroe County)	11,000
Total # of Ohio Registered Boats (Lucas, Wood and Fulton Counties)	21,000
Average # of Boats per Ottawa River Area Household	1.7
Total # of Boater Households (Monroe County)	6,500
Total # of Boater Households (Lucas, Wood and Fulton Counties)	12,000

Objective 1

Economic value of dredging the Ottawa River and a connecting channel to Lake Erie to recreational boaters who used the Ottawa River area during 1998. To accomplish objective 1, we use information from the section *Improving the Ottawa River Resource, questions 22-26, of the contact survey* (CS), Appendix A. Respondents indicated they would increase Ottawa River area trips by an average of 16.5 percent in response to dredging for safe recreational navigation (question 22) and by an average of 16 percent in response to dredging of contaminated sediments (question 24). From (22), 78 percent would increase trips by an average 21.2 percent while 22 percent would make no change for navigational dredging; from (24), 72 percent would increase trips by an average 22.2 percent while 28 percent would make no change. While these changes cannot be added, area boaters can be expected to increase trips to Ottawa River area sites by 15 to 20 percent (5 to 7 trips per year) in response to either navigational, environmental, or joint dredging.

Activity changes boaters would make in response to navigational and contaminated sediment dredging (question 26) suggest environmental dredging is of greater importance to more respondents than navigational dredging. Of 101 respondents, 65 would swim in the Ottawa River, 63 would sport fish, 41 would purchase a larger boat, 34 would water ski, 30 would use a personal watercraft, and 27 would purchase a boat with a deeper draft (Figure 2). Four of these six involve contact with water, activities currently prohibited because of contaminated water.

Figure 2: New Actions of Current Boaters in Response to Dredging



The responses to the willingness to pay questions suggest that navigational dredging has the greater value, however. In question 23, the median (or middle) respondent household would pay \$25 per year for 10 years for navigational dredging; the mean of responses is \$42.55. One-fourth of 104 respondents said they would not pay anything for navigational dredging. Both median and mean estimates are presented because it is the median that is used to design a referendum which would be expected to pass; it is also the more conservative estimate. For example, if a referendum on navigational dredging were designed for Ottawa River area boaters, one would expect a referendum which asked boaters to pay \$25 per year for 10 years to pass because the median voter is the last vote needed for a majority.

In question 25, the median respondent household would pay \$10 per year for 10 years for dredging to remove contaminated sediments from the Ottawa River; the mean willingness to pay is \$37.59. Thirty-one percent of respondents would not pay anything for contaminated sediment dredging.

Since respondents were asked for the maximum payment level for a 10-year period, the median and mean payments per year are then converted to the present value of an annuity for 10 years. At a discount (interest) rate of 5 percent, the present value of a one dollar annuity for 10 years is \$7.72. For navigational dredging, the present value of the median payment of \$25 is (25×7.72) \$193; the present value of the mean payment of \$42.55 is (42.55×7.72) \$328 (Table 4). For contaminated sediment dredging, the present value of the median payment of \$10 is (10×7.72) \$77, and the present value of the mean payments of \$37.59 is (37.59×7.72) \$290.

Since the navigational and contaminated sediment dredging estimates cannot be added, the larger of the two for navigational dredging is used to estimate total value. Multiplying the net present value of the median (\$193) or mean (\$328) willingness to pay by the 1,780 boating households who used the Ottawa River area during 1998 yields the total willingness to pay for navigational dredging of the Ottawa River and a channel to Lake Erie. The total of boating households is comprised of 1,700 who docked boats and 80 who used the two boat ramps. The total willingness to pay estimate for the median is ($193 \times 1,780$) \$343,540, and for the mean is ($328 \times 1,780$) \$583,840 (Table 4).

**Table 4: Estimated Economic Value of Dredging
Measured by Willingness To Pay***

Willingness-to-Pay	Navigational Dredging		Environmental Dredging	
	Per Household or Business	Ottawa River Area	Per Household or Business	Ottawa River Area
Current Users				
median	\$193	\$343,540	\$77	N/A
mean	\$328	\$583,840	\$290	N/A
Potential Users				
median	\$0	\$0	\$0	\$0
mean	\$39	N/A	\$62	\$47,740
Businesses				
median	\$772	\$58,672		
mean	\$1,513	\$114,988		

***Willingness To Pay** = Present Value of the Annual Payment for the 10 Year Period Discounted at 5%

In addition to boating households, Ottawa River area businesses were asked how much they would be willing to pay each year for 10 years to have the river and connecting channel dredged for navigation and contaminated sediment removal (See *Business Survey*, Appendix C, question 25). The median willingness to pay was \$100 while the mean was \$196; 23 of 28 businesses responded. In question 26, 13 business respondents said navigation and contaminated

sediment removal were of equal importance, 7 said navigation was more important and 3 said contaminated sediment removal was more important.

Using the same 5 percent discount rate for 10 years which yields an annuity factor of 7.72, the present value of the median willingness to pay is $(\$100 \times 7.72)$ \$772 and the present value of the mean willingness to pay is $(\$196 \times 7.72)$ \$1,513. If these estimates apply to all 76 businesses, the willingness to pay for dredging is $(\$772 \times 76)$ \$58,672 at the median and $(\$1,513 \times 76)$ \$114,988 at the mean (Table 4).

Objective 2

Potential economic value of dredging the Ottawa River and a connecting channel to area recreational boaters who would use the Ottawa River area if dredged. To accomplish objective 2, information from the section *Improving the Ottawa River Resource, questions 22-26, of the participation survey (PS)*, Appendix B is used. Although there is some inconsistency in responses across questions 19a, 22, 23 and 25, it is concluded that about 40 percent of sample respondents used the Ottawa River area for boating during 1998; the responses of these users to the dredging alternatives are similar to those from the *contact survey*. Another 42 to 44 percent responded that they would not use the Ottawa River area even if it is dredged. The remaining 16 to 18 percent are potential users under the dredging alternatives. In (23) 18 percent (10 of 56) said they would use the area for 25 percent of trips (6 to 7 trips) if dredged for navigation. In (25), 16 percent (9 of 57) said they would use the area for 15 percent of trips (4 trips) if contaminated sediments were removed.

There is an obvious response bias in the *participant survey* with a much higher proportion of boaters who use the Ottawa River area responding than boaters who have no interest in the area. Lucas, Fulton and Wood Counties in Ohio have over 21,000 registered boats, which at 1.7 boats per household means there are over 12,000 boating households in these three counties. Monroe County, Michigan adds about 11,000 registered boats or nearly 6,500 boating households at 1.7 boats per household, yielding over 18,000 boating households within the area.

At capacity of about 2,172 docks, Ottawa River area marinas could accommodate about 12 percent of boater households. In addition, the two public ramps in the area could accommodate an additional 300 boaters, or 2 percent of area boating households. This leaves 86 percent who cannot be accommodated at current Ottawa River area facilities, in contrast to 60 percent of survey respondents. If it is further assumed that respondents to the PS who are interested in using the Ottawa River area responded at twice the rate as those who would not use it under any conditions, then the proportion of those who would use the area if dredged is reduced from 16-18 percent to 8-9 percent. Eight percent of 18,000 households is 1,400 potential households as users of Ottawa River area facilities, which far exceeds the current unused capacity of the area.

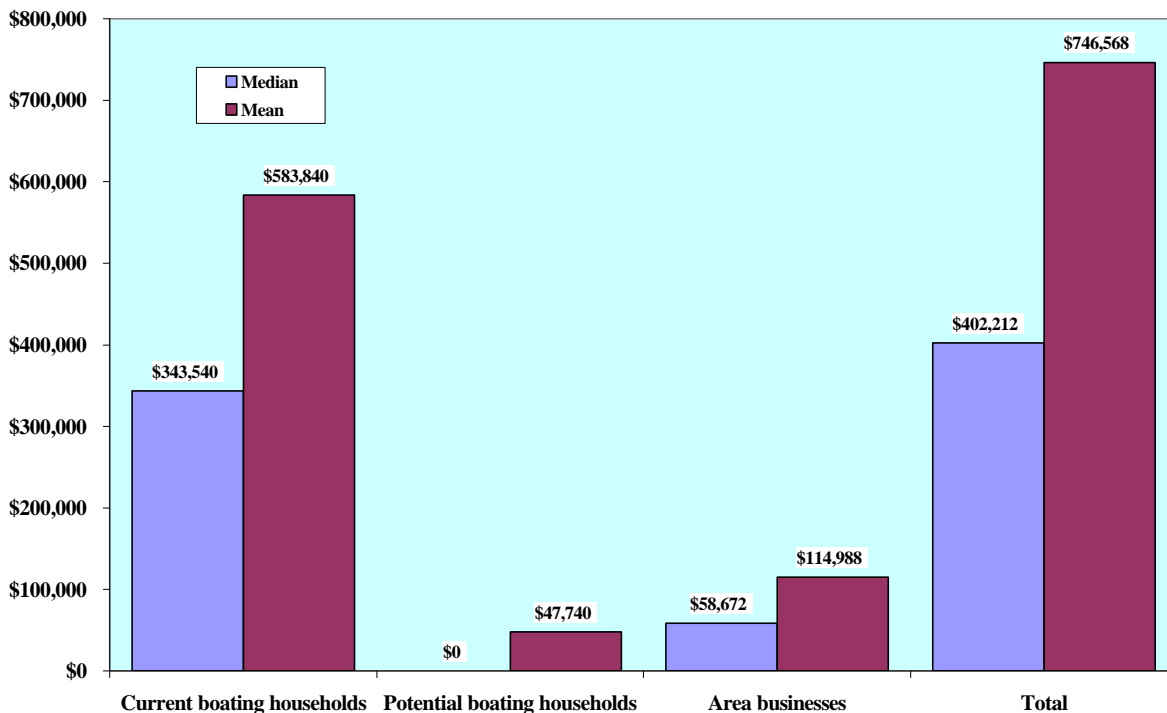
Unfortunately, these potential boaters are not willing to pay very much for dredging the Ottawa River and connecting channel to Lake Erie. Six of 10 would pay nothing for navigational dredging and 5 of 9 would pay nothing for environmental dredging. The resulting median willingness to pay from both types of dredging is zero. The median willingness to pay for both types of dredging is also zero for all sample respondents, i.e., more than 50 percent of

respondents said they would pay zero in each dredging question, because those who would never use the Ottawa River area would pay zero for its dredging. The mean willingness to pay for navigational dredging by the 10 potential users is \$5.00, and for environmental dredging by the 9 potential users is \$7.55. The mean willingness to pay by all respondents is much higher, (*see Appendix B, questions 24 and 26*), but is driven by the respondents who use the area and whose valuation is accounted for in the *contact survey* results above.

The net present value of the median willingness to pay per year is zero. The net present value of the mean willingness to pay for navigational dredging is $(\$5 \times 7.72)$ \$39 and for environmental dredging is $(\$8 \times 7.72)$ \$62 (Table 4).

The larger economic value of environmental dredging is used to estimate the total value as the product of the present value of the willingness to pay and the number of new boating households the Ottawa River area is able to absorb to reach capacity. This increase is estimated at 770 households, comprised of 470 households who would use the open docks and 300 additional households who keep their primary boats at home and trailer them to the public ramps. The estimated economic value of potential new users is zero at the median willingness to pay and $(\$62 \times 770)$ \$47,740 at the mean willingness to pay.

Figure 3: Estimated Economic Value of Dredging Measured by Willingness To Pay: Present Value of Annual Payment for 10-Year Period Discounted at 5 Percent



The estimated economic value of dredging the Ottawa River to current and potential boaters and to area businesses from objectives 1 and 2 is graphically presented in Figure 3. The total economic value is \$402,212 at the median and \$746,568 at the mean willingness to pay of respondents.

Objective 3

Direct economic and fiscal impacts of dredging the Ottawa River and connecting channel by recreational boaters who used the Ottawa River area during 1998. The direct economic and fiscal impacts of recreational boating in the Ottawa River area are comprised of boater expenditures in the area and the tax revenues generated by those expenditures. The direct economic and fiscal impacts of dredging are the expected new expenditures by current boaters as a result of navigational or environmental dredging. The impacts of new boaters are estimated under objective 4. The contact or user survey data on boater expenditures provides the basic information for direct economic impacts, supplemented by the business survey. Fiscal impact information comes primarily from the business survey, which unfortunately is poorly reported and not estimated.

From the *contact survey* (CS), the average boater household spent \$8,495 on boat trips to the Ottawa River area and on maintenance, fees and repair and equipment purchases (Figure 1). In addition each household spent an average of \$6,912 purchasing boats and \$1,667 on boat loan payments. Using information from questions 9 and 10, about one-third of the boats were purchased as new boats and about one-half were purchased from dealers (the remaining boats were purchased from other individuals). In addition, about 85 percent of the retail cost of new boats goes to the boat manufacturer and wholesaler, leaving 15 percent to be captured by the boat dealer or marina. For used boats sold by dealers, it is assumed that 85 percent of the price goes to the previous owner and 15 percent to the dealer. Since 50 percent of boats were purchased through dealers, 15 percent of the 50 percent of boats sold by dealers is included, or 7.5 percent of the boat purchases reported by survey respondents. This amount is $(\$6,912 \times 0.075)$ \$518 per household. The total estimated expenditure per boating household during 1998 is $\$8,495 + 518 = \$9,013$.

From this expenditure of \$9,013 per boating household who used the Ottawa River area during 1998, total expenditures can be estimated as the product of per household expenditure and the estimated number of households who used Ottawa River area facilities during 1998. This is $\$9,013 \times 1,780 = \$16,043,140$. In other words, area boaters are estimated to have spent \$16.0 million on Ottawa River area recreational boating trips during 1998. In addition, $(\$1,667 \times 1,780)$ nearly \$3.0 million was paid to financial institutions as boat loan payments.

However, not all of these expenditures were made at Ottawa River area businesses. The CS respondents indicated they made an average of 74 percent of their expenditures in the area. Expenditures made by these boaters in the local Ottawa River area economy are estimated at $(\$16,043,140 \times .74)$ \$11.9 million. The local share of boat loan payments is estimated at $\$3.0 \text{ million} \times .74 = \2.2 million .

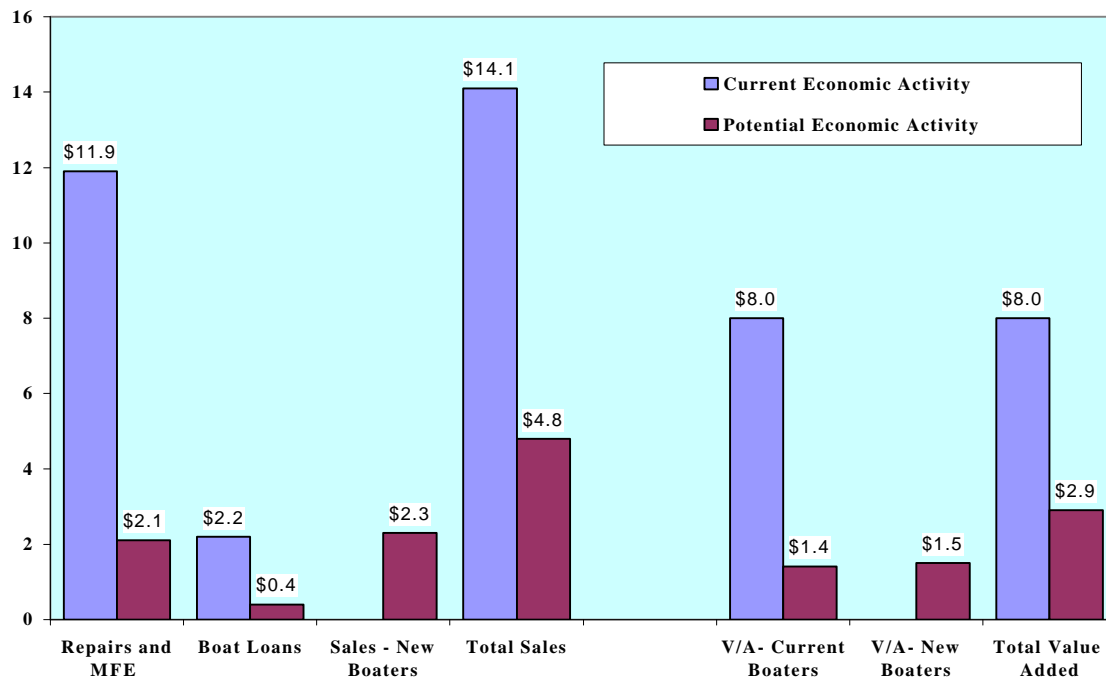
If Ottawa River area trips increase by 15 to 20 percent, then trip, maintenance, fees, repair and equipment expenditures are likely to increase by 15 to 20 percent, or by \$1.8 million to \$2.4 million, or about \$2.1 million. Initial impacts from boat purchases could be larger if boaters follow through by purchasing larger, deeper-draft boats. After the initial impacts, it is not clear that an increase of 15 to 20 percent would be maintained for boat purchases and boat loan payments. Boat loan payments would increase an expected \$330,000 to \$440,000, or about \$0.4 million.

The businesses which serve the Ottawa River area are for the most part labor intensive, i.e., depending on the business 50 to 85 percent of sales or revenues accrue as income to labor, management and property. At the midpoint, 67 percent, about \$8 million of the \$11.9 million of local boater expenditures accrues locally as wages to employees, as returns to management and as payments for real property and property taxes, i.e., this is called value added in economic impact models. An increase of \$2.1 million in expenditures from dredging would generate estimated value added (new wages and returns to management and real property) of \$1.4 million.

Objective 4

Direct economic and fiscal impacts of dredging the Ottawa River and connecting channel by area recreational boaters who would use the Ottawa River area if dredged. The direct economic and fiscal impacts of potential recreational boating households to the Ottawa River area are comprised of expenditures made by boaters attracted to the area as a result of dredging the river and the tax revenues generated by those expenditures. *The participant or area boater survey* data on boater expenditures provides the basic information for estimation of direct economic impacts. Fiscal impacts are not estimated. The estimated sales and value added (economic) impacts to the local economy of current and potential (if dredging occurs) boating activity from objectives 3 and 4 is shown in Figure 4.

Figure 4: Estimated Annual Sales and Value Added Impacts of Current and Potential Boating Activity (In Millions of Dollars)



From the PS, average boater expenditures for all trips; maintenance, fees and repair; and equipment are \$5,642. (Figure 1). In addition, these boaters spent on average \$4,841 on new boat purchases and \$375 on boat loan payments. Using information from questions 9 and 10, about 40 percent of boats were purchased new and 52 percent of boats were purchases from

dealers. Using the same approach used in objective 3, excluding 85 percent of the cost of boats as manufacturing cost or to previous owners, 15 percent of the 52 percent of boats sold by dealers is included, or 7.8 percent of the boat purchases reported by respondents. This amount is $(\$4,841 \times 0.078)$ \$378 per household. The total expected expenditure for boating during 1998 was $\$5,642 + 378 = \$6,020$. In addition, there are boat loan payments of \$375 per household.

New boaters will not make all of their trips to Ottawa River area sites. Current boaters made two-thirds of their 1998 trips to area sites. Nor will they make all their expenditures at area businesses for those trips they do make to the area. Current boaters made 74 percent of their expenditures at area businesses. Current boaters make close to 50 percent of their boating expenditures at Ottawa River area businesses (.66 of trips x .74 of expenditures) assuming that expenditures are proportional to trips. For discussion purposes, it is assumed that new boating households to the Ottawa River area would make 50 percent of their 1998 boating expenditures at area businesses, or \$3,010 per household.

To estimate the number of new boaters, two estimates are made. First, under the assumption that all unused docks would be utilized, it is estimated that new boating households would use all of the 470 unused docks, bringing 470 new boating households to the area. Second, it is assumed the two boat ramps double their use, adding 3,000 launches per year. At 18 trips per household for those who keep their boats at home, this means the ramps could serve an additional 300 households making one-half or 9 of their trips to area sites. The additional 770 households spending \$3,010 per household at area businesses would generate an estimated \$2.3 million in revenues or sales to area businesses. This estimated impact is similar in size to the increased activity of current users of Ottawa River area facilities. The local value added (wages, management, property income, taxes) would be similar to that generated by current boaters, i.e., about 67 percent or \$1.5 million.

Conclusions

Dredging the Ottawa River area and a connecting channel to Lake Erie would generate significant increases in the economic value of the Ottawa River area resource and increase

Table 5: Economic Value of Dredging the Ottawa River and a Connecting Channel to Lake Erie*

	Median	Mean
Current boating households	\$343,540	\$583,840
Potential boating households	0	47,740
Area businesses	58,672	114,988
Total	\$402,212	\$746,568
* Present Value for a 10 Year Period at Median and Mean Values of Dredging to Boaters and Businesses		

significantly the economic activity of area businesses. Economic value estimates are over \$400,000 at the median value reported by area boaters and businesses, and nearly \$750,000 at the mean values (Table 5).

These represent estimates of the present value of willingness to pay for dredging over and above recreational expenditures for Ottawa River area boating to improve the boating environment of the river for a 10 year period.

The estimated impacts on the local economy are the annual changes in sales or revenues resulting from dredging the river and connecting channel and the annual income from new jobs and profits as a result of these sales. Current sales are over \$14 million annually which generate \$8 million in value added income to labor, management and property. The estimated increase in economic activity is nearly \$5 million in annual sales and \$3 million in annual income (Table 6).

Table 6: Current and Expected New Annual Sales and Income Impacts of Dredging the Ottawa River and a Connecting Channel to Lake Erie

	Current Activity	New Activity
Sales		
Current boating households		
Trip, maint, repair, fees, equip.	\$11.9m	\$2.1m
Boat loans	2.2m	0.4m
Potential boating households		2.3m
Total Sales	\$14.1m	\$4.8m
Value added		
Current boating households		
Trip, maint, repair, fees, equip.	\$8.0m	\$1.4m
Boat loans	???	???
Potential boating households		1.5m
Total Sales	\$8.0m	\$2.9m

The estimates in Tables 5 and 6 are made under the assumption that the Ottawa River area would be used at current capacity after the dredging is completed. If the dredging does not occur, the \$11.9 million in current activity will erode as the river continues to silt over time, reducing the already limited navigation on the river. If the capacity of area facilities were increased through improvements of existing facilities or the construction of new ones, then the estimated economic value and economic impacts would be larger.

ACTION GROUP RECOMMENDATIONS

The Ottawa River Action Group of the Maumee RAP proposes to build local support for dredging the Ottawa River by presenting the result of this research to boaters, businesses and other stakeholders, as well as local, state, and federal government representatives and by pursuing the following actions in its dredging strategy over the next 18-24 months:

- Identify and obtain a local government sponsor to provide partial financial support for a dredging project. This will involve communicating with local and state officials initially and on a regular basis as progress is made.
- Develop a local revenue program for dredging with area marinas and yacht clubs based on current boaters willingness to pay for dredging. Initial steps include communicating with stakeholders to strengthen their willingness to join in a local sponsor partnership for environmental and navigational dredging. This will involve communicating with the stakeholder partnership as a whole, rather than target special interests.
- Request and develop the support of the Toledo Lucas County Port Authority Seaport Division for providing local disposal facilities for Ottawa River dredged material.
- Request and develop the financial support of the Army Corp of Engineers after local sponsorship has been determined and a commitment made
- Expand the support base for this project by seeking the involvement of new people representing the Ohio Division of Watercraft, banking community, colleges and universities, economic development agencies, and other private and public sector participation.
- Advertise progress and positive stakeholder attributes to the media.

