

The Value of Restoring Wetlands for Maumee Bay State Park Beach Visitors

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Introduction

Maumee Bay State Park (MBSP) Beach is a unique recreational destination in northwest Ohio, estimated to receive 112,000 “visitor occasions” to the beach during the summer of 2006¹. Total “visitor occasions” for 2006 are an estimate of the total times the beach was visited throughout the year. However, the beach is frequently posted with swimming advisories due to high E. coli bacteria measurements, and further impaired due to high sediment and nutrient run-off. Generally, beach visitation has declined significantly in the past decade, with 246,000 visitor occasions estimated in the summer of 1996. One of the reasons for the decline may be heightened concerns about the water quality. Extensive research has been conducted at the University of Toledo to determine the source of the bacteria contamination (Francy et al. 2005). The primary source is Berger ditch, just west of the beach. A feasibility study is currently being conducted for the restoration of wetlands near the beach, which will eliminate the bacteria concerns and swimming advisories. Other benefits of the restored wetlands may include: providing opportunities for bird watching and other wildlife observation, improved spawning habitat for sport fish, and increased numbers of endangered wildlife species and rare plants native to Ohio. Only 5% of the original wetlands remain in Northwest Ohio, and, “wetlands are almost unequaled in their benefits to humans...and unequaled in biological productivity”.²

In the summer of 2006 and 2007, the visitors to Maumee Bay State Park Beach were surveyed to collect information on their preferences for the restored wetlands and to estimate the value of the restored wetlands to the beach visitors. Information was also gathered on the amount the visitors spent in the local area when they visited the beach, representing the dollars brought to the local economy.

Survey Administration

The MBSP beach survey was designed in the spring of 2006, and its content was discussed in a focus group of about 10 people at the Lake Erie Center, including secretaries, students, and scientists. We obtained feedback from this diverse group concerning the survey’s readability and understanding of the questions. Next a pre-test was conducted at the beach where about 40 surveys were distributed and filled-out by the MBSP beach visitors. These preliminary surveys were analyzed, and a few minor changes were made to the final survey design.

The final survey was administered at the MBSP beach throughout the summer of 2006, from July 4th till the beginning of September. Also, the survey was conducted on two days during the summer of 2007 to increase the number of total surveys obtained. The hired survey administrators approached all groups of individuals at the beach and asked one member of the group to complete the survey. As an incentive, they could also fill-in a raffle ticket to be entered into a lottery for \$100. Before handing-out the surveys the administrators placed several boxes along the edge of the beach, and the respondents were directed to place the survey in the box

¹ Estimate provided by Jim Brower, Maumee Bay Regional Manager.

² “Ohio Wetland Restoration and Mitigation Strategy Blueprint”, Ohio DNR, Ohio EPA, USEPA Wetland Grant Program, Federal Grant NO. CD985853-01-0, September 1999.

when they were finished. Both visitors to the Lake Erie beach and the inland lake beach were asked to participate.

Survey Summary Statistics

Table 1 contains summary statistics from the 178 usable, completed surveys. The information contained in Table 1 controls for the fact that those individuals who visit MBSP beach more often are more likely to be intercepted, and are over represented in the sample. On average, respondents reported taking about 3 trips per year to MBSP beach during the current season. They expected to take slightly higher trips on average for the next season, 3.8 trips. Table 1 also provides summary statistics on the respondents socio-demographic characteristics.

Table 1. Survey Respondent Summary Statistics

<u>Variable</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Minimum</u>	<u>Maximum</u>
Past Trips	3.0	7.7	1	40
Expected Trips	3.8	8.4	0	40
Expected Trips if wetlands restored	5.2	12.1	0	70
Travel Cost	\$63.10	\$43.73	\$1.73	\$263.48
YES to hypothetical referendum	0.56	0.49	0	1
Bid Value	\$240.90	\$153.36	\$5	\$500
Household Income	\$83,380	\$44,520	\$7,500	\$200,000
Male	0.48	0.49	0	1
Age	39.6	12.3	11	76
Education	0.72	0.46	0	1
Household size	3.61	1.4	1	8

Sample Size is 178

The “education” variable equals one if the respondent has attended some level of higher education and zero otherwise. With 72% of the sample having higher education, and a relatively high average household income, the indication is that more educated and higher income individuals are more likely to visit MBSP beach. The other variables in Table 1 will be discussed in a later section.

Survey Results

In our sample, the majority, 78.3%, had visited MBSP beach before. The average time spent at the beach is four hours. When respondents were asked the open ended question, “what would you have done during this time if you had not come to this beach”, the largest number of responses could be categorized as other leisure activities (103 responses), such as gardening or activities at home. Another 40 respondents listed house or yard work. Only five respondents listed they would have instead visited another beach, highlighting MBSP beach as a unique destination. Notably, a higher number, eleven, listed swimming at a pool as their alternate use of

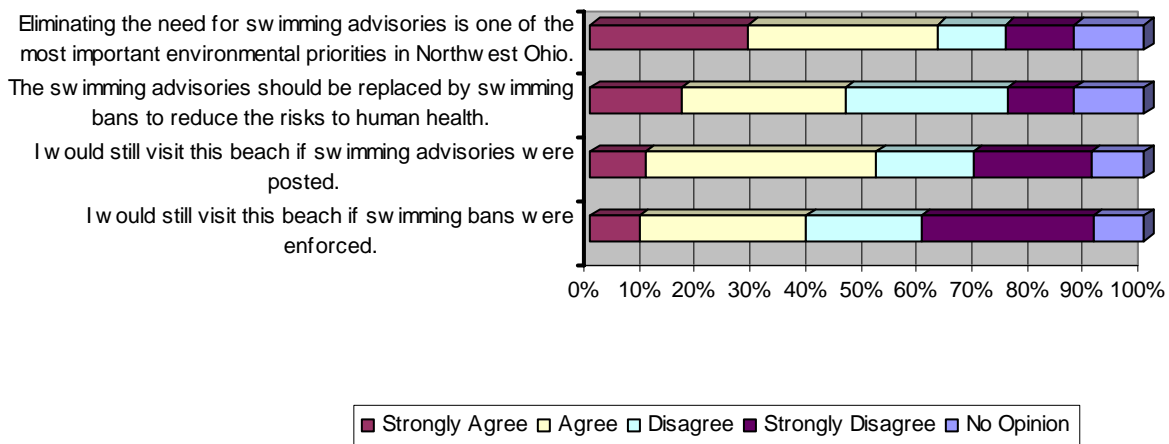
time. A following question did ask respondents to list any other beaches they visit, with East Harbor State Park being the site mentioned the most (16 respondents). No other site was mentioned by more than four respondents.

Turning to water quality, respondents were asked if they will swim, and if not why? For adults, 61.4% of the respondents swam during their visit, and if they had children with them, 59% of the respondents stated that their children will swim. For the roughly 40% of MBSP beach visitors who did not swim, they were offered several categories, with “Water not clean” being the category checked the most (36 respondents), followed by “Water too cold” (22 respondents), “Not in the mood” (16 respondents), “Weather” (19 respondents), “Other” (11 respondents), “Water not safe (waves, depth, etc.)” (7 respondents), “Don’t enjoy” (6 respondents) and “Don’t want to leave belongings” (4 respondents).

A. Swimming Advisories

The next section of the survey informed the respondents about the swimming advisories frequently posted at MBSP beach and the possible increases in illness for those who swim during this time. The majority of respondents had heard of the swimming advisories (74.9%). The next question in the survey asked the respondents for their opinion concerning several statements about the swimming advisories. The results are summarized in Figure 1 below.

FIGURE 1. Opinions



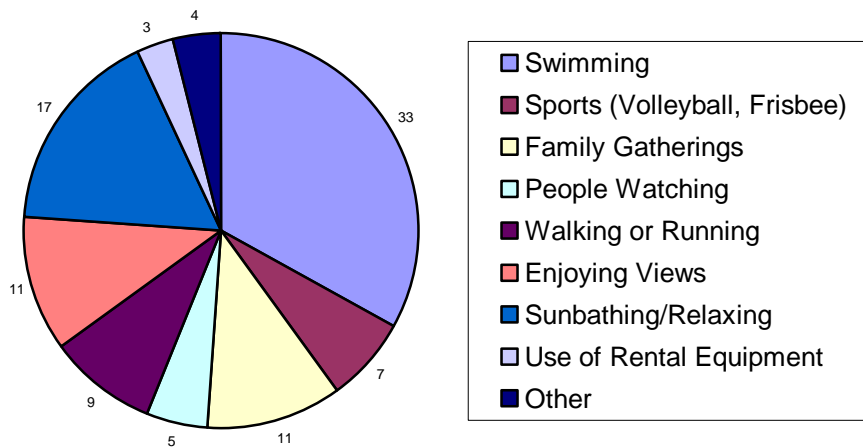
Of the four statements, the respondents agreed or strongly agreed the most for the statement, “Eliminating the need for swimming advisories is one of the most important environmental

priorities in Northwest Ohio,” with 65% agreeing or strongly agreeing. Roughly half of the respondents agree or strongly agree that, ”swimming advisories should be replaced by swimming bans to reduce the risks to human health,” although the respondents indicate that they would visit the beach less if swimming bans were enforced.

B. Beach Activities

In the latter part of the survey the respondents were asked to, “assume the wetlands have been restored and therefore swimming in the water poses no health risks from high bacterial levels.” They were then asked to assign 100 importance points to various activities, with the results summarized in Figure 2 below.

Figure 2. Average allocation of 100 importance points to activities at the beach



Assuming no bacteria contamination concerns, the respondents list swimming in the water as the most important activity when they visit MBSP beach. The category “Sunbathing/Relaxing” is a distant second with about half the importance points. Related to the importance of swimming when visiting MBSP beach, the respondents were asked an open-ended question about what improvements would lead them to visit MBSP beach more frequently. The number one response was if the water quality was better (34 respondents) with the second most response being if they lived closer to the beach (19 respondents). Other responses mentioned better concession options, restrooms, or simply having more free time to visit.

C. Spending

The respondents were asked, “Excluding your transportation expenses, how much do you expect to spend at or nearby this beach today? (consider all expenses such as, food, entertainment, rentals, supplies, lodging, souvenirs).” The amount spent for those respondents visiting MBSP beach for a single-day was \$29 on average and the multi-day visitors spent \$135 on average. In order to calculate a total annual dollar value, we need to estimate the annual number of single-day and multi-day visitors to MBSP beach. Using the estimated 112,000 annual visitor

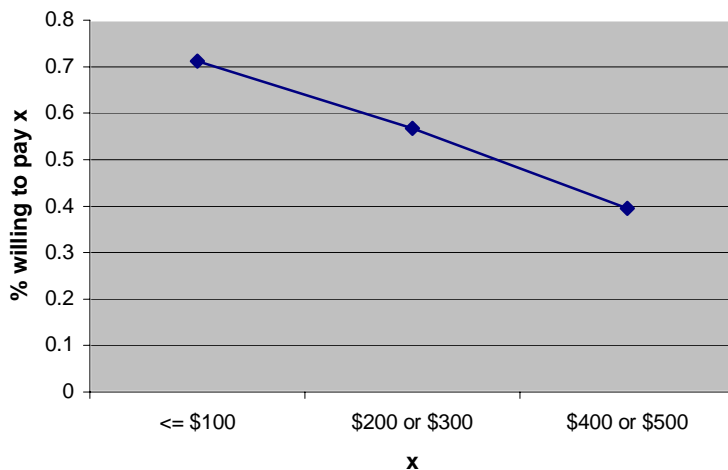
occasions to MBSP beach, and dividing by three, the average number of trips the sample respondents reported, leads to an estimated 37,300 unique annual total visitors to MBSP beach. In our sample, 70.8% of the respondents are single-day visitors with the remaining 29.2% being multi-day visitors. Therefore, we estimate single-day visitors spend \$765,832 annually and that multi-day visitors spend \$1,470,420 annually.

D. Value of the Restored Wetlands to the MBSP Beach Visitors

We estimate the value of the restored wetlands to the MBSP beach visitors using two techniques. Both techniques estimate the value based on respondents willingness to pay for the restored wetlands. The first method is based on the respondents reported increased trips to the beach, given the restored wetlands eliminate the swimming advisories and bacteria concerns. The respondent's willingness to pay for the restored wetlands is inferred from these increased trips. The second method is based on directly asking respondents if they are willing to pay a certain sum of money to support the restoration.

Referring back to Table 1, notice that the respondents report a 37% increase in trips (5.2 vs. 3.8 trips) to MBSP beach if the wetlands are restored and there is no need for the swimming advisories. The inferred value from these increased trips is \$147 per visitor per year. The second method for estimating the value is based on a hypothetical referendum. The respondents were asked the following question, "Would you vote "yes" on a referendum to restore wetlands on nearby public land that would improve the water quality at this beach to the level described above? The proposed project would cost you \$B per year in increased state income tax." The value of "\$B" was varied so that different respondents were faced with different restoration costs. Figure 3 plots the relationship between the percentage of respondents indicating they would be willing to pay the given restoration cost (x) along the horizontal axis. As Figure 3 shows, roughly 71% would be willing to pay \$100 or less, but only 39.5% would be willing to pay \$400 or \$500. Based on these data, the median willingness to pay is approximately \$375 per visitor per year. Although not discussed here, both of these willingness to pay estimates were generated via a formal statistical model.

Figure 3. Willingness to pay for wetlands restoration at MBSP



As is typical, the estimated value from the second method is higher than the first method, as the first method only estimates the value from the increased use of the beach, whereas the second method estimates directly the value of the restored wetlands, including other benefits such as the public access to the restored wetlands. To be conservative, we use the value from the first method. Multiplying this average annual value per visitor by the number of annual visitors results in a total annual value of the restored wetlands to the MBSP beach visitors of \$5.5 million. Note, that this value is only a portion of the total value of the restored wetlands, as many others will also enjoy this public resource. For example, 84% of the beach visitors state they will visit the proposed restored wetlands. Finally, it is important to remember that the value estimates are point estimates. There is a sampling error associated with each estimate. For the estimated value of \$147 the margin of error is \pm \$66. This margin of error represents a 95 percent confidence interval.

Conclusion

In conclusion, a conservative estimate of the annual value of the restored wetlands to the beach visitors is \$5.5 million per year, based on an average value of \$147 per visitor per year. Therefore, as long as the costs of the restored wetlands *which eliminate beach advisories* is less than \$5.5 million per year, they should be built, based on benefit-cost analysis, as those citizens visiting the beach indicate they are willing to pay \$5.5 million per year for the eliminated swimming advisories.

References

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- Francy, D.S., P. Struffolino, A. Brady, and D.F. Dwyer. 2005. "A Spatial, Multivariable Approach for Identifying Proximate Sources of *Escherichia coli* to Maumee Bay, Lake Erie, Ohio," U.S. Department of the Interior, U.S. Geological Survey, Open-File Report 2005-1386.

Appendix: Maumee Bay State Park Beach Survey

Maumee Bay State Park Beach Survey



DEPARTMENT OF ECONOMICS
DEPARTMENT OF ENVIRONMENTAL SCIENCES

THIS RESEARCH IS SPONSORED BY:
OHIO COASTAL MANAGEMENT ASSISTANT GRANTS PROGRAM

Your Opinion Matters!

Thank you for participating in the Maumee Bay State Park Beach Study at the University of Toledo.

The information you provide will significantly contribute to our understanding of the usage of Maumee Bay State Park Beach and how visitors feel about water quality.

It is important that we hear from everyone possible to get a fair representation of all views.

To provide an incentive for you, one lucky survey respondent will receive \$100! To enter the competition for this prize, please write your name and phone number or address on the raffle ticket and return it with your completed survey. We will contact the winner following the completion of our study.

The results of this survey will be used to inform policymakers concerning the possible restoration of wetlands in the area.

This survey is completely anonymous and your identity will not be requested at any time. Please ask the surveyor if you have any questions, or contact Dr. Kevin Egan at kevin.egan@utoledo.edu.

I. YOUR BEACH TRIP

- 1. Is this the first time you have been to this beach (Maumee Bay State Park Beach)?
 YES NO
- 2. Please enter approximately the amount of time you will spend on the beach today.
 HOURS
- 3. What would you have done **during this time** if you had not come to this beach?
- 4. Is your current visit a single day or multiple day trip?
 SINGLE DAY TRIP MULTIPLE DAY TRIP
- 5. So far this year, how many times have you visited this beach?
 - a. How many of these visits lasted longer than a single day?
- 6. Going forward for the rest of the year, how many more times do you expect to visit this beach?
 - a. How many of these visits will last longer than a single day?
- 7. Please list any other beaches you have or will visit this year and your total number of single day visits for each beach.
 Other beach Number of single day visits
 Other beach Number of single day visits
- 8. Excluding your transportation expenses, how much do you expect to spend at or nearby this beach today? (consider all expenses such as, food, entertainment, rentals, supplies, lodging, souvenirs)
- 9. Did you or will you swim today? YES NO
 - a. If you have children, will they swim today? YES NO

If you answered NO for yourself and/or children, why not? Please check all that apply.

- Don't enjoy Not in the mood
- Water too cold Water not clean
- Water not safe (waves, depth, etc.) Weather
- Don't want to leave belongings Other

II. SWIMMING ADVISORIES

From 1999-2004, the following swimming advisory was posted at the Maumee Bay State Park Beaches a total of 148 days:

Water Quality Advisory - Bacterial levels here currently exceed state standards. Children, the elderly and those in ill health are advised not to swim.

For the 2006 season, swimming advisories are posted based on the past days E. coli bacteria measurements. The high (i.e. exceeding state standards) bacterial levels in the water increase the risk of illness to people who swim in it.

Possible Symptoms from Exposure to High Bacterial Levels

- Nausea
- Stomach cramps
- Sore Throat
- Diarrhea
- Eye, ear, skin, & respiratory infections

1. Have you heard of swimming advisories at this beach due to high E. coli bacteria counts?
 _____ YES _____ NO

If YES, how did you hear about it? _____

Please circle the appropriate response to each statement.

N = No Opinion (N) 3 = Agree (A)
 1 = Strongly Disagree (SD) 4 = Strongly Agree (SA)
 2 = Disagree (D)

	N	SD	D	A	SA
Eliminating the need for swimming advisories is one of the most important environmental priorities in Northwest Ohio.	N	1	2	3	4
The swimming advisories should be replaced by swimming bans to reduce the risks to human health.	N	1	2	3	4
I would still visit this beach if swimming advisories were posted.	N	1	2	3	4
I would still visit this beach if swimming bans were enforced.	N	1	2	3	4

VI. WETLANDS

1. Have you ever visited the nearby wetlands which include Ottawa National Wildlife Refuge, Magee Marsh Wildlife Area, or the Maumee Bay State Park Wetland Boardwalk? YES
 NO
2. Would you visit the additional restored wetlands proposed here?
 YES NO

If YES, what activities would you enjoy?

wildlife observation biking trails hiking trails
 educational programs other _____

VII. BEACH ACTIVITIES

Assume the wetlands have been restored and therefore swimming in the water poses no health risks from high bacterial levels.

Now, assume you have a total of 100 importance points to assign to the following activities at this beach. Please indicate the importance of each activity by allocating your 100 points among the items on this list. You do not need to give points to all of the items, but remember that the total needs to equal 100.

Number of Points	Activity
	Swimming
	Sports (volleyball, Frisbee)
	Family Gatherings
	People Watching
	Walking or Running
	Enjoying Views
	Sunbathing/Relaxing
	Use of Rental Equipment
	Other
100	TOTAL

1. I would visit this beach more if _____.
(Please provide any improvements you would like to see.)

VIII. ABOUT YOU

For statistical purposes only, we need to know some information about you and your household.

- 1. What is your home zip code? _____
- 2. What is your gender? _____ Male _____ Female
- 3. In what year were you born? _____
- 4. How many people traveled with you on this trip? _____
- 5. How many adults (over the age of 18) live in your household? _____
- 6. How many children (18 or under) live in your household? _____
- 7. Please check your last level of completed education.

- _____ Primary School
- _____ High School Diploma or equivalent
- _____ Some College/Technical School
- _____ Four year College Degree
- _____ Graduate/Professional Degree

- 8. Please check your *household's* approximate annual income (before taxes) in 2005.

- | | |
|---------------------------|-----------------------------|
| _____ Less than \$10,000 | _____ \$40,001 - \$50,000 |
| _____ \$10,000 - \$15,000 | _____ \$50,001 - \$60,000 |
| _____ \$15,001 - \$20,000 | _____ \$60,001 - \$75,000 |
| _____ \$20,001 - \$25,000 | _____ \$75,001 - \$100,000 |
| _____ \$25,001 - \$30,000 | _____ \$100,001 - \$125,000 |
| _____ \$30,001 - \$35,000 | _____ \$125,001 - \$150,000 |
| _____ \$35,001 - \$40,000 | _____ More than \$150,000 |

Thank you for your assistance with the Maumee Bay State Park Beach Survey at the University of Toledo.

Comments: