

PROJECT REPORT

Includes: summary • findings • recommendations

Maslowski Beach Water Quality Education Project

September
2016

Report
prepared
by:

Center for Rural Communities
NORTHLAND COLLEGE

Acknowledgements

This report was developed by the Center for Rural Communities at Northland College. Funding for this project was provided by a Wisconsin Coastal management Program award to the City of Ashland Parks and Recreation Department.

We would like to thank staff from the Mary Griggs Burke Center for Freshwater Innovation (Northland College), the Applied Research and Environmental Lab (Northland College), and the City of Ashland's Parks and Recreation Department for their input and assistance throughout this project. We would also like to thank Northland College Center for Rural Communities student research assistants for their contributions, Jasmyn DiMeglio, Emily Donaldson, Sophie Holz, KayDee Johnson, Megan McBride, and Jordan Pelsue. We are especially grateful to student research assistant Kaylee Thornley for her leadership and extensive contributions to this project.

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Project Overview

Over the past three years, the Northland College Center for Rural Communities worked in collaboration with the Mary Griggs Burke Center for Freshwater Innovation (Northland College), the Applied Research and Environmental Lab (Northland College), and the City of Ashland's Parks and Recreation Department to measure and understand risky swimming behavior at Maslowski Beach. During the summer of 2014 and 2015, CRC staff collected baseline data including observations and surveys with beachgoers at Maslowski Beach. Baseline data were used to create a new warning sign to inform beachgoers of current water quality condition and potential health risks associated with swimming at the beach during increased levels and occurrences of E.coli. The new sign, referred to as Louie the Bass (Image 2), was designed to target children who are at high risk of becoming infected and who were also most likely to enter the water based on data collected at baseline. The sign includes a warning system as well as information on risks, water quality, and alternative swimming locations. In the summer of 2016, CRC staff collected observation and survey data of beachgoers at Maslowski Beach to assess the effectiveness of the new sign. This report summarizes key findings from 2014, 2015, and 2016. The report ends with suggestions to improve public awareness around swimming during warning or closure periods.

Image 1. Old Warning System



Image 2. Louie the Bass Warning System





Summer 2016 Data Collection¹

Research staff observed 2,400 beachgoers prior to sign re-design, and an additional 763 beachgoers in 2016, after placement of the new sign (Table 1). Research staff interviewed 243 beachgoers prior to sign re-design, and an additional 68 beachgoers in 2016, after placement of the new sign (Table 1). All of 2016 observations and interviews occurred after the installation of a new informational sign referred to as “Louie the Bass”. The primary purpose of the new sign was to warn swimmers about current water quality and safety conditions as well as inform beachgoers of potential health risks when swimming at the beach during warning or closure periods.

Table 1. Number of observations and interviews by year

	2014	2015	2016	Total
Observations	1242	1158	763	3163
Interviews	122	121	68	311

Comparison to Baseline Findings

Consistent with 2014 and 2015 baseline findings, beachgoers were most likely to go to the beach and enter the water on warmer days; specifically days where the air temperature was at or above 80 degrees Fahrenheit. Before and after sign re-design, children and youth under the age of 18 were most likely to enter the water regardless of temperature compared to any other age group. Self-reported survey data before and after sign re-design indicates beachgoers most commonly swam because they wanted to be outside, it was hot, and they had free time.

¹ See Appendix A for explanation of methodology.

Analysis of New Warning System

To test the effectiveness of the new sign at communicating potential risks associated with swimming during increased levels of E.coli, we tested seven hypotheses using logistic regression to see what factors were associated with the likelihood a beachgoer would enter the water. Hypotheses and results are summarized below:

H1: Beachgoers are less likely to enter water when warning sign is present.

The presence of warning and beach closure signs was not related to entering the water. Moreover, there was no difference in beachgoer behavior after the Louie the Bass sign was posted. The Louie the Bass sign had no effect on the cohort most likely to enter the water, children and youth under the age of 18.

There are a number of possible explanations for the lack of observed relationship between the new signage and risky behavior, including the unusually high number of warm days during 2016 summer. However, a likely shortcoming was sign placement. The sign was placed perpendicular to the lake on the east end of a beach that spans about a third of a mile.

Additionally, the sign is on the side of the kiosk, which is also the side that would be least visible to beachgoers whether entering via foot, bike, or car. To highlight this point, only 4.1 percent of all beachgoers (or 31 out of 763) actually looked at the sign during our 2016 observations. Similarly, the percentage of survey respondents who stated they noticed the new sign is slightly higher at 16.2 percent (or 11 out of 68 respondents) but still only a small minority of beachgoers.

Although the new sign did not have an effect on overall beachgoer behavior, we did find evidence – although not statistically significant – that viewing the sign was positively correlated with beachgoer’s knowledge of risky swimming.

H1a: People who view the new sign are less likely to enter the water on days when E.coli levels are elevated.

Findings indicate that beachgoers who viewed the new sign on days where E.coli levels were elevated (as signified by a yellow or red warning) were less likely to enter the water compared to (1) those who did not view the sign on warning days, (2) those who did not view the sign on non-warning days, and (3) those who did view the sign on non-warning days (Table 2).

Table 2. Percent and frequency of those entered or did not enter, by sign view and water quality

		Viewed Sign	
		Yes	No
No Warning	Did not enter	38.5% (n=10)	39.0% (n=208)
	Entered	61.5% (n=16)	61.0% (n=326)
Yellow or red Warning	Did not enter	80.0% (n=4)	31.8% (n=61)
	Entered	20.0% (n=1)	68.2% (n=131)

The percent of beachgoers who entered versus those who did not enter the water are basically the same for all groupings except those who saw the sign on warning days. With no warning posted, 61.5 percent of beachgoers viewed the sign and entered the water while 61 percent did not view the sign and entered the water. However, during warning days 20 percent viewed the sign and did not enter the water while 68.2 percent did not view the sign and entered the water. These results were not statistically significant.

H1b: People who report seeing the new sign score higher on beach knowledge index than those who report not seeing the sign.

We also examined beachgoer knowledge of risky versus non-risky behavior and found that beachgoers who viewed the sign scored higher on a knowledge index than those who did not see the sign. The knowledge index is made up of questions respondents were asked about risky beach behavior (see table 3 below for questions and scoring). All questions are based on information communicated on the new Louie the Bass sign. Based on our survey data, we found that individuals who self-reported seeing the new sign scored higher on a beach knowledge index. The sample size used for this analysis is low, and the difference in score is not statistically significant. However, the score is going in the direction one would expect; that is, those who saw the sign scored higher on average (on a scale 0-1 with 1 being perfect score and 0 meaning no correct answers) than those who did not see the sign – 0.70 versus 0.61.

Table 3. Beach knowledge index questions

Question	Scoring
At Maslowski Beach, a red sign indicates a warning, no closure	True = 0 False = 1
Everyone has an equal risk of getting sick from bacteria at beaches	True = 0 False = 1
Water at Maslowski Beach is most often unsafe for two or three days after heavy rainfall when the weather has been very warm	True = 1 False = 0
Gulls, geese, and other shorebirds' waste increases bacteria levels at Maslowski Beach	True = 1 False = 0
During times of high bacteria levels at Maslowski Beach, it is usually also unsafe to swim at the two other public beaches in Ashland	True = 0 False = 1
Participant scores created taking the mean score of at least three questions with a range 0-1 (0 means no correct answers and 1 means answered all questions correctly).	

Analysis of Other Explanatory Variables

If the current signage (new or old) did not make a difference in changing behaviors, what factors could explain engagement in risky behavior? To complete our analysis, we examined the potential effect of temperature, age, gender, time spent at the beach, time of day, and cloud cover.

H2: Beachgoers are more likely to enter water when the weather is warmer.

Entering the water is associated with ambient air temperature. The odds of entering the water by all beachgoers are 1.11 times higher for each ten-degree increase in air temperature. Across all age groups, a majority of beachgoers entered the water when the air temperature was at or above 90 degrees Fahrenheit.

Table 4. Percent of people entering water by age and ambient air temperature

	60 degrees	70 degrees	80 degrees	90 degrees
Child (under 13)	52.1%	77.9%	89.5%	94.6%
Teen (13-18)	17.6%	65.1%	87.1%	100.0%
Young person (19-35)	21.1%	41.5%	66.1%	88.9%
Middle age (36-55)	7.5%	28.8%	55.3%	63.0%
Older person (over 55)	14.0%	16.8%	47.3%	81.8%

H3: Children are more likely to enter water than adults.

The age of beachgoers is associated with the likelihood of entering the water. After controlling for a variety of factors potentially associated with entering the water (e.g., air temperature), the odds that children under the age of 13 will enter the water is 8.08 times higher than beachgoers over the age of 55.

H4: Male beachgoers are more likely to enter the water than female beachgoers.

After controlling for other factors (e.g., temperature, age, time of day, and time spent at beach), male beachgoers are no more likely to enter the water than female beachgoers.

H5: Beachgoers who spend more time at the beach are more likely to enter the water than those who spend less time at the beach.

The odds of entering the water by all beachgoers are 1.55 times higher for each unit increase in time spent at the beach. That is, beachgoers who spent over an hour are one and a half times more likely to enter the water than those who spent less than an hour at the beach.

H6: Beachgoers who arrive at the beach later in the day are more likely to enter the water than those who come to the beach earlier in the day.

The odds of entering the water are 1.17 times higher for each unit increase in time of day. Beachgoers who show up at 2:00 pm are 1.17 times more likely to enter the water than those who show up at 12:00 pm.

H7: Beachgoers are most likely to enter the water on clear, sunny days compared to all other types of days.

After controlling for the other factors, cloud cover is not associated with likelihood of entering the water.

Conclusion

People want to and will swim when it is hot – especially children under the age of eighteen. Despite finding a modest, non-significant relationship between engagement in risky swimming behavior and the new sign as well as between knowledge and the new sign, additional information kiosks or signs have the potential to inform the public and reduce the likelihood of swimming on days with elevated levels of E.coli. Data gathered through observations suggests people who see the sign on warning and closure days do not enter the water at the same rate as those who do not see or who go to the beach when there are no warning signs up. The information and warning systems should be positioned more prominently (e.g., an angled sign in the middle of the beach where beachgoers can see it from either direction and reach line of sights across the span of the beach). However, based on the evidence we have collected over the last three summers, signage alone does not seem to be sufficient to reduce risky swimming behavior during elevated levels of E.coli.

In addition to better signage placement, we recommend exploring three other avenues forward. The first is addressing the underlying causes high E.coli levels at Maslowski Beach. Ashland Parks and Recreation is actively pursuing this option as highlighted by a successful grant application (of \$175,000) to reduce runoff through infiltration swales, native vegetation, and replenishment of beach surfaces. There are, of course, other causes related to an increase in E.coli that would require technical fixes.

Second is enforcing closures at Maslowski or actively redirecting beachgoers to other areas. However, this avenue may prove unpopular with beachgoers and the larger community.

The final avenue is pursuing sustained social marketing campaign and outreach efforts to reduce risky swimming behaviors. Social marketing applies the same techniques commonly used to sell goods and services to modifying behaviors to solve social and community problems. This technique involves identifying who is participating in the behavior, understanding the underlying causes of behavior, identifying the barriers to behavior change, and reducing these barriers. The data collected over the last summer offers insight into most of these questions, including who participates and why, as well as some of the main barriers. These data can be used to craft a targeted message(s) addressing the problem, offering a solution, and outlining actions. These data can also inform an outreach plan that includes increased signage, volunteers speaking with beachgoers on warning days, and publicity through print, television, and radio. The Parks and Recreation Department may consider a staged approach, starting with raising awareness, moving toward changing attitudes, and finally motivating people to act. Potential partners should be identified, for example, local non-profits, schools, and Health Department. Social marketing efforts take time and resources to implement but provide a promising option for more comprehensively addressing the problem of risky swimming behavior at Maslowski beach.

Appendix A

Methods

Surveys

CRC Research Assistants surveyed beachgoers over 18 years of age during 2014, 2015 and 2016. The survey instrument included questions about swimming behaviors on that day, their family members' swimming behaviors on that day, their awareness of risky swimming behavior, and demographic questions.

Surveys were conducted on randomly selected days, and a total of 311 surveys were completed over three summers (Table 1).

Observations

CRC Research Assistants observed all beachgoers noting the approximate age and engagement in risky swimming behavior. Observation sheets included beachgoer time of day, length of stay, ambient air temperature, cloud cover, gender presentation, approximate age, minor or not, and behavior (e.g., did not enter water, wading, swimming), and viewing warning sign.

Observations were conducted on randomly selected days, and a total of 3,163 observations were completed over three summers (Table 1).

Variable Construction

Warning

A dichotomous variable was constructed using observation data. Yellow and red signs that indicate moderate to high E.Coli levels were coded as "warning" and a green sign indicating below threshold E.Coli levels were coded as "no warning".

Viewed Sign

A dichotomous variable was constructed using observation data. Beachgoers who walked by and looked at the sign were coded as "viewed sign." All others were coded as "not viewed."

Entered the Water

A dichotomous variable was constructed using observation data. People wading or swimming were coded as "entered water" while those who stayed on the sand were coded as "did not enter water."

Beach Knowledge Index

The knowledge index was developed based on survey data. A series of five survey questions assessing knowledge of risky beach behavior were included. All questions are based on information communicated on the new Louie the Bass sign. The index score was created by taking the mean score on a minimum of three questions. The index is on a scale from zero to one, where one indicates all answers were correct, while zero indicates no correct answers.

Center for Rural Communities

The Northland College Center for Rural Communities applies research based solutions to social and economic challenges, partners with community members to build on local knowledge, and promotes the long-term health and vitality of rural communities in the north woods region. For more information, visit us at northland.edu/crc

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