2012 BATHING BEACH
MONITORING & NOTIFICATION PROGRAM RESULTS

Introduction

Ohio conducts a monitoring and notification program of identified public and semi-public beaches located along the Ohio/Lake Erie border. The goal of the program is to monitor the water quality of the state's bathing beach waters and to notify the public whenever bacteria levels present a potential health risk to bathers. The program involves the efforts and cooperation of multiple state and local health agencies and organizations. The Ohio Department of Health (ODH) coordinates the state effort and is responsible for the successful management of the program.

There are 60 public and semi-public beaches that are monitored every season by ODH and our partners. The Ohio Department of Natural Resources (ODNR) published "Ohio's Lake Erie Public Access Guidebook" in 2010. This guidebook revealed that there are 164 points of public access to Lake Erie in Ohio and "nearly 53 miles of publicly accessible shore."[1] Currently all identified beaches are monitored weekly and the majority of beaches are sampled a minimum of four times per week.

The BeachGuard web-based reporting system was successfully installed and went 'live' in 2011. A press release was distributed state-wide and several media outlets ran a story on the updated and interactive website. As a result of the outreach efforts, program staff were contacted by Avon Municipal Sewer District regarding two beaches on the Lake Erie shore that they monitor. These beaches were added to the BeachGuard system but have not been added to the list that the ODH submits to the US EPA as part of the beach monitoring and notification program. The ODH and Avon Municipal Sewer District are discussing the possibility of collecting the necessary information for inclusion in the beach program. The website is located on the internet at: www.odh.ohio.gov/healthybeaches. The ODH received many positive comments on the new notification system.

Monitoring

The normal beach season in Ohio runs from Memorial Day to Labor Day. In 2012, the ODH contracted with four local health districts, Ottawa County, Erie County, Cuyahoga County and Lake County as well as the University of Toledo and Northeast Ohio Regional Sewer District, to conduct the monitoring and notification program. This was the second year that all monitoring and notification activities occurred at the local level since the ODH has managed this program. Sampling frequency along the Lake Erie shoreline remained the same as last year with a few exceptions. The beaches in Lorain City were monitored seven days per week to collect data to develop the NOWCAST predictive model for future use at those beaches.

Table 1 indicates the sampling frequencies:

Table 1

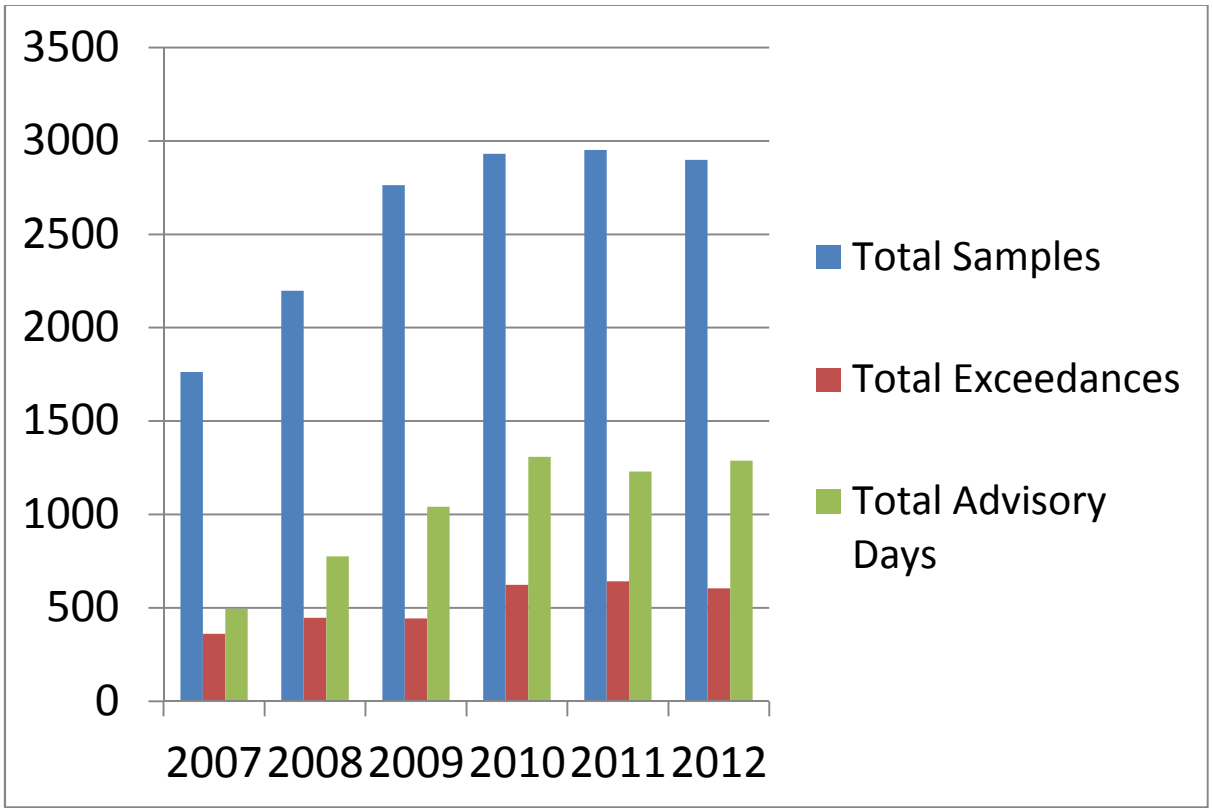
7 samples per week	7 beaches
4 samples per week	36 beaches
1+ sample per week	2 beaches
Minimum of 1 sample per week	17 beaches

[1] Ohio's Lake Erie Public Access Guidebook, 2010, Ohio Department of Natural Resources

For the first time since at least 2007, there was a decrease in the number of samples taken at the monitored beaches in 2012. The total number of samples taken was 2,898, down from 2,952 in 2011.

Figure 1 represents the sampling efforts in Ohio's bathing beaches over the past 5 years.

Figure 1



A review of the data from the past five seasons indicates that the number of samples collected decreased in 2012 as well as the number of exceedances; however, the number of advisory days actually increased slightly in 2012.

During 2012, water quality analysis in Ohio was based upon the single sample maximum established by the United States Environmental Protection Agency (USEPA) of 235 E. coli colony forming units (cfu) per 100mL. of water sampled. Erie, Ottawa and Lake Counties used the Collilert-18 method for sample analysis which has a maximum detection limit, without dilution, of 2419.6 cfu. Cuyahoga County and the Northeast Ohio Regional Sewer District used the Modified M-tech method to analyze their samples.

Public Notification

When sample results exceeded the standard of 235 cfu, advisory signs were posted to alert the bathing public of the water quality. Under normal circumstances, beaches are not closed solely due to high bacteria levels. However, the signage helps to educate the public and provides valuable data

for making informed decisions about their aquatic recreational activity.

The following pictures are examples of the signage posted at a beach location to alert the public whether the sample results from the previous day were acceptable or if the results exceeded the bacterial standard.

Acceptable Results

Exceeded Standard

The ODH posted a request for proposals (RFP) to administer the beach monitoring and notification program at the local level in 2012. In addition to posting the RFP on the internet, the local health jurisdictions that have beaches but have not participated in this program were contacted and encouraged to apply for the contract. A total of six proposals were received. The proposals were reviewed and contracts were awarded. The total amount of money awarded to the local projects was $149,438.00, which represents 66% of the money awarded to ODH by the US EPA.

Contracts were awarded to the Lake County General Health District, Erie County General Health District, Cuyahoga County Board of Health, Ottawa County Health Department, the University of Toledo and the Northeast Ohio Regional Sewer District. The Lake County General Health District monitored three public beaches in Lake County, one beach in Conneaut City, one beach in Ashtabula City and two beaches in Ashtabula County. The Erie County General Health District monitored 25 public beaches within its jurisdiction. The Northeast Ohio Regional Sewer District monitored three beaches in its area. The Cuyahoga County Board of Health monitored 16 beaches within its jurisdiction most of which are semi-public and private beaches as well as two beaches in Lorain City. The Ottawa County Health District monitored seven beaches within its area.

Name of Contracted Entity	**Amount of Award**	**Number of beaches monitored**
Lake County General Health District	$40,770.00	7
Erie County General Health District	$26,796.00	25
Cuyahoga County Health District	$36,792.00	16
Ottawa County Health Department	$19,038.00	7
University of Toledo	$13,146.00	2
Northeast Ohio Regional Sewer District	$12,896.00	3

Monitoring Data generated by the Ohio Department of Health and our local partners for the 2012 recreation season.

The single sample maximum level was used to evaluate sample results. Results were reported for evaluation against the standard, determination of whether an advisory was warranted, and notification to the public when necessary.

Table 2 is a summary of the sampling results and advisories for the monitored beaches in the State of Ohio.

Table 2

ID#	BEACH NAME	Samples Taken	Sample exceedance	%Sample exceedance	Average Ecoli per sample taken	Advisory days	Total advisories	% of the season on advisory
OH907394	South Bass Island St. Pk.	11	0	0.00%	18.21	0	0	0.00%
OH133557	Kelleys Island St. Pk.	12	1	8.33%	71.43	3	1	2.86%
OH810688	Arcadia Beach	14	8	57.14%	1204.5	54	3	51.43%
OH983073	Bay Park Beach	14	1	7.14%	77.78	7	1	6.67%
OH135472	Clarkwood Beach	14	4	28.57%	403.43	27	4	25.71%
OH862936	Columbia Park Beach	14	4	28.57%	941.86	27	3	25.71%
OH964162	Edgecliff Beach	14	4	28.57%	377.93	27	3	25.71%
OH507120	Moss Point Beach	14	6	42.86%	237.79	39	3	37.14%
OH159626	Noble Beach	14	4	28.57%	258.29	28	4	26.67%
OH645425	Parklawn Beach	14	3	21.43%	252.29	20	2	19.05%
OH934275	Royal Acres Beach	14	4	28.57%	451.21	27	4	25.71%
OH179611	Shoreby Club Beach	14	3	21.43%	5424.79	20	3	19.05%
OH435857	Sims Beach	14	4	28.57%	295.93	27	4	25.71%
OH775880	Utopia Beach	14	6	42.86%	1226.71	42	4	40.00%
OH396459	Catawba Island St. Pk.	15	2	13.33%	255.67	4	2	3.81%
OH136995	Wagar Beach	16	7	43.75%	370.94	40	4	38.10%
OH351307	Camp Perry	23	16	69.57%	1127.76	52	6	49.52%
OH484007	Clifton Beach	28	8	28.57%	285.57	28	7	26.67%
OH685679	East Harbor State Park	46	13	28.26%	304.52	19	8	18.10%
OH216093	Lakeside	46	0	0.00%	26.94	0	0	0.00%
OH463595	Port Clinton (Lakeview)	47	22	46.81%	501.06	40	10	38.10%
OH921073	Lion's Park	50	9	18.00%	264.34	24	4	22.86%
OH014323	Cranberry Creek	51	3	5.88%	98.91	6	3	5.71%
OH881916	Darby Creek	51	7	13.73%	173.93	14	6	13.33%
OH011172	Cedar Point	52	5	9.62%	137.18	5	4	4.76%
OH934406	Chappel Creek	52	4	7.69%	115.41	13	3	12.38%
OH517567	Edson Creek	52	15	28.85%	400.07	29	7	27.62%
OH242977	Fichtel Creek	52	4	7.69%	109.02	9	4	8.57%
OH497945	Hoffman Ditch	52	5	9.62%	101.16	9	5	8.57%
OH531706	Huron River East	52	9	17.31%	268.88	19	6	18.10%
OH102681	Huron River West	52	10	19.23%	152.52	18	6	17.14%
OH787470	Old Woman Creek West	52	2	3.85%	56.37	5	2	4.76%
OH840983	Sherod Creek	52	13	25.00%	392.57	33	8	31.43%
OH287343	Showse Park	52	5	9.62%	93.48	11	5	10.48%

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OH513071	Sugar Creek	52	7	13.46%	138.68	13	6	12.38%
OH625113	Battery Park	53	0	0.00%	16.69	0	0	0.00%
OH568760	Bay View West	53	26	49.06%	747.81	53	14	50.48%
OH158931	Crystal Rock	53	11	20.75%	268.06	17	6	16.19%
OH661129	Kiwanis Park	53	10	18.87%	206.05	28	6	26.67%
OH647956	Old Woman Creek East	53	3	5.66%	93.7	3	3	2.86%
OH957157	Pickeral Creek	53	9	16.98%	148.72	18	8	17.14%
OH453378	Sawmill Creek	53	9	16.98%	220.67	15	5	14.29%
OH084281	Vermilion East	53	12	22.64%	247.64	18	9	17.14%
OH944567	Vermilion West	53	10	18.87%	196.75	16	5	15.24%
OH422598	Whites Landing	53	21	39.62%	620.08	41	6	39.05%
OH510880	Bay View East	54	14	25.93%	264.91	23	12	21.90%
OH182884	Maumee Bay St. Pk. (Erie)	55	12	21.82%	250.99	16	11	15.24%
OH318877	Maumee Bay St. Pk. (Inland)	55	6	10.91%	97.62	16	6	15.24%
OH597908	Century Beach	56	9	16.07%	180.11	15	6	14.29%
OH882395	Lakeshore Park	57	25	43.86%	568.76	46	12	43.81%
OH400405	Conneaut Twp. Park	58	3	5.17%	81.84	3	3	2.86%
OH682568	Geneva State Park	58	2	3.45%	46.37	5	2	4.76%
OH610732	Walnut Beach	58	4	6.90%	103.83	8	3	7.62%
OH183537	Huntington Beach	59	10	16.95%	118.12	20	8	19.05%
OH273826	Lakeview Beach	94	49	52.13%	624.24	53	20	50.48%
OH719776	Headlands State Pk. (West)	101	11	10.89%	101.3	11	8	10.48%
OH777353	Headlands State Pk. (East)	103	13	12.62%	141.47	13	10	12.38%
OH244759	Euclid State Park	105	42	40.00%	645.98	38	38	36.19%
OH736320	Villa Angela State Park	105	45	42.86%	582.28	40	40	38.10%
OH270037	Edgewater Beach	106	13	12.26%	99.95	15	15	14.29%
OH491555	Fairport Harbor	108	18	16.67%	173.43	18	15	17.14%

NOWCAST and predictive models

During the summer of 2012, the Cuyahoga County Board of Health, in collaboration with the United States Geological Survey (USGS), continued the predictive modeling project at Huntington Beach, located on Lake Erie in Bay Village, Ohio. The project, known as NOWCAST System for Predicting Beach Advisories, evaluates multiple environmental factors such as rainfall, turbidity, wave height, and various other factors to determine the probability that the E. coli water quality standard will be exceeded. The NOWCAST system provides the public with same-day, near real-time water quality data seven days per week.

The Cuyahoga County Board of Health, in collaboration with the United States Geological Survey

(USGS), has also been working on creating a predictive model for Lakeview beach in Lorain County. Data from 2004, 2005, and 2011 (years where water quality data and sanitary survey information was readily available from USGS and CCBH) was entered into the Virtual Beach software program to determine significant variables impacting water quality at the beach. As a result of statistical analysis, wind speed, lake level, rainfall, turbidity, and the day of the year were all factors in predicting water quality at Lakeview. A threshold of 41% was calculated; however the model was used for research purposes only. Throughout the season, water quality advisory postings were based on laboratory sample analysis. The CCBH will continue to work with the Lorain Metroparks and the USGS on resolving this issue as well as reducing the overall number of false positive and false negative results.

The Northeast Ohio Regional Sewer District (NEORSD) continued the NOWCAST predictive model developed in cooperation with the USGS for the beach at Edgewater State Park. The NEORSD sampling crews were equipped with laptop computers and a wireless card, to effectively and efficiently identify water quality issues using the model. The sampling crews entered several variables into the model and posted the appropriate beach signage based on the prediction from the model.

As in previous years, it was agreed that water samples would be collected and analyzed for E. coli in the normal fashion in addition to the sample protocol for the NOWCAST system. It was also agreed that the NOWCAST predictions would be used as the determinant factor for posting water quality advisories at Huntington Beach and Edgewater. A detailed explanation of the project as well as results of sampling and predictions was available to the public throughout the summer at the following website, www.ohionowcast.info.

The University of Toledo also partnered with the USGS to develop a NOWCAST model for use at Maumee Bay on the western shore of Lake Erie. The model went 'live' in 2011. A further review of the variables resulted in slight changes to the model in 2012. During the 2012 recreational season, there were two different predictive models used based on the direction of flow from Berger Ditch, which empties into Lake Erie approximately 70 m east of the lakeside beach at MBSP, and previously identified as a potential source of fecal contamination. (1) A negative flow model used the 7:30 am discharges along with the change in lake level and the product of turbidity and a sum of a wind code based on the direction of wind for the previous four hours. (2) A positive flow model was based on rainfall for the previous 48 hours pulse the sum of a wind code for the previous four hours. As a result the model was accurate 79% of the time compared to 62% accuracy using traditional culture methods.

The Lake County General Health District began NOWCAST'ing their beaches on a trial basis for the 2012 beach sampling season. With the assistance of the USGS, models were developed for Mentor Headlands State Park Beach and Fairport Harbor Beach. Samples were also collected seven days a week from each beach and analyzed for E. coli. After examining the results of the NOWCAST, it was determined that the models need to be reviewed for the 2013 sampling season. There were a large number of false negatives predicted for both Mentor Headlands and Fairport Beach. Possible reasons for the inaccuracy of the model may be due to the scattered, spotty storms throughout the summer and using weather data in the models from Ashtabula and Burke Lakefront Airport. One of these weather data locations may have received rain while neither of the Lake County beaches did. One variable used in the model is a value for Grand River flow. Since it was a dry summer, on several occasions the stream gauge was below a level where a flow could be

measured. Therefore, the constant flow value used in the model at this time may have caused inaccuracy in the model output.

The Erie County Health Department continued its work with the USGS to develop predictive models at three of its beaches, Huron East, Huron West and Vermilion West. The tested model worked well at Huron West and Vermilion West, with accuracies of 76.9 % and 82.7%, respectively. The Huron East model did not perform as well with only 48.9% accuracy. This model will be changed to determine which variables will provide the most accurate model in 2013.

Additional activities in 2012

At the end of 2011and again in 2012, the Ohio Department of Health (ODH) began working closely with the Ohio Environmental Protection Agency (OEPA) to submit the Ohio monitoring and notification data through the OEPA State node. The data for the 2011 season was the first data package submitted in this fashion. The change in the submission protocol caused a few challenges. It was difficult to determine the chain of communication within the PRAWN and WQX systems to and when errors occurred in the submission process. The ODH and OEPA have already begun the submission process for 2012 and are working to streamline the interagency submission process.