International Joint Commission Health Professionals Advisory Board and Great Lakes Beach Association

Beach Sanitary Survey and Environmental Health and Safety Survey Initiative

Technical Report on Second Survey Responses

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Final technical report: June 2023

Introduction

The International Joint Commission's (IJC) Health Professionals Advisory Board and the Great Lakes Beach Association are collaborating on a public health initiative to assess the binational extent, experience and effects of Beach Sanitary Surveys (US)/Environmental Health and Safety Surveys (Canada) in the Great Lakes. We are seeking to determine to what extent routine and annual environmental survey activities are performed at Great Lakes Beaches.

A detailed survey of existing local beach programs in the Great Lakes was conducted in early 2021. We were looking to discover narratives that illuminate how mitigation led to swimming water compliance, and narratives illuminating mitigation leading to other outcomes, be they positive or negative. The project also aimed to underscore existing gaps in mitigation for issues already identified by surveys, for the Great Lakes overall, by nation (Canada and US), within each Great Lake state, and in the Province of Ontario.

About the surveys

The survey was first publicly announced at the 2019 State of Lake Huron Conference in Saginaw, Michigan. Following the conference, in early 2020, a short preliminary survey was distributed on listserv channels (Great Lakes Information Network [GLIN] and BEACHNET). It was also made available on the Great Lakes Beach Association website.

The second, more in depth survey was distributed in early 2021, and responses were solicited through the summer of 2021. The Initiative team shared the survey on listserv channels (GLIN, BEACHNET) and online publications, including the IJC's Great Lakes Connection newsletter. The second survey was also made available on the Great Lakes Beach Association website. The team also directly connected with government departments at the state and local level who are monitoring beaches.

Access the first survey here and the second survey here.

Snapshot of all Survey Responses

- 34 survey responses are reviewed here. We received 41 responses, however 5 were duplicate responses. After consultation with health departments, the duplicates were removed or amalgamated into the responses. This analysis focuses on those 34 survey responses.
- Responses were received from every Great Lakes state in the US (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin) and Ontario, Canada.

68% (23) respondents - US
32% (11) respondents - Canada

- Three tribes completed the survey, located in the US.
- The survey responses report on a total of 1155 beaches: 328 in Canada, and 827 US beaches.
- Of the 34 surveys reported on here, 71% (24) of respondents indicated that their program completes Annual Beach Sanitary Surveys/Environmental Health and Safety Surveys every year. 26% (9) do not complete the surveys, and 6% (2) don't know if their program completes the ABSS/EHSS surveys.

Survey response analysis

Questions 1 through 6 of the survey contain personal or identifying information and will therefore be shared in summary. Questions 1 through 6 are: email, name, county, state/province, name of organization, name of beach monitoring program, and number of beaches monitored.

Country representation

USA - 68% (23) respondents
Canada - 32% (11) respondents

State/Province breakdown

State/Province	Number of survey responses	Number of beaches reported on in surveys
Ontario	11	328
Illinois	1	21
Indiana	1	24
Michigan	3	435
Minnesota	1	36
New York	1	6
Ohio	1	25
Pennsylvania	3	32
Wisconsin	12	248

(Question 7) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season?

Don't know - 6% (2)
No - 26% (9)
Yes - 68% (23)

(Question 8) How many ABSS/EHSS does your program conduct each year? (multiple choice: At each beach, At most beaches, Sporadically at beaches as needed, Not conducted)
At each beach - 44% (15)
At most beaches - 18% (6)
Sporadically at beaches as needed - 12% (4)
Not conducted - 18% (6)
N/A - 9% (3)

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.
Short answers responses received from 13 respondents

No changes in physical beach areas (no new structures such as storm water outfalls) and landscapes
Testing is conducted daily and staff are present 24/7 to view any abnormalities on site.
Participation in Indiana's Beach Program is voluntary, but funding for ABSS/EHSS is made available to all eligible Beach Program participants who choose to conduct both ABSS and routine beach sanitary surveys.
We do a short survey, but not as detailed as the EPA survey.
Only as needed due to not enough staff and funds
Perform weekly in season *Bacti* sampling
Beach sanitary surveys are conducted whenever a new beach becomes permitted and then whenever a major change happens at the beach (environmental, outfall additions/removal, beach use, etc.)
It has not historically been done.
Funding
These are conducted by State Park management and local municipality, not by ECDH.
They are conducted at 40+ every year and other periodically.
Funding

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?
Yes - 94% (32)
No - 6% (2)

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

Note that respondents had the option to choose more than one answer

USEPA Recreational Water Quality Criteria - (19)
Health Canada's Guidelines for Canadian Recreational Water Quality - (1)
US State regulatory requirements (8)
Recreational Water Guideline (2018)/Operational Approaches for Recreational Water Guideline, 2018, Ontario Ministry of Health and Long Term Care - (9)
Other - (2)

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other)

Human Sewage: 44% (15)
Stormwater runoff: 79% (27)
Parking lot runoff: 59% (20)
Cattle fecal waste: 24% (8)
Pig fecal waste: 9% (3)
Poultry fecal waste: 6% (2)
Dog fecal waste: 41% (14)
Geese fecal droppings: 85 % (29)
Gull fecal droppings: 74% (25)
Sources of industrial pollution: 15% (5)
Algal blooms: 58% (20)
Dangerous water currents: 32% (11)
Other: 6% (2)

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Yes - 38% (13)
No - 38% (13)
Don't Know - 21% (7)
N/A - 3% (1)

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

Yes - 29% (10)
No - 41% (14)
Don't know - 26% (9)
N/A - 3% (1)

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli*/*enterococci*) surveillance?

Yes - 32% (11)
No - 41% (14)
Don't know - 9% (3)
N/A - 3% (1)
Other - 15% (5) (see specific responses below)

- *E. coli* indicator surveillance is done daily during the beach season - 1
- No, but if the need arises yes. All our monitoring has been going on for decades. - 1
- We will begin looking at the potential sources of contamination and help implement new rules at the source of contamination. - 1
- Weekly in season *E. coli* sampling - 1
- *E. coli* surveillance at each beach is conducted on a routine basis throughout the swimming season as part of our bathing beach monitoring program - 1

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Yes - 50% (17)
No - 38% (13)
Don't Know - 9% (3)
N/A - 3% (1)

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

Yes - 18% (6)
No - 79% (27)
Don't know - 0
N/A - 3% (1)

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (*cyanobacteria*)?

Yes - 18% (6)
No - 79% (27)
N/A - 3% (1)

(Question 18) Have the surveys led to beach remedial actions?

Yes - 65 % (22)
No - 32% (11)
N/A - 3% (1)

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

Yes - 59% (20)
No - 41% (14)

(Question 20) Did the surveys help recommend mitigation activities?

Yes - 68% (23)
No - 26% (9)
N/A - 6% (2)

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

Short answers received from 23 respondents who answered YES to Question 20.

Wastewater infrastructure upgrades - 29% (10)
Waterfowl control actions - 65% (22)
Pet control actions - 26% (9)
Beach landscaping - 50% (17)
Sand grooming - 47% (16)
Enhanced garbage/waste management - 35% (12)
Farm BMPs - 6% (2)
Land use changes - 15% (5)

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

Short answer responses from the 23 respondents who answered YES to Question 20.

Mitigation activities only conducted at three beach areas
Minimal. Goose fencing performed at one monitored location reduced waterfowl concentration. Lower bacterial contamination was observed after. Not proven statistically
None as of yet, the program is in its first 5 years. A formalized report at the end of 2022 will outline detailed mitigation activities for contaminated sites. This will help procure funding for applied mitigation/restoration activities.
Beach cleanup of excess feces
Plantings to detour waterfowl
Sand grooming occurs at some but not all of the beaches. Some parks have chosen to close beaches due to continual posting because of waterfowl.
All recommended mitigation activities have been performed. All listed in q.22

Regular beach grooming occurs, waterfowl control efforts have been sporadic
Most issues on the Chicago Lakefront have to do with unintended releases of stormwater or bad adherence to dog exclusions.
In 2010, Indiana received GLRI funding for a project consisting of ABSS and Routine beach sanitary surveys (conducted by USGS) for all Indiana Lake Michigan beaches over two beach seasons and Microbial Source Tracking studies at these same beaches. The MST portion of the project was done concurrently with the sanitary surveys, so neither the MST nor the following mitigation efforts were solely driven by the results of the surveys. Indiana recommends daily beach grooming, waterfowl control actions, pet waste control actions and frequent garbage/waste management measures to all beaches within the Lake Michigan basin to help mitigate *E. coli* exceedances.
10%, some wastewater infrastructure has been performed and some beach landscaping
Beach Landscaping, Sand Grooming
Barkers Island Beach Restoration
Stormwater management BMPs... green infrastructure... anti-microbial filters
mostly funded with GLRI funds from 2010-2012
The list is long and beach specific. Some have been completely reengineered and redesigned. Some have had minimal mitigation. We have had over 60 locations develop mitigation and reengineering plans developed.
Site dependent; some none - others 100%. Mitigation measures include landscape alterations, addition of green infrastructure, permeable pathways, waterfowl deterrent/exclusion measures, alterations in beach grooming, removal of invasive species, enhancement of native plant communities, educational signage, enactment of municipal ordinances, relocation or retrofit of stormwater infrastructure, enhanced monitoring of potential sources (e.g. tributaries & beach sands), improved public access, installation of water safety equipment/water safety campaign, restoration of coastal wetlands, encouragement of dune and swale systems, and enhancements to shore protective structures.
Wastewater infrastructure upgrades Waterfowl control actions Pet control actions Beach landscaping Sand grooming Storm Sewer Jetting of Outfalls
Mitigation was completed. Mitigation included diverting storm water runoff, installing a settling area, and swales to slow down and catch storm water runoff from road and parking areas.
Sand grooming
Our County land Management division is working with nearby farmers and homeowners to mitigate farm run off and update out of compliance private wastewater systems

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

Short answer responses from the 19 respondents

Reduction of waterfowl numbers, reduction in waterfowl waste on beach
Minimal
decrease in indicator bacteria
Beach water quality has improved significantly e.g., Bluffer's Park Beach was awarded the Blue Flag designation
Unknown
Daily beach grooming and waterfowl deterrent measures (e.g., Dog Program, Eagle Eyes, wildlife-proof trash cans, No handfeeding messaging and ordinances) have shown to have the most impact on *E. coli* levels and the number of samples exceeding Indiana's recreational water quality criteria.
less bacteria in water samples! hooray!
Unknown
fewer advisories and no beach closings
reduction of *E. coli*
fewer beach closures, lower bacteria counts, less turbidity, less gunk on beach
N/A
Option 1
Improvement
advisories and closures at that beach dropped dramatically and resulted in more open beach days.
decreases in occurrence of beach closures and/or advisories
None
Fewer beach closures due to *E. coli*
Decrease of geese presence, owners picked up dog waste

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

Short answer responses from the 21 respondents

Did not reply -38% (13)
Yes - 5% (2)
No - 32% (11)
Not determined - 3% (1)
Unknown -5% (2)
Other - 14% (5) (see specific responses below)

- No, beach utilization and/or local economic impacts were not measured or estimated.
- At one location
- Utilization is about the same - less complaints on the closures or advisories.
- Mitigation is ongoing
- Monthly *E. coli* monitoring showed decreases

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

Short answer responses from the 18 respondents

Beach users and citizen scientists are crucial to helping monitor water quality in places where government programs are unable or unwilling to monitor. Across the US and beginning in Canada, community-based monitoring programs are filling gaps by testing for fecal contamination and conducting field surveys at local beaches and swimming spot.
Municipalities need to be more involved with beach water quality.
impacts of weather conditions, actions of beach users
Impact of beach user behavior on water quality and environment
Assist in awareness of beach health advisories
Yes, but citizens do not understand aspects such as magnitude and cascadal importance of things observed. Also the lack of consistency is a major issue for analysis.
Information on daily rainfall/precipitation levels, beach utilization and/or local economic impacts would be beneficial.
The need for educating the public on discarding wastewater into the Great Lakes.
conduct surveys on the weekends, outside of business hours, etc
Real-time results data
Source tracking of *E. coli* contamination for our bathing beaches
Periodic monitoring beaches currently on the list but unable to monitor due to funding.
don't know
Knowledge Gap is sharing data with local officials. Citizens can contact their local representatives and officials with their data and concerns to improve beaches. Local health departments report to locally elected officials.
Unsure
Beach users and citizen scientists could contribute to overall beach management activities through volunteer clean sweep events as well as event-based monitoring.
A reporting tool for illness, algae reporting, swimmers itch and strong currents.
We have several beaches that are utilized heavily by dog walkers- folks need to use common courtesy and clean up after their pets

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Yes - 41% (14)
No - 12% (4)
Maybe - 44% (15)
N/A - 3% (1)

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

Yes - 18% (6)
No - 82% (28)

(Question 28) If yes, do you engage with citizen science programs directly?

Yes - 9% (3)
No - 47% (16)
N/A - 44% (15)

(Question 29) Is citizen-based monitoring data utilized?

Yes - 9% (3)
No - 65% (22)
N/A - 26% (9)

(Question 30) If yes, how?

Short answer responses from the 6 respondents

To inform remediation activities, to share with the public.
On Swim Guide and published on recreationalwater.ca
Conservation Authority has been conducting studies of 3 beaches within our jurisdiction. Report is provided to local municipalities.
There is a lack of consistency but when reports emerge they will sometimes trigger more investigation.
*Our Partner, Regional Science Consortium would work more closely with citizen science programs.
Some citizen-based data is collected and utilized by the state department of natural resources; primarily on tributaries.

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes - 65% (22)
No - 29% (10)
N/A - 6% (2)

(Question 32) If yes, how is it shared?

Short answer responses from 22 respondents

Shared upon request
Open data portal - raw data, machine readable, accessible
Open data portal - raw data, machine readable, accessible
Shared with municipality upon request
Open data portal - raw data, machine readable, accessible
Accessible from website
Shared upon request
Prior to May 2021, beach sanitary survey data was made available to the public via the BeachGuard website; however, with the advent of IDEM BeachAlert, the legacy beach sanitary survey data is now available on request.
Accessible from website
Accessible from website
Shared upon request
Open data portal - raw data, machine readable, accessible
Accessible from website
Accessible from website
Both Open Data Portal and Accessible from Website, using Google Map.
Shared upon request
Sent to the state at the conclusion of each year as well as being available on request.
Accessible from website
Open data portal - raw data, machine readable, accessible
Accessible from website
uploaded to EPA's system
Annual WQ reports and EPA's WQX database

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes - 65% (22)
No - 35% (12)

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Lab capacity to perform water quality assays impacted
Frequency of water sampling/monitoring reduced
Frequency of water sampling/monitoring reduced
Staff capacity reduced

Frequency of water sampling/monitoring reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Lab capacity to perform water quality assays impacted
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Frequency of water sampling/monitoring reduced
Staff capacity reduced
Frequency of water sampling/monitoring reduced

Tribe, Country, Province or State Breakdown

Canada - Ontario

There are 34 Provincial Health Units monitoring beaches in Ontario, monitoring approximately 652 beaches. Ontario Parks (MECP) also monitors 163 beaches in the province. In addition, 2 community based water monitoring groups completed the survey accounting for another 12 sites.

Of the 815 monitored beaches, 274 are surveyed here, representing 40% of the provinces officially monitored beaches. (Sources: Ontario Parks, Health Units)

- 8 health units completed the survey.
- Ontario Parks completed the survey.
- 2 community based water monitoring groups completed the survey.

Responses

(Question 7 - 8) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season?

Yes -90 % (10)
No - 10% (1)

Of the 274 surveyed beaches, EHSS are conducted every year at 252 beaches, or 92% of the beaches reported on in the survey.

6. How many beaches does your monitoring program sample? (i.e., 4)	7. Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season	8. How many ABSS/EHSS does your program conduct each year?
22	no	Not conducted
4	Yes	At each beach, Sporadically at beaches as needed
8	Yes	At each beach
7	Yes	At each beach
8	Yes	At each beach

14	Yes	At each beach
48	Yes	At each beach
163	Yes	At each beach, At most beaches
25	Yes	At each beach
11	Yes	At each beach
18	Yes	At each beach

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

Short answers responses received from 1 respondent

No changes in physical beach areas (no new structures such as storm water outfalls) and landscapes

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

Yes - 100% (11)
No - 0% (0)

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

Note that respondents had the option to choose more than one answer

Health Canada's Guidelines for Canadian Recreational Water Quality - (1)
Recreational Water Guideline (2018)/Operational Approaches for Recreational Water Guideline, 2018, Ontario Ministry of Health and Long Term Care - (9)
Other - (1)

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Human Sewage: 45% (5)
Stormwater runoff: 73%(8)
Parking lot runoff: 55% (6)
Cattle fecal waste: 27% (3)
Pig fecal waste: 18% (2)
Poultry fecal waste: 18% (2)
Dog fecal waste: 45% (5)

Geese fecal droppings: 100% (11)
Gull fecal droppings: 100% (11)
Sources of industrial pollution: 36% (4)
Algal blooms: 73% (8)
Dangerous water currents: 18% (2)
Other: 9% (1)

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Yes - 36% (4)
No - 64% (7)

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

Yes - 55% (6)
No - 9% (1)
Don't know - 36% (4)

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli*/*enterococci*) surveillance?

Yes - 18% (2)
No - 73% (8)
Other - 9% (1) (see specific responses below)

- *E. coli* indicator surveillance is done daily during the beach season

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Yes - 36% (4)
No - 45% (5)
Don't Know - 18% (2)

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

Yes - 0% (0)
No - 100 % (11)

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (*cyanobacteria*)?

Yes - 9% (1)
No - 91% (10)

(Question 18) Have the surveys led to beach remedial actions?

Yes - 64% (7)
No - 36% (4)

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

Yes - 73% (8)
No - 27% (3)

Question 20) Did the surveys help recommend mitigation activities?

Yes - 82% (9)
No - 18% (2)

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

Wastewater infrastructure upgrades - 36% (4)
Waterfowl control actions - 73% (8)
Pet control actions - 36% (4)
Beach landscaping - 45% (5)
Sand grooming - 64% (7)
Enhanced garbage/waste management - 27% (3)
Farm BMPs - 9% (1)
Land use changes - 9% (1)

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

Short answer responses from 9 respondents:

Mitigation activities only conducted at three beach areas
Minimal. Goose fencing performed at one monitored location reduced waterfowl concentration. Lower bacterial contamination was observed after. Not proven statistically
None as of yet, the program is in its first 5 years. A formalized report at the end of 2022 will outline detailed mitigation activities for contaminated sites. This will help procure funding for applied mitigation/restoration activities.
Beach cleanup of excess feces
N/A
Plantings to detour waterfowl
Sand grooming occurs at some but not all of the beaches. Some parks have chosen to close

beaches due to continual posting because of waterfowl.
All recommended mitigation activities have been performed. All listed in q.22
n/a

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

Short answer responses from 4 respondents:

Reduction of waterfowl numbers, reduction in waterfowl waste on beach
Minimal
decrease in indicator bacteria
Beach water quality has improved significantly e.g., Bluffer's Park Beach was awarded the Blue Flag designation

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

Yes - 0 %
No - 55% (6)
Not determined - 9% (1)
N/A - 36% (4)

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

Short answer responses from 5 respondents:

Regular photographic evidence of the beach in question can assist in determining changes in use, beach health, and shoreline stability over time.
Beach users and citizen scientists are crucial to helping monitor water quality in places where government programs are unable or unwilling to monitor. Across the US and beginning in Canada, community-based monitoring programs are filling gaps by testing for fecal contamination and conducting field surveys at local beaches and swimming spot.
Municipalities need to be more involved with beach water quality.
impacts of weather conditions, actions of beach users
Impact of beach user behavior on water quality and environment

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Yes - 36% (4)
No - 18% (2)
Maybe - 36% (4)
N/A - 9% (1)

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

Yes - 27% (3)
No - 73% (8)

(Question 28) If yes, do you engage with citizen science programs directly?

Yes - 27% (3)
No - 45% (5)
N/A - 27% (3)

(Question 29) Is citizen-based monitoring data utilized?

Yes - 27% (3)
No - 55% (6)
N/A - 18% (2)

(Question 30) If yes, how?

Short answer responses from 6 respondents

To inform remediation activities, to share with the public.
On Swim Guide and published on recreationalwater.ca
Conservation Authority has been conducting studies of 3 beaches within our jurisdiction. Report is provided to local municipalities.

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes - 45% (5)
No - 55% (6)

(Question 32) If yes, how is it shared?

Short answer responses from 5 respondents

Shared upon request
Open data portal - raw data, machine readable, accessible
Open data portal - raw data, machine readable, accessible
Shared with municipality upon request
Open data portal - raw data, machine readable, accessible

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes - 64% (7)
No - 36% (4)

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Short answer responses from 7 respondents

Lab capacity to perform water quality assays impacted
Frequency of water sampling/monitoring reduced
Frequency of water sampling/monitoring reduced
Staff capacity reduced
Frequency of water sampling/monitoring reduced
Staff capacity reduced
Staff capacity reduced

US - Great Lakes States

There are 8 states in the US monitoring Great Lakes beaches, monitoring a total of approximately 1,142 beaches. Of the 1,142 monitored beaches, 827 are surveyed here, representing 72.4% of the United States' officially monitored beaches.

- 3 tribes completed the survey. Their responses are reviewed separately, but are also included in the US review, and at the state level review in Wisconsin and Michigan.
- State monitoring programs, county programs, and state university based monitoring programs also completed the survey
- No US based community water monitoring programs completed the survey

Responses

(Question 7 - 8) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season?

Yes - 56.5 % (13)
No - 34.8% (8)
Don't know - 8.7% (2)

Of the 8 surveyed beaches, BSS are conducted every year at 684 beaches, or 70% of the beaches reported on in the survey.

6. How many beaches does your monitoring program sample? (i.e., 4)	7. Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season	8. How many ABSS/EHSS does your program conduct each year?
21	No	Sporadically at beaches as needed
24	No	Option 5
9	No	Not conducted
26	Yes	Sporadically at beaches as needed
400	Yes	At most beaches
36	No	Sporadically at beaches as needed
6	No	Sporadically at beaches as needed
25	No	Not conducted
9	No	Not conducted
13	Yes	At most beaches

10	Yes	At most beaches
3	Don't know	
4	Don't know	Option 5
6	No	Not conducted
70	Yes	At most beaches
15	Yes	At each beach
9	Yes	At each beach
12	Yes	At each beach
105	Yes	Sporadically at beaches as needed
5	Yes	At each beach
7	Yes	At each beach
8	Yes	At most beaches, Sporadically at beaches as needed
4	Yes	Not conducted
21	No	Sporadically at beaches as needed
24	No	Option 5

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

Short answers responses received from 1 respondent

- Testing is conducted daily and staff are present 24/7 to view any abnormalities on site.
- Participation in Indiana's Beach Program is voluntary, but funding for ABSS/EHSS is made available to all eligible Beach Program participants who choose to conduct both ABSS and routine beach sanitary surveys.
- We do a short survey, but not as detailed as the EPA survey.
- Only as needed due to not enough staff and funds
- perform weekly in season *Bacti* sampling
- Beach sanitary surveys are conducted whenever a new beach becomes permitted and then whenever a major change happens at the beach (environmental, outfall additions/removal, beach use, etc.)
- It has not historically been done.
- funding

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

Yes - 91% (21)
No - 9% (2)

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

Note that respondents had the option to choose more than one answer

US State regulatory requirements - (7)
USEPA Recreational Water Quality Criteria - (22)
Other - (1)

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Human Sewage: 43% (10)
Stormwater runoff: 83% (19)
Parking lot runoff: 61% (14)
Cattle fecal waste: 22% (5)
Pig fecal waste: 4%(1)
Poultry fecal waste: 0% (0)
Dog fecal waste: 39% (9)
Geese fecal droppings: 78% (18)
Gull fecal droppings: 70% (16)
Sources of industrial pollution: 4% (1)
Algal blooms: 52% (12)
Dangerous water currents: 39% (9)
Other: 4% (1)

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Yes - 39% (9)
No - 26 % (6)
Don't know - 30% (7)
N/A - 4% (1)

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

Yes - 21.7% (5)
No - 56.5% (13)
Don't know - 21.7% (5)

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli*/*enterococci*) surveillance?

Yes - 39% (9)
No - 30% (7)
Don't know 13% (3)
Other - 17% (4) (see specific responses below)

- *E. coli* surveillance at each beach is conducted on a routine basis throughout the swimming season as part of our bathing beach monitoring program
- No, but if the need arises yes. All our monitoring has been going on for decades.
- We will begin looking at the potential sources of contamination and help implement new rules at the source of contamination.
- Weekly in season *E. Coli* sampling

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Yes - 56.5% (13)
No - 39% (9)
Don't Know - 4.3% (1)

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

Yes - 26% (6)
No - 73.4 % (17)

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (*cyanobacteria*)?

Yes - 21.7% (5)
No - 78.2% (18)

(Question 18) Have the surveys led to beach remedial actions?

Yes - 65% (15)
No - 34.7% (8)

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

Yes - 52% (12)
No - 48% (11)

(Question 20) Did the surveys help recommend mitigation activities?

Yes - 60.1% (14)
No - 30% (7)
N/A - 8.6% (2)

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

Wastewater infrastructure upgrades - 26% (6)
Waterfowl control actions - 60.9% (14)
Pet control actions - 26% (6)
Beach landscaping - 52% (12)
Sand grooming - 39% (9)
Enhanced garbage/waste management - 39% (9)
Farm BMPs - 4% (1)
Land use changes - 17% (4)

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

Short answer responses from 15 respondents:

Most issues on the Chicago Lakefront have to do with unintended releases of stormwater or bad adherence to dog exclusions.
In 2010, Indiana received GLRI funding for a project consisting of ABSS and Routine beach sanitary surveys (conducted by USGS) for all Indiana Lake Michigan beaches over two beach seasons and Microbial Source Tracking studies at these same beaches. The MST portion of the project was done concurrently with the sanitary surveys, so neither the MST nor the following mitigation efforts were solely driven by the results of the surveys. Indiana recommends daily beach grooming, waterfowl control actions, pet waste control actions and frequent garbage/waste management measures to all beaches within the Lake Michigan basin to help mitigate *E. coli* exceedances.
Stormwater management BMPs... green infrastructure... anti-microbial filters
mostly funded with GLRI funds from 2010-2012
10%, some wastewater infrastructure has been performed and some beach landscaping
Beach Landscaping, Sand Grooming
N/A
Regular beach grooming occurs, waterfowl control efforts have been sporadic
Barkers Island Beach Restoration
The list is long and beach specific. Some have been completely reengineered and redesigned. Some have had minimal mitigation. We have had over 60 locations develop mitigation and reengineering plans developed.
Site dependent; some none - others 100%. Mitigation measures include landscape alterations, addition of green infrastructure, permeable pathways, waterfowl deterrent/exclusion measures, alterations in beach grooming, removal of invasive species, enhancement of native plant communities, educational signage, enactment of municipal ordinances, relocation or retrofit of stormwater infrastructure, enhanced monitoring of potential sources (e.g. tributaries & beach sands), improved public access, installation of water safety equipment/water safety campaign, restoration of coastal wetlands, encouragement of dune and swale systems, and enhancements to

shore protective structures.
Wastewater infrastructure upgrades Waterfowl control actions Pet control actions Beach landscaping Sand grooming Storm Sewer Jetting of Outfalls
Mitigation was completed. Mitigation included diverting storm water runoff, installing a settling area, and swales to slow down and catch storm water runoff from road and parking areas.
Our County land Management division is working with nearby farmers and homeowners to mitigate farm run off and update out of compliance private wastewater systems
Sand grooming

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

Short answer responses from 16 respondents:

n/a
Daily beach grooming and waterfowl deterrent measures (e.g., Dog Program, Eagle Eyes, wildlife-proof trash cans, No handfeeding messaging and ordinances) have shown to have the most impact on *E. coli* levels and the number of samples exceeding Indiana's recreational water quality criteria.
reduction of *E. Coli*
fewer beach closures, lower bacteria counts, less turbidity, less gunk on beach
less bacteria in water samples! hooray!
Unknown
N/A
Unknown
fewer advisories and no beach closings
Option 1
Improvement
advisories and closures at that beach dropped dramatically and resulted in more open beach days.
decreases in occurrence of beach closures and/or advisories
Fewer beach closures due to *E. coli*
None
Decrease of geese presence, owners picked up dog waste

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

Yes - 8.6 % 2
No - 21.7% (5)
Other - 36% (4) (see specific responses below)

- At one location
- Mitigation is ongoing
- monthly *E. coli* monitoring showed decreases

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

Short answer responses from 15 respondents:

Yes, but citizens do not understand aspects such as magnitude and cascadal importance of things observed. Also the lack of consistency is a major issue for analysis.
Information on daily rainfall/precipitation levels, beach utilization and/or local economic impacts would be beneficial.
The need for educating the public on discarding wastewater into the Great Lakes.
don't know
Knowledge Gap is sharing data with local officials. Citizens can contact their local representatives and officials with their data and concerns to improve beaches. Local health departments report to locally elected officials.
conduct surveys on the weekends, outside of business hours, etc
Real-time results data
Source tracking of *E. coli* contamination for our bathing beaches
Unsure
Assist in awareness of beach health advisories
Periodic monitoring beaches currently on the list but unable to monitor due to funding.
Beach users and citizen scientists could contribute to overall beach management activities through volunteer clean sweep events as well as event-based monitoring.
NA
A reporting tool for illness, algae reporting, swimmers itch and strong currents.
We have several beaches that are utilized heavily by dog walkers- folks need to use common courtesy and clean up after their pets

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Yes - 43.5% (10
No - 8.7% (2)
Maybe - 47.8% (11)

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

Yes - 13% (3)
No - 87% (20)

(Question 28) If yes, do you engage with citizen science programs directly?

Of the 3 respondents who answered yes, all three responded that they do not engage with citizen science programs directly.

(Question 29) Is citizen-based monitoring data utilized?

Yes - 8.7% (2)
No - 69.5% (16)
N/A - 21.7 (5)

(Question 30) If yes, how?

- There is a lack of consistency but when reports emerge they will sometimes trigger more investigation.
- *Our Partner, Regional Science Consortium would work more closely with citizen science programs.
- Some citizen-based data is collected and utilized by the state department of natural resources; primarily on tributaries.

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes - 74% (17)
No - 17% (4)
N/A - 9% (2)

(Question 32) If yes, how is it shared?

Short answer responses from 17 respondents:

Prior to May 2021, beach sanitary survey data was made available to the public via the BeachGuard website; however, with the advent of IDEM BeachAlert, the legacy beach sanitary survey data is now available on request.
Accessible from website
Accessible from website
Accessible from website
Shared upon request
Accessible from website
Both Open Data Portal and Accessible from Website, using Google Map.
Accessible from website

Shared upon request
Open data portal - raw data, machine readable, accessible
Shared upon request
Sent to the state at the conclusion of each year as well as being available on request.
Accessible from website
Open data portal - raw data, machine readable, accessible
Accessible from website
uploaded to EPA's system
Annual WQ reports and EPA's WQX database

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes - 65% (15)
No - 35% (8)

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Short answer responses from 16 respondents:

Staff capacity reduced
Lab capacity to perform water quality assays impacted
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
Frequency of water sampling/monitoring reduced
Staff capacity reduced
Frequency of water sampling/monitoring reduced

US Tribes

- 3 tribes completed the survey. 2 tribes are from Wisconsin, and one tribe from Michigan.

Responses

(Question 7 - 8) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season?

Yes - 66 % (2)
No - 33% (1)

Of the 21 beaches the tribes reported on, BSS are conducted every year at 12 of the beaches.

6. How many beaches does your monitoring program sample? (i.e. 4)	7. Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season	8. How many ABSS/EHSS does your program conduct each year?
8	Yes	At most beaches, Sporadically at beaches as needed
4	Yes	Not conducted
9	No	Not conducted

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

Short answers responses received from 2 respondents

We do a short survey, but not as detailed as the EPA survey.
Funding

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

Yes - 100% (3)
No - 0% (0)

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

Note that respondents had the option to choose more than one answer

US State regulatory requirements - (2)
Other - (1)

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Human Sewage: 33% (1)
Stormwater runoff: 66%(2)
Parking lot runoff: 33% (1)
Cattle fecal waste: 0% (0)
Pig fecal waste: 0%(0)
Poultry fecal waste: 0%(0)
Dog fecal waste: 0%(0)
Geese fecal droppings: 66% (2)
Gull fecal droppings: 0% (0)
Sources of industrial pollution: 0%(0)
Algal blooms: 0% (0)
Dangerous water currents: 0%(0)
Other: 33% (1)

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Yes - 33% (1)
No - 0 % (0)
Don't know - 66% (2)

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

Yes - 66% (2)
No - 33% (1)

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli*/ *enterococci*) surveillance?

Yes - 66.6% (2)
No - 0% (0)
Other - 33.3% (1)

- We will begin looking at the potential sources of contamination and help implement new rules at the source of contamination.

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Yes - 33.3% (1)
No - 66.6% (2)

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

Yes - 0% (0)
No - 100% (3)

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (cyanobacteria)?

Yes - 0% (0)
No - 100% (3)

(Question 18) Have the surveys led to beach remedial actions?

Yes - 33.3% (1)
No - 66.6% (2)

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

Yes - 33.3% (1)
No - 66.6% (2)

(Question 20) Did the surveys help recommend mitigation activities?

Yes - 60.1% (14)
No - 30% (7)
N/A - 8.6% (2)

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

Sand grooming, Enhanced garbage/waste management, Land use changes
Waterfowl control actions, Beach landscaping, Enhanced garbage/waste management

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

Sand grooming

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

Decrease of geese presence, owners picked up dog waste
none

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

Yes - 33.3% (1)
No - 33.3% (1)
N/A - 33.3% (1) (see specific responses below)

- monthly *E. coli* monitoring showed decreases

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

The need for educating the public on discarding wastewater into the Great Lakes.

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Yes - 66.6% (2)
Maybe - 33.3% (1)

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

Yes - 0% (0)
No - 100% (3)

(Question 28) If yes, do you engage with citizen science programs directly?

N/A

(Question 29) Is citizen-based monitoring data utilized?

Yes - 0% (0)
No - 100% (3)

(Question 30) If yes, how?

N/A

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes - 66.6% (2)
No - 33.3% (1)

(Question 32) If yes, how is it shared?

Uploaded to EPA's system
Annual WQ reports and EPA's WQX database

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes - 100% (3)
No - 0% (0)

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Staff capacity reduced - 66.6% (3)
Frequency of water sampling/monitoring reduced - 33.3% (1)

Survey Responses by US State

Illinois

There are 2 counties monitoring Great Lakes beaches in Illinois, Cook and Lake, for a total of 59 monitored public beaches (source: USEPA and Illinois Department of Public Health)

- 1 Parks District completed the survey.
- The Chicago Park District completed the survey for 21 Chicago beaches.

Of the 59 monitored Lake Michigan beaches, 21 surveyed, representing 36% of the state's Great Lakes Coastal Beaches.

Responses

(Question 7) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season?

No

(Question 8) How many ABSS/EHSS does your program conduct each year?

Sporadically at beaches as needed

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

Testing is conducted daily and staff are present 24/7 to view any abnormalities on site.

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

No

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

US EPA Recreational Water Quality Criteria, US State regulatory requirements

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Stormwater runoff, Parking lot runoff, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Algal blooms, Dangerous water currents

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Yes

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

No

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli/enterococci*) surveillance?

No, but if the need arises yes. All our monitoring has been going on for decades.

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Don't know

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

No

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (*cyanobacteria*)?

No

(Question 18) Have the surveys led to beach remedial actions?

Yes

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

No

(Question 20) Did the surveys help recommend mitigation activities?

No

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

N/A

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

Most issues on the Chicago Lakefront have to do with unintended releases of stormwater or bad adherence to dog exclusions.

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

N/A

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

N/A

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

Yes, but citizens do not understand aspects such as magnitude and cascadal importance of things observed. Also the lack of consistency is a major issue for analysis.

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Yes

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

Yes

(Question 28) If yes, do you engage with citizen science programs directly?

No

(Question 29) Is citizen-based monitoring data utilized?

Yes

(Question 30) If yes, how?

There is a lack of consistency but when reports emerge they will sometimes trigger more investigation.

(Question 31) Is your beach environmental survey data distributed externally/publicly?

No

(Question 32) If yes, how is it shared?

N/A

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Staff capacity reduced

Indiana

There are 4 counties monitoring beaches in Indiana, monitoring a total of 60 beaches. Of those monitored, 24 are Lake Michigan beaches. (Source: USEPA and IDEM)

- Indiana Department of Environmental Management completed the survey for the 24 Indiana Lake Michigan Beaches Monitoring and Notification Program beaches.

Of Indiana's 24 Lake Michigan Beaches, 24 were surveyed, representing 100% of the state's officially monitored beaches.

Responses

(Question 7) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season?

No

(Question 8) How many ABSS/EHSS does your program conduct each year?

N/A

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

Participation in Indiana's Beach Program is voluntary, but funding for ABSS/EHSS is made available to all eligible Beach Program participants who choose to conduct both ABSS and routine beach sanitary surveys.

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

Yes

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

US EPA Recreational Water Quality Criteria, US State regulatory requirements

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Human Sewage, Stormwater runoff, Parking lot runoff, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

No

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

Don't know

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli/enterococci*) surveillance?

No

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

No

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

No

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (*cyanobacteria*)?

No

(Question 18) Have the surveys led to beach remedial actions?

Yes

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

Yes

(Question 20) Did the surveys help recommend mitigation activities?

Yes

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

In 2010, Indiana received GLRI funding for a project consisting of ABSS and Routine beach sanitary surveys (conducted by USGS) for all Indiana Lake Michigan beaches over two beach seasons and Microbial Source Tracking studies at these same beaches. The MST portion of the project was done concurrently with the sanitary surveys, so neither the MST nor the following mitigation efforts were solely driven by the results of the surveys. Indiana recommends daily beach grooming, waterfowl control actions, pet waste control actions and frequent garbage/waste management measures to all beaches within the Lake Michigan basin to help mitigate *E. coli* exceedances.

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

Daily beach grooming and waterfowl deterrent measures (e.g. Dog Program, Eagle Eyes, wildlife-proof trash cans, No handfeeding messaging and ordinances) have shown to have the most impact on *E. coli* levels and the number of samples exceeding Indiana's recreational water quality criteria.

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

No, beach utilization and/or local economic impacts were not measured or estimated.

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

Information on daily rainfall/precipitation levels, beach utilization and/or local economic impacts would be beneficial.

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Yes

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

No

(Question 28) If yes, do you engage with citizen science programs directly?

N/A

(Question 29) Is citizen-based monitoring data utilized?

N/A

(Question 30) If yes, how?

N/A

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes

(Question 32) If yes, how is it shared?

Prior to May 2021, beach sanitary survey data was made available to the public via the BeachGuard website; however, with the advent of IDEM BeachAlert, the legacy beach sanitary survey data is now available on request.

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Lab capacity to perform water quality assays impacted

Michigan

There are 40 counties monitoring beaches in Michigan, monitoring a total of 600 beaches. However, only 183 monitored are Great Lakes beaches (Beach Act).

This survey represents 400 state monitored beaches, 26 regional beaches. In addition the Keweenaw Bay Indian Community completed the survey for 9 tribal beaches.

- Michigan State EGLE completed the survey for 400 beaches.
- Grand Traverse Region Healthy Beaches completed the survey for 26 beaches
- Keweenaw Bay Indian Community completed the survey for 9 beaches

Responses

(Question 7) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season ?

6. How many beaches does your monitoring program sample? (i.e. 4)	7. Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season	8. How many ABSS/EHSS does your program conduct each year?
9	No	Not conducted
26	Yes	Sporadically at beaches as needed
400	Yes	At most beaches

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

Short answers responses received from 1 respondent
We do a short survey, but not as detailed as the EPA survey.

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

Yes - 100% (3)
No - 0% (0)

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

Note that respondents had the option to choose more than one answer

Other
US EPA Recreational Water Quality Criteria, US State regulatory requirements
US EPA Recreational Water Quality Criteria

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Human Sewage, Geese fecal droppings
Stormwater runoff, Parking lot runoff, Geese fecal droppings, Gull fecal droppings
Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Algal blooms, Dangerous water currents

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Yes - 100% (3)
No - 0% (0)

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

Yes - 33.3% (1)
No - 66.6% (2)

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli*/*enterococci*) surveillance?

We will begin looking at the potential sources of contamination and help implement new rules at the source of contamination.
Yes
Yes

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Yes - 100% (3)
No - 0% (0)

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

Yes - 66.6% (2)
No - 33.3% (1)

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (*cyanobacteria*)?

Yes - 33.3% (1)
No - 66.6% (2)

(Question 18) Have the surveys led to beach remedial actions?

Yes - 66.6% (2)
No - 33.3% (1)

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

Yes - 66.6% (2)
No - 33.3% (1)

(Question 20) Did the surveys help recommend mitigation activities?

Yes - 66.6% (2)
No - 33.3% (1)

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

Short answers received from 2 Michigan respondents who answered YES to Question 20.

Wastewater infrastructure upgrades, Waterfowl control actions
Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Enhanced garbage/waste management, Land use changes

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

Short answers received from 2 Michigan respondents who answered YES to Question 20.

Stormwater management BMPs... green infrastructure... anti-microbial filters
mostly funded with GLRI funds from 2010-2012

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

Short answer responses from the 2 respondents

reduction of *E. coli*
fewer beach closures, lower bacteria counts, less turbidity, less gunk on beach

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

Yes – (1)
No – (1)
N/A – (1)

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

The need for educating the public on discarding wastewater into the Great Lakes.
don't know
Knowledge Gap is sharing data with local officials. Citizens can contact their local representatives and officials with their data and concerns to improve beaches. Local health departments report to locally elected officials.

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Yes - 66.6% (2)
No - 33.3% (1)

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

Yes- 0% (0)
No - 100% (3)

(Question 28) If yes, do you engage with citizen science programs directly?

Yes - 0%
No - 66.6% (2)
NA - 33.3 (1)

(Question 29) Is citizen-based monitoring data utilized?

Yes- 0% (0)
No - 100% (3)

(Question 30) If yes, how?

No answers submitted.

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes - 33.3% (1)
No - 66.6% (2)

(Question 32) If yes, how is it shared?

Accessible from website

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes - 66.6% (2)
No - 33.3% (1)

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Staff capacity reduced
Staff capacity reduced

Minnesota

There are 3 counties (Cook, Lake, St. Louis) monitoring beaches in Minnesota, for a total of 36 beaches (USEPA and Minnesota Dept. of Health). All 36 beaches were reported on in the survey, representing 100% of the state's EPA Beach Act Grant beaches.

- The Minnesota Department of Health completed the survey for 36 beaches.

Responses

(Question 7) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season ?

No

(Question 8) How many ABSS/EHSS does your program conduct each year?

Sporadically at beaches as needed

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

Only as needed due to not enough staff and funds

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

Yes

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

Note that respondents had the option to choose more than one answer
USEPA Recreational Water Quality Criteria

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Human Sewage, Stormwater runoff, Parking lot runoff, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Dangerous water currents

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Yes

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

No

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli*/*enterococci*) surveillance?

Yes

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Yes

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

No

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (*cyanobacteria*)?

No

(Question 18) Have the surveys led to beach remedial actions?

Yes

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

Yes

(Question 20) Did the surveys help recommend mitigation activities?

Yes

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Enhanced garbage/waste management

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

10%, some wastewater infrastructure has been performed and some beach landscaping

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

less bacteria in water samples! hooray!

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

No

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

Conduct surveys on the weekends, outside of business hours, etc

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Yes

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

No

(Question 28) If yes, do you engage with citizen science programs directly?

N/A

(Question 29) Is citizen-based monitoring data utilized?

No

(Question 30) If yes, how?

N/A

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes

(Question 32) If yes, how is it shared?

Accessible from website

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Staff capacity reduced

New York

There are 5 counties monitoring Great Lakes beaches in New York, monitoring a total of 18 beaches (USEPA and Niagara County).

- Niagara County, NY completed the survey for 6 beaches.

With 18 monitored beaches in Great Lakes, and 6 surveyed, representing 33.33% of the state's Great Lakes' beaches.

Responses

(Question 7) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season?

No

(Question 8) How many ABSS/EHSS does your program conduct each year?

Sporadically at beaches as needed

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

Perform weekly in season *Bacti* sampling

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

Yes

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

US State regulatory requirements

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Algal blooms

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Yes

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

No

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli*/*enterococci*) surveillance?

Weekly in season *E. coli* sampling

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Yes

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

Yes

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (*cyanobacteria*)?

No

(Question 18) Have the surveys led to beach remedial actions?

No

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

No

(Question 20) Did the surveys help recommend mitigation activities?

Yes

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

Waterfowl control actions, Beach landscaping, Sand grooming

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

Beach Landscaping, Sand Grooming

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

Unknown

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

Unknown

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

Real-time results data

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Maybe

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

No

(Question 28) If yes, do you engage with citizen science programs directly?

N/A

(Question 29) Is citizen-based monitoring data utilized?

N/A

(Question 30) If yes, how?

N/A

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes

(Question 32) If yes, how is it shared?

Accessible from website

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Staff capacity reduced

Ohio

There are 7 counties monitoring beaches in Ohio, for a total of 69 beaches (USEPA and Ohio Beach Guard)

- The Cuyahoga County Board of Health completed the survey for 25 beaches.

With 69 monitored beaches, 25 surveyed represent 36% of Ohio's Great Lakes beaches.

Responses

(Question 7) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season?

No

(Question 8) How many ABSS/EHSS does your program conduct each year?

Not conducted

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

Beach sanitary surveys are conducted whenever a new beach becomes permitted and then whenever a major change happens at the beach (environmental, outfall additions/removal, beach use, etc.)

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

Yes

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

USEPA Recreational Water Quality Criteria, US State regulatory requirements

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Stormwater runoff, Parking lot runoff, Geese fecal droppings, Gull fecal droppings, Algal blooms

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Don't know

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

No

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli*/*enterococci*) surveillance?

E. coli surveillance at each beach is conducted on a routine basis throughout the swimming season as part of our bathing beach monitoring program

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Yes

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

No

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (*cyanobacteria*)?

No

(Question 18) Have the surveys led to beach remedial actions?

No

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

No

(Question 20) Did the surveys help recommend mitigation activities?

No

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

N/A

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

N/A

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

N/A

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

N/A

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

Source tracking of *E. coli* contamination for our bathing beaches

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Yes

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

No

(Question 28) If yes, do you engage with citizen science programs directly?

No

(Question 29) Is citizen-based monitoring data utilized?

No

(Question 30) If yes, how?

N/A

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes

(Question 32) If yes, how is it shared?

Shared upon request

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

No

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

N/A

Pennsylvania

There is one county monitoring beaches in Pennsylvania, including the 9 Great Lakes beaches; there are 32 state beaches surveyed. Erie County Department of Health, Pennsylvania Dept. of Conservation, and Natural Resources Presque Isle State Park Complex all filled out surveys, which includes beaches not on Great Lakes.

- Erie County Department of Health reported on 10 beaches
- Pennsylvania Dept. of Conservation reported on 13 beaches
- Natural Resources Presque Isle State Park Complex reported on 9 beaches.

In total 32 beaches were reported one, which means 100% of the state's Great Lakes beaches were surveyed. In addition, 21 beaches that are not Beach Act Grant beaches were reported on.

Responses

(Question 7) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season?

6. How many beaches does your monitoring program sample? (i.e., 4)	7. Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season	8. How many ABSS/EHSS does your program conduct each year?
9	No	Not conducted
13	Yes	At most beaches
10	Yes	At most beaches

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

It has not historically been done.
These are conducted by State Park management and local municipality, not by ECDH.

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

Yes - 66.6% (2)
No - 33.3% (1)

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

USEPA Recreational Water Quality Criteria
USEPA Recreational Water Quality Criteria, US State regulatory requirements

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Stormwater runoff, Geese fecal droppings, Gull fecal droppings
Human Sewage, Geese fecal droppings, Gull fecal droppings, Algal blooms

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Yes - 0%
No - 33.3% (1)
Don't know - 33.3% (1)
N/A - 33.3% (1)

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

Yes - 0%
No - 0%
Don't know - 66.6% (2)
N/A - 33.3% (1)

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli*/*enterococci*) surveillance?

Yes - 0%
No - 33.3% (1)
Don't know - 33.3% (1)
N/A - 33.3% (1)

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Yes -33.3% (1)
No - 33.3% (1)
Don't know - 0%

N/A - 33.3% (1)

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

Yes - 0 %
No - 66.6% (2)
N/A - 33.3% (1)

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (*cyanobacteria*)?

Yes -33.3% (1)
No - 33.3% (1)
Don't know - 0%
N/A - 33.3% (1)

(Question 18) Have the surveys led to beach remedial actions?

Yes -33.3% (1)
No - 33.3% (1)
Don't know - 0%
N/A - 33.3% (1)

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

Yes - 0%
No - 100%

(Question 20) Did the surveys help recommend mitigation activities?

Yes -33.3% (1)
No - 33.3% (1)
Don't know - 0%
N/A - 33.3% (1)

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

Wastewater infrastructure upgrades, Waterfowl control actions, Beach landscaping

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

No responses

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

No responses

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

Short answer responses from the 1 respondent
Unknown

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

Short answer responses from the 1 respondent
Unknown

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Maybe - 100% (3)

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

Yes - 33.3% (1)
No - 66.6% (2)

(Question 28) If yes, do you engage with citizen science programs directly?

No - 66.6% (2)
N/A - 33.3% (1)

(Question 29) Is citizen-based monitoring data utilized?

Yes - 0%
No- 100% (3)

(Question 30) If yes, how?

*Our Partner, Regional Science Consortium would work more closely with citizen science programs.

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes - 66.6% (2)
N/A - 33.3% (1)

(Question 32) If yes, how is it shared?

Accessible from website
Both Open Data Portal and Accessible from Website, using Google Map.

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes - 33.3% (1)
No - 66.6% (2)

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Staff capacity reduced
Staff capacity reduced

Wisconsin

We received 12 survey responses from beach managers and monitoring programs in Wisconsin. Of those respondents, 2 were Indigenous tribes. Their responses are included in this Wisconsin state profile, but are also profiled independently.

- Wisconsin Department of Natural Resources (DNR)
- University of Wisconsin, Oshkosh
- City of Racine, WI - Wisconsin Beach Monitoring Program in Racine, Kenosha and Southern Milwaukee County
- North Shore Health Department
- Bayfield County Health Department
- Kenosha County Division of Health
- Lake Superior Research Institute-UW-Superior, Douglas County
- Northland College, Burke Center Beach Monitoring
- Washington Ozaukee Public Health
- Door County Public Health

State and county programs reported on a total of 250 beaches.

Tribes-Wisconsin

- Red Cliff Reservation - Environmental Department - 4 beaches
- Mashkiiziibii (Bad River) Tribe - Natural Resources Department - 8 beaches

The Red Cliff Reservation and the Mashkiiziibii tribes' responses are analyzed individually.

Responses - WI State and Tribes

(Question 7) Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season?

Yes - 70% (7)
No - 10% (1)
Don’t know - 20% (2)

6. How many beaches does your monitoring program sample? (i.e. 4)	7. Does your beach monitoring program conduct Annual Beach Sanitary Surveys/ Environmental Health and Safety Surveys every year, ahead or at the end of swim season	8. How many ABSS/EHSS does your program conduct each year?
3	Don't know	
4	Don't know	Option 5
6	No	Not conducted
70	Yes	At most beaches
15	Yes	At each beach
9	Yes	At each beach
12	Yes	At each beach
105	Yes	Sporadically at beaches as needed
5	Yes	At each beach
7	Yes	At each beach

(Question 9) If no, please explain why your program does not conduct ABSS/EHSS.

Short answers responses received from 2 respondent

funding
They are conducted at 40+ every year and other periodically.

(Question 10) Does your monitoring program regularly perform field data reports/Routine Beach Sanitary Surveys associated with water sample collection?

Yes - 100% (10)
No - 0% (0)

(Question 11) What guidelines are followed in implementing your foundational or annual ABSS/EHSS?

Note that respondents had the option to choose more than one answer

US EPA Recreational Water Quality Criteria
US EPA Recreational Water Quality Criteria
US EPA Recreational Water Quality Criteria, US State regulatory requirements
US EPA Recreational Water Quality Criteria, US State regulatory requirements
US EPA Recreational Water Quality Criteria
US EPA Recreational Water Quality Criteria

US EPA Recreational Water Quality Criteria
US EPA Recreational Water Quality Criteria
US EPA Recreational Water Quality Criteria

(Question 12) What potential health threats have been identified by these environmental surveys. (Respondents chose all that apply from the following options: Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Pig fecal waste, Poultry fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Sources of industrial pollution, Algal blooms, Dangerous water currents, other.)

Stormwater runoff, Geese fecal droppings, Gull fecal droppings
Human Sewage, Stormwater runoff, Parking lot runoff, Geese fecal droppings
Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Algal blooms
Stormwater runoff, Parking lot runoff, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Algal blooms, Dangerous water currents
Stormwater runoff, Parking lot runoff, Dog fecal waste, Geese fecal droppings, Gull fecal droppings, Algal blooms, Dangerous water currents
Human Sewage, Stormwater runoff, Parking lot runoff, Cattle fecal waste, Geese fecal droppings, Gull fecal droppings, Algal blooms
Human Sewage, Stormwater runoff, Parking lot runoff, Geese fecal droppings, Gull fecal droppings, Algal blooms, Dangerous water currents
Stormwater runoff, Dangerous water currents
Stormwater runoff, Cattle fecal waste, Dog fecal waste, Gull fecal droppings, Algal blooms, Dangerous water currents

(Question 13.1) Have the surveys identified any previously unrecognized sources of fecal pollution from sewage, livestock or wildlife fecal wastes?

Yes - 30% (3)
No - 40% (4)
Don’t know - 30% (3)

(Question 13.2) Are all the fecal pollution sources impacting your beach(es) known?

Yes - 20% (2)
No - 60% (6)
Don’t know - 20% (2)

(Question 14) Have the surveys led to expanded indicator bacteria (*E. coli*/*enterococci*) surveillance?

Yes - 40% (4)
No - 40% (4)
Don't know - 20% (2)

(Question 15) Have the surveys led to the conduct of microbial source tracking studies?

Yes - 60% (6)
No - 40% (4)

(Question 16) Have the surveys led to the conduct of specific pathogen studies?

Yes - 30% (3)
No - 70% (7)

(Question 17) Have the surveys led to the conduct of study/ies to detect harmful algae (cyanobacteria)?

Yes - 30% (3)
No - 70% (7)

(Question 18) Have the surveys led to beach remedial actions?

Yes - 80% (8)
No - 20% (2)

(Question 19) When fecal indicator bacteria levels exceed relevant thresholds designated for the protection of public health, did you use beach/environmental surveys to identify fecal pollution sources?

Yes - 70% (7)
No - 30% (3)

(Question 20) Did the surveys help recommend mitigation activities?

Yes - 70% (7)
No - 30% (3)

(Question 21) If yes, what types of mitigation activities were they? (Check all that apply from: Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes)

Short answers received from 7 respondents who answered YES to Question 20.

Wastewater infrastructure upgrades, Waterfowl control actions, Beach landscaping
N/A
Waterfowl control actions, Sand grooming
Waterfowl control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management
Waterfowl control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Farm BMPs, Land use changes
Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management, Land use changes
Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming
Waterfowl control actions, Beach landscaping
Wastewater infrastructure upgrades, Waterfowl control actions, Pet control actions, Beach landscaping, Sand grooming, Enhanced garbage/waste management
N/A
N/A

(Question 22) What proportion of recommended mitigation activities have been performed? What types of recommended mitigation activities have been performed?

Short answers received from 6 respondents.

N/A
N/A
Regular beach grooming occurs, waterfowl control efforts have been sporadic
Barkers Island Beach Restoration
The list is long and beach specific. Some have been completely reengineered and redesigned. Some have had minimal mitigation. We have had over 60 locations develop mitigation and reengineering plans developed.
Site dependent; some none - others 100%. Mitigation measures include landscape alterations, addition of green infrastructure, permeable pathways, waterfowl deterrent/exclusion measures, alterations in beach grooming, removal of invasive species, enhancement of native plant communities, educational signage, enactment of municipal ordinances, relocation or retrofit of stormwater infrastructure, enhanced monitoring of potential sources (e.g. tributaries & beach sands), improved public access, installation of water safety equipment/water safety campaign, restoration of coastal wetlands, encouragement of dune and swale systems, and enhancements to shore protective structures.

Wastewater infrastructure upgrades Waterfowl control actions Pet control actions Beach landscaping Sand grooming Storm Sewer Jetting of Outfalls
Mitigation was completed. Mitigation included diverting storm water runoff, installing a settling area, and swales to slow down and catch storm water runoff from road and parking areas.
N/A
N/A
Our County land Management division is working with nearby farmers and homeowners to mitigate farm run off and update out of compliance private wastewater systems

(Question 23) When mitigation activities were performed, what changes have been detected in subsequent monitoring or surveys?

Short answer responses from the 7 respondents

N/A
N/A
Unknown
fewer advisories and no beach closings
N/A
Option 1
Improvement
advisories and closures at that beach dropped dramatically and resulted in more open beach days.
decreases in occurrence of beach closures and/or advisories
N/A
Fewer beach closures due to *E. coli*

(Question 24) When mitigation activities were completed, were changes in beach utilization and/or local economic impact measured (or estimated)?

Short answer responses from the 5 respondents

N/A
N/A
No
N/A
Yes
At one location
No

Utilization is about the same - less complaints on the closures or advisories.
N/A
N/A
Mitigation is ongoing

(Question 25) In your opinion, what gaps in knowledge (regarding the need for, the importance of, and health impact of fecal contamination and other aspects of environmental surveys) could beach users or citizen scientists contribute directly?

Short answer responses from the 5 respondents

N/A
Assist in awareness of beach health advisories
periodic monitoring beaches currently on the list but unable to monitor due to funding.
N/A
Beach users and citizen scientists could contribute to overall beach management activities through volunteer clean sweep events as well as event-based monitoring.
NA
A reporting tool for illness, algae reporting, swimmers itch and strong currents.
N/A
N/A
We have several beaches that are utilized heavily by dog walkers- folks need to use common courtesy and clean up after their pets

(Question 26) In your opinion, is there relevant data that could be provided directly by beach managers through partnerships with beach users or citizen scientists?

Yes - 30% (3)
No - 10% (1)
Maybe - 60% (6)

(Question 27) Are you aware of environmental surveys conducted by citizen scientists?

Yes - 10% (1)
No - 90% (9)

(Question 28) If yes, do you engage with citizen science programs directly?

No - 50% (5)
N/A - 50% (5)

(Question 29) Is citizen-based monitoring data utilized?

Yes - 10% (1)
No - 60% (6)
N/A - 30% (3)

(Question 30) If yes, how?

Short answer responses from the 1 respondent
Some citizen-based data is collected and utilized by the state department of natural resources; primarily on tributaries.

(Question 31) Is your beach environmental survey data distributed externally/publicly?

Yes - 80% (8)
No - 10% (1)
N/A - 10% (1)

(Question 32) If yes, how is it shared?

Accessible from website
Shared upon request
Open data portal - raw data, machine readable, accessible
Shared upon request
Sent to the state at the conclusion of each year as well as being available on request.
Accessible from website
Open data portal - raw data, machine readable, accessible
Accessible from website
N/A
N/A

(Question 33) Has your beach program been adversely impacted by the COVID-19 pandemic?

Yes - 60% (6)
No - 40% (4)

(Question 34) If yes, what impacts has the COVID-19 pandemic had on your program?

Staff capacity reduced
Staff capacity reduced
Staff capacity reduced
N/A
Staff capacity reduced

N/A
Staff capacity reduced
Frequency of water sampling/monitoring reduced
N/A
N/A
Staff capacity reduced

Appendix

Ontario monitoring beaches

Country	Province	Municipality/County/monitoring body	# monitored beaches	Source
Canada	Ontario	Algoma	37	algomapublichealth.com/environment-inspections/recreational-water/beach-warnings/
Canada	Ontario	Brant/ Grand River Conservation	4	bchu.org/ServicesWeProvide/Inspections/BeachPostings
Canada	Ontario	Chatham-Kent	8	chatham-kent.ca/parks-recreation/activities-programs/aquatics-swimming/Beaches
Canada	Ontario	Durham	14	durham.ca/en/health-and-wellness/beaches.aspx
Canada	Ontario	Eastern Ontario	0	
Canada	Ontario	Elgin St. Thomas/ Southwestern health unit	7	swpublichealth.ca/en/community-health/beaches.aspx
Canada	Ontario	Grey Bruce	12	publichealthgreybruce.on.ca/Your-Environment/Safe-Water/Recreational-Water
Canada	Ontario	Haldimand-Norfolk (monitored by Ontario Parks)	4	hnhu.org/alerts-advisories/beaches/
Canada	Ontario	Haliburton, Kawartha, Pine Ridge District	57	hkpr.on.ca/my-community/beach-water/
Canada	Ontario	Halton	7	halton.ca/For-Residents/Water-and-Environment/Recreational-Water/Beach-Water
Canada	Ontario	Hamilton	8	hamilton.ca/parks-recreation/parks-trails-and-beaches/beach-water-quality-in-hamilton
Canada	Ontario	Hastings and Prince Edward Counties	18	hpepublichealth.ca/public-beaches/
Canada	Ontario	Huron County	16	myperthhuron.ca/index.php?MenuItemID=82

Country	Province	Municipality/County/monitoring body	# monitored beaches	Source
Canada	Ontario	Kingston, Frontenac and Lennox and Addington	29	kflaph.ca/en/healthy-living/public-beach-listings.aspx?sso_redirect=https:%2f%2fwww.kflaph.ca%2fen%2fhealthy-living%2fpublic-beach-listings.aspx&AuthTickId=N/A
Canada	Ontario	Lambton	7	lambtonpublichealth.ca/health-info/beach-water-quality-surveillance/
Canada	Ontario	Leeds, Grenville, Lanark	23	healthunit.org/health-information/recreational-water/weekly-beach-results/
Canada	Ontario	Middlesex-London	2	healthunit.com/beach-water-monitoring
Canada	Ontario	Niagara Region	18	niagararegion.ca/living/water/beaches/default.aspx
Canada	Ontario	North Bay Parry Sound	28	myhealthunit.ca/en/health-topics/beaches-and-pools.asp
Canada	Ontario	Northwestern (Kenora)	28	nwhu.on.ca/ourservices/EnvironmentalHealth/Pages/Beach-Monitoring.aspx
Canada	Ontario	Ontario Parks	100	ontarioparks.com/beachresults
Canada	Ontario	Ottawa	5	ottawapublichealth.ca/en/public-health-services/beach-water-quality-results.aspx
Canada	Ontario	Oxford County	8	swpublichealth.ca/en/community-health/beaches.aspx
Canada	Ontario	Peel	5	peelregion.ca/health/beach/enbeach.asp
Canada	Ontario	Perth District	16	hpph.ca/en/partners-and-professionals/beach-water-quality.aspx
Canada	Ontario	Peterborough County	22	peterboroughpublichealth.ca/your-health/beaches-and-pools/beach-testing-results/
Canada	Ontario	Porcupine (Timmins)	6	porcupinehu.on.ca/en/your-community/safe-water/porcupine-beachwise/
Canada	Ontario	Renfrew County	0	

Country	Province	Municipality/County/monitoring body	# monitored beaches	Source
Canada	Ontario	Simcoe Muskoka	54	simcoemuskokahealth.org/Topics/SafeWater/BeachWater/BeachPostings
Canada	Ontario	Sudbury	34	phsd.ca/health-topics-programs/water/beaches-splash-pads-pools-spas/beach-water-testing-results/
Canada	Ontario	Thunder Bay	17	tbdhu.com/
Canada	Ontario	Timiskaming	17	timiskaminghu.com/350/Beach-Water-Testing
Canada	Ontario	Toronto	11	toronto.ca/explore-enjoy/parks-gardens-beaches/beaches/
Canada	Ontario	Waterloo	2	apps.grandriver.ca/beachconditions/public/beachconditions.aspx
Canada	Ontario	Wellington-Dufferin-Guelph	4	apps.grandriver.ca/beachconditions/public/beachconditions.aspx
Canada	Ontario	Windsor-Essex	10	wechu.org/beaches-pools-and-spas/beach-safety
Canada	Ontario	York Region	14	york.ca/environment/water-and-wastewater/beach-water-testing
Canada	Ontario	Ontario Parks	163	
		Total Beaches	**815**	
		Total Beaches completed survey	**328**	
		% completed survey	**40.24539877**	

US and Tribal Monitored beaches sources

Country	State	County/ monitoring body	# monitored beaches	Source	Open Data Source
US	Illinois	Cook	41	idph.state.il.us/envhealth/ilbeaches/public/Default.aspx	idph.state.il.us/envhealth/ilbeaches/public/Search.aspx
US	Illinois	Lake	19	idph.state.il.us/envhealth/ilbeaches/public/Default.aspx	idph.state.il.us/envhealth/ilbeaches/public/Search.aspx
US	Indiana	Kosciusko	7	in.gov/idem/lakemichigan/pages/beachguard/	in.gov/idem/lakemichigan/pages/beachguard/
US	Indiana	Lake	16	in.gov/idem/lakemichigan/pages/beachguard/	in.gov/idem/lakemichigan/pages/beachguard/
US	Indiana	LaPorte	18	in.gov/idem/lakemichigan/pages/beachguard/	in.gov/idem/lakemichigan/pages/beachguard/
US	Indiana	Porter	15	in.gov/idem/lakemichigan/pages/beachguard/	in.gov/idem/lakemichigan/pages/beachguard/
US	Minnesota	Saint Louis (Duluth)	13	mnbeaches.org/	mnbeaches.org/gmap/DataViewer.html
US	Minnesota	Lake County (Two Harbours)	8		
US	Minnesota	Cook County (Silver Bay)	5		
US	Minnesota	Cook County (Schroeder)	3		
US	Minnesota	Cook County (Grand Marais)	9		
US	Michigan	Alcona	9	egle.state.mi.us/beach/Default.aspx	egle.state.mi.us/beach/Search.aspx
US	Michigan	Alger	18		
US	Michigan	Allegan	7		
US	Michigan	Alpena	14		
US	Michigan	Antrim	17		
US	Michigan	Arenac	21		
US	Michigan	Baraga	12		
US	Michigan	Bay	6		
US	Michigan	Benzie	11		
US	Michigan	Berrien	22		
US	Michigan	Charlevoix	22		
US	Michigan	Cheboygan	13		

Country	State	County/ monitoring body	# monitored beaches	Source	Open Data Source
US	Michigan	Chippewa	39	egle.state.mi.us/beach/Default.aspx	egle.state.mi.us/beach/Search.aspx
US	Michigan	Delta	29		
US	Michigan	Emmet	21		
US	Michigan	Gogebic	7		
US	Michigan	Grand Traverse	34		
US	Michigan	Houghton	15		
US	Michigan	Huron	24		
US	Michigan	Iosco	16		
US	Michigan	Keweenaw	16		
US	Michigan	Leelanau	39		
US	Michigan	Luce	15		
US	Michigan	Mackinac	41		
US	Michigan	Macomb	3		
US	Michigan	Manistee	10		
US	Michigan	Marquette	7		
US	Michigan	Mason	13		
US	Michigan	Menominee	8		
US	Michigan	Monroe	2		
US	Michigan	Muskegon	13		
US	Michigan	Oceana	8		
US	Michigan	Ontonagon	11		
US	Michigan	Ottawa	11		
US	Michigan	Presque Isle	22		
US	Michigan	Sanilac	14		
US	Michigan	Schoolcraft	9		
US	Michigan	St. Clair	15		
US	Michigan	Van Buren	4		
US	Michigan	Wayne	2		
US	New York	NY State Parks	72	parks.ny.gov/recreation/swimming/beach-results/documents/results/BeachResults.pdf	
US	New York	Chatauqua - Lake Erie	5	ny.healthinspections.us/ny_beaches/	

Country	State	County/ monitoring body	# monitored beaches	Source	Open Data Source
US	New York	Geneva	1	ny.healthinspections.us/ny_beaches/search_beaches.cfm	
US	New York	Monroe	2		
US	New York	Oswego	5		
US	New York	Watertown	5		
US	Ohio	Ashtabula	5	publicapps.odh.ohio.gov/beachguardpublic/search	
US	Ohio	Cuyahoga	19		
US	Ohio	Erie	27		
USA	Ohio	Lake	3		
USA	Ohio	Lorain	6		
USA	Ohio	Lucas	2		
USA	Ohio	Ottawa	7		
USA	Pennsylvania		10	eriecountypa.gov/departments/health/services-and-programs/health-and-wellness/beach-water-testing-results/	
USA	Wisconsin	Ashland County [PDF]	10		
USA	Wisconsin	Eastern Bayfield County [PDF]	18		
USA	Wisconsin	Northern Bayfield County [PDF]			
USA	Wisconsin	Brown County [PDF]	10		
USA	Wisconsin	Door County [PDF]	54		
USA	Wisconsin	Douglas County [PDF]	13		
USA	Wisconsin	Iron County [PDF]	3		
USA	Wisconsin	Kenosha County [PDF]	8		
USA	Wisconsin	Kewaunee County [PDF]	6		
USA	Wisconsin	Manitowoc County [PDF]	16		
USA	Wisconsin	Marinette County [PDF]	5		

Country	State	County/ monitoring body	# monitored beaches	Source	Open Data Source
USA	Wisconsin	Milwaukee County [PDF]	13		
USA	Wisconsin	Oconto County [PDF]	1		
USA	Wisconsin	Ozaukee County [PDF]	11		
USA	Wisconsin	Racine County [PDF]	8		
USA	Wisconsin	Sheboygan County [PDF]	15		
USA	BAD RIVER TRIBE		8		
		Total Beaches	**1142**		
		Total Beaches Completed Survey	**827**		
		% complete survey	**72.41681260945709**		