

Maine Healthy Beaches (MHB) Program Risk Assessment Matrix

Scope and Application

A Risk Assessment Matrix (RAM) is a preliminary evaluation of water quality trends and potential sources of fecal bacteria pollution impacting a marine beach. This risk-based ranking system is used to classify coastal beaches into “tiers,”¹ helps improve understanding of the risk of fecal contamination on valued beaches, and helps better define the typical “worst-case scenario” for water quality. It is meant to work in conjunction with routine monitoring, special studies, and sanitary surveys to build a profile of each beach. A RAM may also help determine the need for an in-depth sanitary survey and/or the need for separate beach management areas (BMAs).

Beach Management Areas

A BMA represents an entire beach or segment of a beach that is managed independently from other segments or nearby beaches. Implementing separate BMAs allows management decisions to be made for a specific region of the beach, rather than treating the entire beach as one unit. Each beach management area has its own beach sign(s) and is listed separately on the MHB Web site.

An initial RAM of the entire beach can help managers determine if separation of the larger beach area is warranted. Possible reasons to implement separate BMAs include:

- The beach is heterogeneous and conditions vary considerably (e.g., a river mouth or storm drain on the north end of the beach increases the likelihood of bacterial pollution compared to the southern end; or an area where water quality results are not consistent across the entire length of beach).
- Monitoring and public notification of conditions are not practical or feasible for the entire beach.
- Sections of the beach are not promoted for public use, including areas that are privately owned, not serviced by lifeguards, lack public access, or are deemed unsafe for recreational purposes.
- A section of the beach has heavy public usage compared to other areas.
- The beach has historically informal names or sections known to the public.

Completing the RAM

A RAM should be completed for each BMA. The RAM should be updated every 3-5 years and the frequency of updates depends on conditions, the availability of new information, new development, an increase in activities posing a risk to water quality, changes in the designated use of the waterbody, etc. Each beach management area has its own set of factors or characteristics impacting water quality and the RAM helps determine what those factors are.

If routine monitoring demonstrates bacteria levels that are consistently above the established safety

¹ The “tier” classification determines the beach’s monitoring frequency, need for a more in-depth assessment of wastewater and environmental conditions, etc.; See MHB Tiered Monitoring Plan

limit, simply examining the areas/properties directly on or adjacent to the beach may not be sufficient to thoroughly investigate all actual and potential sources of fecal contamination impacting the beach. Further investigations may include: monitoring of freshwater inputs; property and septic system inspections near the beach and within the larger drainage (i.e. watershed) area(s); smoke, dye, and camera testing to determine the integrity of sewer and/or stormwater infrastructure; and investigating other factors likely contributing to poor water quality (e.g. boats dumping waste, large wildlife/water populations, etc.). Removing sources of bacterial pollution can lead to measurable improvements in water quality.

Before heading to the field, read through the RAM and become familiar with the process and the resources necessary to successfully complete the exercise. Obtain copies of data and reports specific to the beach management area(s) such as previous sanitary surveys, watershed surveys, special studies, etc. Integrate the expertise and knowledge of local code enforcement officers, plumbing inspectors, wastewater treatment, public works, planners, conservation commissions, etc.

- ✓ For sections I-VI, complete each question and enter the total points in the summary below each.
- ✓ Refer to the Definitions (page 11) for terms used in the RAM.
- ✓ Summarize the section totals and enter this value in the **Total Points Box, Section VII page 9**.
- ✓ This final RAM score corresponds with the RAM ranking system below.

RAM Ranking System

The final RAM score corresponds to a ranking or grade with associated recommendations. The beach rankings are meant to be used as a *guideline* to help communities and resource managers assess the recreational water quality and safety of their beaches.

Two examples of using the RAM in making beach management decisions:

- Bacteria results are slightly above the established safety limit, there is no known hazard (e.g., malfunctioning septic, sewage treatment plant overflow), the conditions are not the typical “worst-case scenario,” and the **Beach Ranking = A**. The beach manager may choose to wait for the resample results before posting an advisory.
- The same conditions as above, but the **Beach Ranking = D**. The beach manager consistently posts an advisory immediately following an exceedance of the safety limit and issues preemptive advisories based on local precipitation levels (i.e. precautionary rainfall advisory).

Beach Scores & Rankings

- A. (0-50 points)** Suggested Action: Monitor once per week or less during the monitoring season. Post an advisory and resample when bacteria results exceed the established safety limit. If there are rivers, streams or storm drain near the beach, post a precautionary rainfall advisory when the local rainfall level exceeds the typical trigger (e.g. 1 inch within 24 hrs) linked to unsafe bacteria levels. Routinely update the RAM and take precautionary actions to maintain healthy conditions including routine septic system inspections, reducing runoff by planting buffers and minimizing impervious surfaces within the watershed, ensuring adequate pump-out facilities for boats, etc. Post

PRAs when there are known contamination events (e.g., broken sewer, leaky septic) or during heavy rainfall/severe flooding conditions. Engage in education and outreach efforts that promote healthy sanitary practices at the beach and throughout the watershed.

- B. (51-100 points)** Suggested Action: Monitor once per week or more during the monitoring season. Post an advisory and resample when bacteria results exceed the established safety limit. Post a precautionary rainfall advisory when the local rainfall level exceeds the typical trigger (e.g. 1 inch within 24 hrs) linked to unsafe bacteria levels. Routinely update the RAM and take precautionary actions to maintain healthy conditions including routine septic system inspections, reducing runoff by planting buffers and minimizing impervious surfaces within the watershed, ensuring adequate pump-out facilities for boats, etc. Engage in education and outreach efforts that promote healthy sanitary practices at the beach and throughout the watershed.
- C. (101-150 points)** Suggested Action: Monitor once per week or more during the monitoring season. Post an advisory and resample when bacteria results exceed the established safety limit. Post a precautionary rainfall advisory when the local rainfall level exceeds the typical trigger (e.g. 1 inch within 24 hrs) linked to unsafe bacteria levels. Additional monitoring of freshwater inputs or other high-risk areas may be warranted. When feasible, examine the relationship between bacteria levels and other parameters (e.g., rainfall, tidal stage, seaweed, bather load). Routinely update the RAM and take precautionary actions to maintain healthy conditions including routine septic system inspections, reducing runoff by planting buffers and minimizing impervious surfaces within the watershed, ensuring adequate pump-out facilities for boats, etc. Engage in education and outreach efforts that promote healthy sanitary practices at the beach and throughout the watershed.
- D. (151+ points)** Suggested Action: When feasible, increase the frequency of monitoring and the number of sites on the beach and/or in high-risk areas (e.g., river mouth, storm drain, stagnant tide pool). Post an advisory and resample when bacteria results exceed the established safety limit. Post a precautionary rainfall advisory when the local rainfall level exceeds the typical trigger (e.g. 1 inch within 24 hrs) linked to unsafe bacteria levels. Consider keeping the BMA posted until bacteria levels are consistently within acceptable limits. Post educational signage or flags at the beach alerting the public to wet weather risks or other potential pollution pathways (e.g., no wading in stagnant tide pools or swimming in river mouths). Examine all bacterial pathways to the beach and when feasible, conduct an in-depth wastewater assessment (i.e., survey of sewer and septic systems) of the shoreline and adjacent areas. Identify and remediate pollution sources. Engage in education and outreach efforts that promote healthy sanitary practices at the beach and throughout the watershed.

MHB Risk Assessment Matrix

Town /Park: _____

Evaluation Date: _____

Evaluator(s): _____

Title/Department: _____

Beach Name: _____

Beach Boundaries: _____

Beach Site(s): _____

I. Beach history

-
1. What was the geometric mean² level for each monitoring site during the previous season (2016)?
____ > 35 col/100mls (# sites __ x 10 points)
____ < 35 col/100mls (0 points for each site) _____
-
2. How many monitoring dates³ during the previous 5 seasons (2012-2016) did at least one beach site exceed the established safety limit (i.e. results >104)?
____ >= 7 times (20 points) ____ 5-6 times (15 points) ____ 3-4 times (8 points)
____ 1-2 times (5 points) ____ 0 times (0 points) _____
-
3. Has dry weather monitoring resulted⁴ in an exceedance during the past 5 seasons (2012-2016)?
____ Yes (10 points) ____ No (0 points) _____
-
4. How often are resamples⁵ clean?
____ <70% of the time (10 points) ____ 70-90% of the time (5 points)
____ >90 % of the time (0 points) _____
-
5. Were there any illness reports⁶ associated with this beach in the past 3 years?
____ Yes (20 points) ____ No (0 points) _____
-

² Source: <http://www.maineoastdata.org>->reports->select date range; OR visit <http://new.maineoastdata.org/>->graph data->select date range; count dates that at least one site failed and not the total number of sites.

³ Source: www.mainehealthybeaches.org ->beach status-> select monitoring data icon->site tab; OR visit <http://new.maineoastdata.org/>->download data->select date range->generate report.

⁴ Source: <http://www.maineoastdata.org>->datasheets; OR visit <http://new.maineoastdata.org/>->download data->select date range->generate report; OR ->graph data->value comparison by site->select Enterococci and rainfall.

⁵ Source: MHB Program Beach Inventory (2006-2016).

⁶ Source: Town records; MHB; ME CDC; also include un-confirmed reports.

MHB NOTES:

Section I. Total Points:

| |
|--|
| |
|--|

II. Human wastewater

Impact Guidelines:

- *Drains directly to the beach.*
- *Within a 1 mile radius of the beach boundaries- this includes a mile from each boundary length-wise, 1 mile behind or upland of the beach and 1 mile offshore.*
- *Adjacent to a stream/river that empties within a mile of the beach.*

Score 25 points for each of the following based on the impact guidelines (above):

1. Is there a wastewater treatment plant outfall?

___ Yes (#outfalls ___ x 25 points)

___ No (0 points)

2. Is there a sewer system (public or privately owned)?

___ Yes (0 points)

___ No (25 points)

3. Are there subsurface wastewater disposal (septic or cesspool) systems that are 20 years or older?

___ Yes (# systems ___ x 25 points)

___ No (0 points)

4. Are there combined sewer overflows (CSO)?

___ Yes (# of CSOs ___ x 25 points)

___ No (0 points)

5. Are there overboard discharge units (OBD)?

___ Yes (# units ___ x 25 points)

___ No (0 points)

6. Is there a marina and/or a mooring field?

___ Yes (# marinas/fields ___ x 25 points)

___ No (0 points)

MHB NOTES:

Section II. Total Points:

III. Freshwater inputs

Impact Guidelines:

- *Drains directly to the beach.*
- *Within a 1 mile radius of the beach boundaries- this includes a mile from each boundary length-wise, 1 mile behind or upland of the beach and 1 mile offshore.*
- *Adjacent to a stream/river that empties within a mile of the beach.*

Score points for each of the following based on the impact guidelines (above). Note the difference in points for each question:

1. Are there rivers⁷ or streams?

___ Yes (# rivers/streams ___ x 25 points) ___ No (0 points) _____

1a. If yes, is the river or stream listed on the state's 303d list⁸ for impairment with bacteria listed as a pollutant?

___ Yes (# waterbodies ___ x 15 points) ___ No (0 points) _____

2. Are there stormwater drains or pipes?

___ Yes (# drains/pipes ___ x 15 points) ___ No (0 points) _____

3. Are there intermittent streams or flows related to rain events only?

___ Yes (# streams/flows ___ x 10 points) ___ No (0 points) _____

MHB NOTES:

Section III. Total Points:

⁷ This is a permanent drainage not related to rain events, but it may flow intermittently.

⁸ Source: <http://www.maine.gov/dep/water/monitoring/305b/>.

IV. Domestic animals/wildlife

Impact Guidelines:

- *Drains directly to the beach.*
- *Within a 1 mile radius of the beach boundaries- this includes a mile from each boundary length-wise, 1 mile behind or upland of the beach and 1 mile offshore.*
- *Adjacent to a stream/river that empties within a mile of the beach.*

Score 10 pts for each of the following based on the impact guidelines (above):

1. Are there domestic animal farms/hobby farms/kennels?

____ Yes (# of farms/kennels ____ x 10 points) ____ No (0 points) _____

2. Are there marsh and wildlife areas/preserves?

____ Yes (# areas ____ x 10 points) ____ No (0 points) _____

2a. If there's a marsh nearby, does it ever drain⁹ to the beach?

____ Yes (# areas ____ x 10 points) ____ No (0 points) _____

3. Are there farms that spread manure and/or compost operations?

____ Yes (#operations ____ x 10 points) ____ No (0 points) _____

MHB NOTES:

Section IV. Total Points:

| |
|--|
| |
|--|

V. Beach activities and characteristics

1. What is the average total number of people that visit any 500-foot stretch of beach during the time of maximum use (July and August)?

____ > 50,000 visitors (10 points) ____ 20,000-50,000 visitors (5 points)
____ 10,000-20,000 visitors (3 points) ____ < 10,000 visitors (0 points) _____

2. Are there public restrooms located within walking distance of the beach?

____ Yes (0 points) ____ No (25 points) _____

⁹ This also includes drainage that occurs only during/after rain events and/or seepage through the beach face.

3. Are there trash cans on the beach?
 _____ Yes (0 points) _____ No (3 points) _____
-
4. Are dogs allowed on the beach during the months of May – September (“Yes” if dogs are allowed and restricted)?
 _____ Yes (10 points) _____ No (0 points) _____
-
5. Are there large numbers of waterfowl (e.g. gulls, ducks, etc.) regularly present ?
 _____ Yes (10 points) _____ No (0 points) _____
-
6. Does more than a small amount of seaweed accumulate¹⁰ on the beach?
 _____ Yes (15 points) _____ No (0 points) _____
-
7. Do tide pools form on the beach?
 _____ Yes (# pools ____x 5 points) _____ No (0 points) _____
-
8. What is the relative shape of the beach?
 _____ Crescent (10 points) _____ Flat (0 points) _____
-
9. Typically, the summer prevailing winds are onshore (sea breeze).
 _____ Yes (10 points) _____ No (0 points) _____
-
10. Is tidal flushing partially restricted (e.g. jetty, pier, dock, breakwater)?
 _____ Yes (10 points) _____ No (0 points) _____
-
11. Is there a paved parking lot located within 100 ft?
 Yes (# lots ____ x 5 points) _____ No (0 points) _____
-
12. How many paved roads are within 500 ft of the beach?
 (#roads _____x 2 points) _____
-

MHB NOTES:

Section V. Total Points:

| |
|--|
| |
|--|

¹⁰ This is before any management of seaweed occurs and includes episodic events.

VI. Actions to improve/protect water quality

Subtract Points for the Following:

1. There's routine inspection and maintenance¹¹ of:
 - Subsurface wastewater disposal (e.g. septic, cesspools) systems (10 points) _____
 - Sewer system¹² (10 points) _____
 - Stormwater system (e.g. catch basin cleaning, surveys) (5 points) _____

2. An active marine vessel pump-out station is located within 3 miles of the beach. (# stations__ x 5 points) _____

3. Local education/outreach¹³ regarding best practices (e.g. pumping septic/boat, dog waste, feeding waterfowl) is conducted. (5 points) _____

4. Local water quality ordinances¹⁴ are in place. (10 points) _____

5. More than half of the beach has a 200 foot vegetative buffer. (5 points) _____

6. Dogs are banned from the beach May-September. (10 points) _____

7. Dog-waste bags are provided at entry points. (3 points) _____

8. The beach is regularly cleaned and/or seaweed is managed¹⁵. (5 points) _____

9. There's "green" infrastructure¹⁶ within a mile of the beach. (5 points) _____

MHB NOTES:

Section VI. Total Points:

¹¹ Ask Codes Enforcement/Plumbing Inspector if routine inspections of older systems occurs, especially in tidal areas and unsuitable soils. Efforts can include asking pump-out history, property inspections for malfunctions, dye tests, etc.

¹² Ask Wastewater Department if routine inspection of system integrity (especially for older, tidal areas) is part of the Operations and Maintenance Plan. Inspections may include smoke, dye and camera testing, checking property to system connection, stormwater cross-connection, etc.

¹³ For ex. signage, posters in restrooms, mailings, public service announcements, stormwater events, advertising, etc.

¹⁴ Tax incentives and/or requirements for pumping out septic, required replacement at time of property transfer; more stringent setback standards than state requirements, etc.

¹⁵ For example, raking or mechanical cleaning.

¹⁶ <https://www.epa.gov/green-infrastructure>

VII. RAM Final Score

Section Total Points

- I. Beach history (+) _____
 - II. Human wastewater (+) _____
 - III. Freshwater inputs (+) _____
 - IV. Domestic animals/wildlife (+) _____
 - V. Beach activities and characteristics (+) _____
-

Subtotal Sections I-V _____

- VI. Actions to improve/protect water quality **Subtract Points (-)** _____
-

Final Score

Note: **See beach scores and rankings, page 2.**

Definitions

303(d) List – The 303(d) list identifies water quality limited waters within the state, causes and sources of nonattainment of water quality standards, and a timetable for the development of TMDLs (Total Maximum Daily Loads) or other management processes to address attainment. Standards refer to specific levels of pollutants, which, if reached or exceeded, are expected to render a body of water unsuitable for its designated use and may adversely affect human health or aquatic life. Issued by a governmental institution or other agency.

Beach Management Area (BMA) – An entire beach or a segment of a beach that is managed independently from other beaches or segments due to potential pollution impacts or capacity of management to provide notification of water quality monitoring results.

Combined Sewer Overflows (CSO) – Consist of mixtures of raw domestic sewage, industrial and commercial wastewaters, and stormwater runoff. Overflow may occur when the flow capacity of combined storm drains and sewer systems are exceeded during rainstorms.

Exceedance – To exceed or go above a standard or permissible limit.

Geometric mean – Reduces the influence of outlying (i.e., the very low and very high) numbers on the data set. The data are transformed to the logarithmic values of each datum and then averaged (summed and divided by the number of terms).

Heterogeneous – Diverse in character or content.

Intermittent streams – Streams that may only flow at certain times of the year (usually related to spring runoff) or after large rainfall events. Generally, intermittent streams will be narrow and shallow and have varying flow rates.

Malfunctioning subsurface wastewater disposal systems (e.g. septic, cesspool) – Area of primary concern due to public health issues. You can usually tell a malfunctioning system by: odor; presence of wetland plant species such as cattails in an otherwise normal vegetation area; seepage from the tank or leach field area; mushy areas above the system; indents in the ground or other signs that the cover or tank might have collapsed.

Marine vessel pump-out station – Provides a safe and legal method for disposing of human sanitary waste from sanitation devices (i.e., storage tanks) on marine vessels.

Monitoring season – Period of time swim beach samples are collected to correspond with public use of recreational water; varies from one beach to another as weather and water temperature vary greatly from region to region; for most beaches in Maine, this is Memorial Day through Labor Day.

Overboard Discharge (OBD) – A discharge of sanitary wastewater from residential, commercial, and publicly-owned facilities to streams, rivers, and the ocean. Since these are point discharges, they are required to be licensed by the state, and are currently being phased out by the Department of Environmental Protection.

Risk Assessment Matrix (RAM) – A preliminary assessment of potential and/or actual pollution sources on or directly adjacent to the beach. The RAM will assist beach managers in making well-informed beach management decisions, in conjunction with routine monitoring to build a “profile” of each BMA and to determine the need for an in-depth sanitary survey of the shoreline and adjacent watershed area(s).

Sanitary survey – The goal of a sanitary survey is to identify, document, and eliminate sources of fecal contamination affecting water resources (e.g., coastal beaches, shellfish growing areas, and freshwater inputs to these areas).

Special study – Monitoring, research, and data analysis conducted beyond the routine Enterococci monitoring of beaches. Typically, special studies are conducted in areas with chronic bacteria issues.

Vegetative buffer – Undeveloped area directly adjacent to a body of water. Reduces runoff, stabilizes soils, provides habitat, etc.

Wastewater treatment plant – Also referred to as a publicly-owned treatment works (POTW), a sanitary sewer collection and treatment system.

Watershed – The upland land area which drains to a particular waterbody.