Maine Healthy Beaches
2011 Report to US EPA
May 2012

I. Program Accomplishments

There are more than 30 miles of public access beaches stretching along Maine's coast. Maine Healthy Beaches (MHB) is managed by the Maine Department of Environmental Protection (DEP) and coordinated by the University of Maine Cooperative Extension (UMaine Extension).

MHB accomplished the following in 2011:

- Worked with 28 local management entities to conduct routine monitoring, assessment and public notification of water quality conditions for 61 beach management areas.

- Processed nearly 2,000 Enterococci samples at approximately 170 routine and enhanced monitoring locations spanning Kittery to Mount Desert Island (MDI).

- Held 45 formal trainings (field, database, laboratory, follow up observational field trainings) for about 175 local staff and volunteers.

- Planned and facilitated over 30 regional planning and problem-solving meetings with local, state and federal partners (111 participants).

- In partnership with local beach managers, completed Risk Assessment Matrices (shoreline surveys) for 33 beach management areas.

- Supported enhanced monitoring and source-tracking efforts for: Bar Harbor Town Pier and Beach; Lincolnville Beach (storm drainage network, Frohock Brook); the Ducktrap River; Goodies Beach (storm drainage network, Rockport Harbor, Lily Pond Stream, Goose River), Goosefare Brook (Bear Brook), Kennebunk River, Cape Neddick River, Long Sands Beach (storm drainage) and Short Sand's Beach (Short Sands Brook).

- In an effort to target human-sourced fecal contamination, approximately 600 samples were analyzed for optical brightener levels at over 150 routine beach sites and enhanced monitoring locations.

- Partnered with Tim Bridges (US EPA Environmental Scientist) and ME DEP to conduct *E.coli*, Enterococci, optical brighteners, nutrients and pharmaceutical analysis in Goosefare Brook and associated tributaries (Bear Brook).

- Supported a Microbial Source Tracking Pilot Study in York County.

- Updated and finalized enhanced monitoring and sanitary survey reports for the Gooch's Beach/Kennebunk River Watershed and Goodies Beach/Rockport Harbor Watershed.

- Developed and distributed a public report: *Maine Healthy Beaches, a unique partnership to keep Maine's beaches clean, status and trends (2005-2010).*

II. Budget Information[1]

Program Activities
The US EPA sponsored, MHB 2011 budget supported all monitoring, assessment and notification, education/outreach, enhanced monitoring and source-tracking efforts including:

- Cooperative Extension staff salaries and a portion of the DEP Program Manager. This team of personnel provides extensive support to 28 local management entities (towns, state parks, national park and private beach associations) including program coordination, quality- assured protocols and structure, field/lab trainings, technical assistance, volunteer recruitment, education/outreach, etc.
- Partial support for a DEP data specialist to provide data management services, transfer MHB data to DEP's Environmental and Geographic Analysis Database (EGAD) system, manage the submission of MHB data into the US EPA databases (STORET and PRAWN), fulfill data requests and complete additional data analysis as needed.
- Pre-season regional beach manager meetings to: communicate program updates, revise Communication Plans, sign the MHB Agreement Form, address participants' needs, distribute materials, schedule field trainings, modify monitoring site locations, regional collaboration, etc.
- Field monitoring supplies, equipment, volunteer training packets and quality-assurance including annual field, database, and observational trainings for approximately 175 citizen volunteers and local level staff.
- Laboratory equipment, supplies, labor, sample transport (courier), training, and QA/QC support for five Enterococci laboratories processing samples for 61 beach management areas (spanning Kittery to MDI).
- Enhanced monitoring and pollution identification efforts including numerous planning and problem-solving meetings with local, state and federal partners. [2]
- Education and outreach efforts including delivering presentations to local, regional and national audiences, development and distribution of numerous publications, etc.
- A contract with Relyon Media for hosting of the MHB database and public interface, as well as consultant services.
- Direct and indirect expenses such GIS software licensing and professional development for MHB staff, travel, telephone, computer services, postage, office support, photocopying, etc.

Volunteer Contribution
MHB participation is voluntary and towns/parks designate local beach managers and field monitors. Beach managers are typically town administrators, health nurses, fire chiefs, state park managers, etc. MHB tasks are an add-on to an already full schedule. The time devoted to these tasks varies and is difficult to quantify.

[1] **Appendix A.**
[2] See Section VI.

Towns and state parks utilize citizen volunteers or devote paid staff time for sample collection, transport and data entry. Each of the approximately 175 local staff/volunteer monitors attend a pre-season field training, and on average contribute 2 hours weekly during the monitoring season. A conservative estimate of the total volunteer monitor contribution was approximately 5,250 hours ($20/hour) for a total of $105,000 in 2011.

III. Program Deliverables/Appendices:

Appendix A MHB 2011 Budget Summary
Appendix B MHB 2011 Beach Mgt. Area Classification/Tiered Monitoring Plan
Appendix C *Maine Healthy Beaches, a unique partnership to keep Maine's beaches clean, status and trends (2005-2010)*
Appendix D Poster: *Tracking human–sourced pollution: using optical brighteners to identify sources of fecal bacteria impacting water quality on Gooch's Beach, Maine*.
Appendix E Updated MHB Education and Outreach Materials
Appendix F MHB 2011 Notification Activity
Appendix G *Impact of Cruise Ship Discharge on Ambient Water Quality Bar Harbor, ME*
Appendix H *Rockport Harbor Water Quality Project 2010-2011*
Appendix I *Kennebunk River Watershed Water Quality Project*
Appendix J *Microbial Source Tracking to Identify Human Sources of Fecal Contamination in Coastal York County in Summer 2011*
Appendix K Cape Neddick River- York Community Development Department Work Plan

IV. Performance Criteria

Beach Management Area Classification/Tiered Monitoring Plan[3]
US EPA funding primarily supports monitoring of moderate to high use beaches with adequate public access. Maine law allows public use of private beaches for "fishing, fowling and navigation" only. Participating beaches must have a management entity able to meet MHB protocols and conditions set forth in the MHB QAPP and MHB Towns/State Parks Agreement. New beach management areas (BMAs) will be recruited over time, as resources and funding allow and/or circumstances change eligibility for program participation.

In 2011, MHB successfully worked with 29 diverse local management entities to conduct routine monitoring for 61 participating BMAs. 58 are classified as "Tier-1," and 3 are classified as "Low risk, Tier-2" with a reduced monitoring effort. "Tier-3" BMAs currently do not meet the criteria for MHB participation.

Beach Monitoring, Assessment, Notification, Education and Outreach
MHB provided a unified structure and quality-assured tools to implement an adaptive monitoring regime, assess the risk of pollution at each BMA and notify the public of water quality conditions on Maine's coastal beaches.

[3] **Appendix B.**

MHB is a voluntary program and monitoring coastal water quality for swimming and other water contact usage is the responsibility of local jurisdictions and is not mandated by state law. In order to participate, a beach must meet the following criteria: a coastal beach (public or privately owned) with adequate public access and medium-high public usage; have a management entity that meets conditions of the MHB Agreement; a feasible plan for monitoring, assessment and public notification, and a plan for compliance with MHB QAPP conditions.

Monitoring

The monitoring season lasted approximately three months from Memorial Day through Labor Day.[4] In partnership with MHB staff, local management entities selected monitoring sites for each beach based on where people swim, at freshwater inputs to the beach, and near other high-risk features including sewage treatment plant outfalls, wildlife areas, etc. Samples were collected in two to three feet of water. For areas experiencing chronic bacterial pollution, additional monitoring sites were added throughout the watershed and/or wet weather monitoring is conducted to help determine pollution sources.

Parameters[5] monitored include: Enterococci bacteria, air and water temperature, salinity, tidal stage, rainfall and weather conditions, other field conditions that may affect beach water quality. Based on US EPA Guidance Criteria and adopted by ME DEP, the safety threshold is 104 Enterococci per 100 ml of sample water.

Approximately 2,000 samples were collected at approximately 170 routine and enhanced monitoring locations spanning Kittery to MDI. Samples are transported to the laboratory (3 regional, 2 local) for analysis within 6 hours of collection. The majority of samples are processed by Nelson Analytical Laboratory and transported via a courier service. Samples are analyzed using the IDEXX Enterolert ® Most Probable Number enumeration. Beach sites are resampled as soon as possible following an exceedance. All samples and parameters are collected and analyzed according to US EPA-approved quality-assured protocols outlined in the MHB QAPP.

Assessment

Beyond routine beach monitoring, MHB evaluated the risk of pollution and potential/actual sources via a Risk Assessment Matrix, and in some cases, through GIS mapping and analysis, enhanced monitoring and source-tracking efforts.[6]

In 2010 and 2011, MHB assisted local beach managers in completing an updated Risk Assessment Matrix for 57 beach management areas. This is an assessment of shoreline characteristics, activities (on and offshore) and water quality. MHB used this risk-based ranking to inform the classification and monitoring regime for each beach management area, as well as determine the need for an in-depth sanitary survey of the shoreline, freshwater inputs and the surrounding watershed areas.

[4] Monitoring may be extended for targeted areas
[5] For areas experiencing frequent bacterial pollution, the list of parameters is often increased as part of the source-tracking toolbox approach
[6] Section VII

Notification
Once available, all beach monitoring results and beach postings were recorded in the MHB internal database that automatically updates the public interface viewable at www.MaineHealthyBeaches.org. An automatic email alert was generated for results >/= 104 MPN per 100 ml of sample water and sent to local beach managers, MHB staff, and state agency partners. Monitoring sites were resampled as soon as possible and the monitoring frequency increased until results were within acceptable limits. However, depending on the time of results and availability of monitors and laboratories, resampling did not always occur the same day results were available. This lag-time increased the duration of beach action days.

The decision to post an advisory[7] was made by local beach managers (in partnership with MHB) and was based on the results of neighboring beach sites, the magnitude of bacteria results, similarity of environmental conditions between sample collection day and results, historical water quality, risk of pollution, known pollution events, etc. Each decision to post the beach was made on a case-by-case basis and for some areas with historically good water quality and a low risk of pollution, beach managers waited until resample results were available. For areas with a history of poor water quality and a high risk of pollution, beaches were posted immediately upon receiving results and in some cases, a precautionary rainfall advisory was posted during heavy rainfall and flooding conditions. In addition to the website, beach status was posted at major beach access points. A few towns supported and maintained local signage, links from their individual websites and hotlines.

In 2011, an extensive Communication Plan of local beach managers and field monitors was updated for re-sampling efforts and beach status notification. MHB staff provided database notification trainings as needed. Following each exceedance, MHB staff contacted local jurisdictions to ensure that MHB protocols were followed according to the MHB QAPP. On a daily basis, MHB staff quality-checked the database for accurate entry of field, laboratory and notification data. All beach attribute, monitoring and notification data was transferred to DEP's EGAD system for final submission into US EPA's STORET and PRAWN databases. MHB continued to make local beach information (site locations, monitoring and notification data, contact information, etc.) more easily accessible to the public via a Google Earth Project launched in 2010.

MHB responded to numerous requests from NRDC, program participants, state agency partners, non-profits, etc. for data, analysis and reports. MHB updated and finalized 2 enhanced monitoring and sanitary survey reports as well as developed and distributed a public report: *Maine Healthy Beaches, a unique partnership to keep Maine's beaches clean, status and trends (2005-2010).*[8]

[7] Closures are rare and occur only when beaches experience chronic high bacteria levels or known safety or public health threats, and in municipalities where closing ordinances are in place.
[8] **Appendix C.**

Education and Outreach

In 2011, MHB delivered 13 oral and poster[9] presentations to local, regional and national audiences (approximately 650 people) to share strategies on how to identify, eliminate and prevent sources of bacterial pollution impacting coastal water quality. MHB staff participated in newspaper, television and radio interviews reaching diverse audiences statewide. MHB materials[10] including program brochure, Town/Park Agreement Form, and other resources were updated and distributed statewide.

Bacterial pollution on beaches and shellfish growing areas threatens public health, the environment and local economies. In response, MHB developed the *Municipal Guide to Clean Water: Conducting Sanitary Surveys to Improve Coastal Water Quality*[11] to help communities and resource managers identify, eliminate and prevent sources of bacterial pollution. In 2010 and 2011, it was distributed to over 50 Maine communities, 8 state/federal agency partners and 11 states (AL, CA, CT, FL, MA, MD, NH, NY, RI, SC, and WA). MHB continued it's partnership with the Kennebec Estuary Clam Flat Partners to deliver a free Workshop, *Septic Systems: The Growing Problem and Solutions to Maine's Greatest Coastal Threat* where participants received copies and in-depth information on the Guide. This resource was also available for downloading on the following websites: Maine Healthy Beaches, Maine Sea Grant, Great Lakes Working Research Group, Surfrider's Research Page and Blue Water Task Force Blog, and the Maine State Codes Enforcement Officers Resource Page.

Here are some ways resource managers have used this resource:

- Codes Enforcement Officers, Town Planners, clammers, watershed associations and conservation commissions in Knox, Lincoln and Waldo Counties to inform ongoing efforts to improve water quality on fresh and marine beaches as well as shellfish growing areas.
- The towns of Rockport and Camden Public Works and Wastewater Departments to conduct illicit discharge detection and elimination (IDDE) studies of public wastewater and storm water collection systems searching for cross connections.
- Lincolnville to pursue feasibility studies, legislation and state and funding to establish water supply and wastewater infrastructure.
- The towns of Saco and Old Orchard Beach to implement IDDE studies of sewer and storm water infrastructure searching for illicit cross connections in the Goosefare Brook Watershed.
- York to develop enhanced monitoring studies, GIS layers and maps, a sanitary survey work-plan and a watershed restoration plan.
- The Kennebunk Community Development, Planning and Codes Enforcement Departments to direct their ongoing sanitary survey efforts in the Kennebunk River Watershed as well as improvements to sewer and storm water infrastructure.
- ME DEP Stream Specialists, the Maine Volunteer Rivers Monitoring Program, the Mousam and Kennebunk Rivers Alliance, the Wells National Estuarine Research

[9] See *Tracking human–sourced pollution: using optical brighteners to identify sources of fecal bacteria impacting water quality on Gooch's Beach, Maine*, **Appendix D**.

[10] **Appendix E**.

[11] http://www.seagrant.umaine.edu/extension/municipal-guide-to-clean-water

Reserve, citizen scientists, etc. to design, implement and enhance water quality monitoring and assessment programs to restore state impaired rivers and streams.

- The NY State Department of Health to train 3 new Department of Health staff and to perform sanitary surveys on 22 beaches in the Great Lakes region over the next 4 years.
- The Pennsylvania Beaches Program, Environmental Compliance Specialists with the Erie County Department of Health, the Kitsap County Pollution Identification and Correction Program in Washington, and the Connecticut Department of Public Health Subsurface Sewage Program's Sanitary Engineers to inform ongoing enhanced monitoring and source tracking efforts.

V. Flagship Beach Status

The two "flagship" beaches, Ferry Beach State Park and Wells Beach, the first to join the MHB program, continued to uphold all policies and guidelines set forth by MHB. Ferry Beach sustained excellent water quality with zero beach action days in 2011. Wells Beach was divided into 3 BMAs (Casino Square, Wells Beach and Wells Harbor) in 2007 and in 2011 all three BMAs had zero beach action days.

VI. Data Summaries[12]

- 1,990 Enterococci samples (including field/lab duplicates) were processed at 91 routine beach monitoring sites, 6 routine sites located in close proximity to managed beach areas, and at 89 enhanced monitoring locations to help pinpoint pollution sources.
- 100% of Tier 1 beaches were monitored.
- 8.8 % of routine beach samples exceeded the safety threshold of 104 MPN/100mls of sample water.
- 112 beach action days reported including 51 actions at 18 beach management areas.[13]
- 98.1 % of beach days were open and safe for swimming.

Year	# Samples	# Exceedances	% Exceedances
2005	1584	196	12.4%
2006	1339	124	9.3%
2007	1359	103	7.6%
2008	1276	79	6.2%
2009	1466	159	10.8%
2010	1486	166	11.2%
2011	1310	115	8.8%
Total	9820	942	9.6%

Table 1. The percent of samples that exceeded the safety limit of 104 MPN Enterococci per 100ml of sample water each year spanning 2005-2011

[12] For more information on status and trends, See **Appendix C**
[13] See MHB 2011 Beach Notification Activity, **Appendix F**.

Inter-annual variability of the percent exceedances may be due to multiple factors including but not limited to: precipitation levels, beach and watershed characteristics (e.g. impervious surfaces, pollution sources), the number of monitoring sites and beach management areas, etc.

Based on the US EPA PRAWN calculation of a beach action day (any part of 24 hrs is counted an entire action day), the number of beach action days in 2011 (112) was almost half of the number of days reported in 2010 (207). The number of BMAs with action days also decreased in 2011(18) compared to 2010 (29).

Four beach management areas (Laite, Goodies, Long Sands-North and East End) accounted for 42% of the reported beach action days in 2011. All of these areas have storm drains that empty onto the beach and rainfall amounts were greater in 2011(13.45 inches) compared to 2010 (10.48 inches).[14] Laite Beach and Goodies Beach accounted for 26% of reported advisories and are located within harbors. In addition to storm drains, potential pollution sources neighboring these areas include rivers, streams, waterfowl, and boats. The head of Camden Harbor also has a publically owned treatment works outfall.

Although it is difficult to definitively account for the decrease in beach action days in 2011, it is likely linked to multi-year enhanced monitoring and source-tracking efforts in rivers, streams and storm drainage networks that impact many beaches experiencing bacterial pollution. For example, Goodies Beach had 12 beach action days in 2011 compared to 25 in 2010 despite the greater amount of rainfall in 2011. Two malfunctioning subsurface wastewater disposal systems were remediated in the neighboring Goose River in the winter of 2010 and this likely had a positive impact on water quality.

VII. Enhanced Monitoring and Source-Tracking Efforts

For areas experiencing chronic bacterial pollution, extensive support was provided to towns through enhanced monitoring and other source-tracking efforts, problem-solving meetings, technical reports, etc. Additional monitoring sites were stratified upriver and throughout the watershed to help determine pollution sources. MHB brought together local, state and federal partners in a collaborative process focused on sharing resources and solving problems.

Optical Brighteners

Optical brighteners are commonly used in commercial/retail products such as clothing detergents, dishwashing agents, and personal care products to brighten the whiteness of materials. These products are typically flushed down the drain; therefore, when optical brightener concentrations are coupled with elevated fecal bacteria levels, this can be indicative of human-sourced fecal contamination.

MHB analyzed nearly 600 samples for optical brightener levels at over 150 routine beach sites and enhanced monitoring locations. In 2011, a new standard was used to calibrate MHB's Turner Designs 10 AU fluorometer instrument. The change relates to the acidification, powder and

[14] Precipitation levels June-August; National Weather Service Forecast Office Gray/Portland

concentration used to make the standard. Standard (FW-21 acidified) was issued by US EPA Region 1 Laboratory and proved to be unreliable as it degraded over time. Another US EPA-issued standard (FB-28 acidified) was used and this too was unreliable and unstable. MHB staff, a US EPA Region 1 Environmental Scientist and Chemist worked with the data, multiple instruments, standards and concentrations in an attempt to develop a correction factor for the 2011 data. These attempts were not successful.

Due to the instability of the solutions, unknown concentration at the time of calibration, inconsistency in standards and results, and several failed attempts to develop a correction factor, MHB had to disregard the optical brightener data collected in 2011. In 2012, MHB will use the standard (FB-28 non-acidified) that was reliable and used in 2009 and 2010. MHB plans to build upon results collected prior to 2011 as often multiple seasons' worth of data is needed to determine if a statistically significant relationship exists between fecal indicator bacteria levels and optical brightener concentrations.

Bar Harbor

MHB, in partnership with the Mt. Desert Island Biological Laboratory, supported a student project: *Impact of Cruise Ship Discharge on Ambient Water Quality Bar Harbor, ME.*[15] This study examined water quality in the vicinity of small passenger cruise ships docked at the town pier to assess whether these ships were discharging untreated grey water or a mixture of grey and black water in violation of harbor policy. These ships are small commercial vessels (<250 passengers) and are exempt from state discharge permitting regulations in coastal waters.

As part of this effort, 45 samples were collected at three monitoring locations (1-town pier, 2-neighboring town beach). Parameters measured included Enterococci, temperature, salinity, dissolved oxygen, biological oxygen demand, turbidity, and nutrient levels. Results indicate that a visiting ship may have discharged into Frenchman Bay on July 30th, 2011, as an elevated bacteria level was detected near the ship while it was docked at the town pier. Results also indicate that a visiting ship may have discharged into Frenchman Bay on August 2nd, 2011, as elevated bacteria levels were detected at the town beach while the ship was docked at the town pier. Bacteria levels were all below the safety threshold on control days when small passenger cruise vessels were not in port.

More data is needed to determine if the relationship between Bar Harbor cruise ships and bacteria levels is statistically significant. It is difficult to discern whether the discharges can be attributed to the presence of small commercial passenger vessels or to other sources such as other boats, storm water, bird waste, marine mammals, etc. Report recommendations include a more formal or detailed policy on discharges in Bar Harbor, creation of a coastal No Discharge Zone in Bar Harbor or Frenchman Bay and installation of pump-out facilities at the pier.

Lincolnville

Lincolnville Beach Area Storm Drainage Network and Frohock Brook

In 2011, MHB continued the multi-year enhanced monitoring in neighboring Frohock Brook and the storm drainage network behind Lincolnville Beach. As a part of this effort, 13 samples were

[15] **Appendix G**.

analyzed for Enterococci and optical brightener concentrations at 9 monitoring sites. The sites were located at the two storm drainage pipes that empty into Frohock Brook, ocean-side of the US Rt. 1 Bridge and at various catch basins along the US Route 1 corridor and US Route 173. Results ranged from 41 MPN to 6,131 MPN per 100 ml of sample water. Optical brightener results were unreliable. The Lincolnville Beach Area's bacterial pollution is likely sourced from malfunctioning septic systems, wildlife and illicit connections to the storm drainage network along US Rt. 1. Lincolnville is actively pursuing funding options to expand wastewater infrastructure.

Ducktrap River

The Ducktrap Recreation Area located at the mouth of the Ducktrap River has historically poor water quality. In 2009, MHB staff joined the Local Plumbing Inspector/Codes Enforcement Officer and DEP staff in surveying 12 properties with subsurface wastewater disposal (septic) systems. The survey did not identify obvious malfunctioning systems. In 2010, the Ducktrap River Recreation Area was reclassified to a Tier 3 beach. This is due to chronic bacteria issues, the town of Lincolnville's decision to not promote it as a swimming area and the lack of public services, parking, lifeguards, etc.

In 2011, MHB supported monitoring at the mouth and upriver to help pinpoint pollution sources. As a part of this effort, 9 samples were analyzed for Enterococci and optical brightener concentrations at 6 monitoring locations. Monitoring was reduced in 2011 compared to previous years and the results ranged from <10 MPN to 883 MPN/100mls of sample water. Potential pollution sources include: wild and domestic animals and subsurface wastewater disposal systems. Periodic surveys are needed to determine if malfunctioning septic systems or illicit discharges are impacting water quality in the Ducktrap River. The town will continue to post a permanent advisory at this location until bacteria levels are consistently within acceptable limits.

Rockport

Goodies Beach, located next to Harbor Park in Rockport Harbor, is a small area mostly used by residents and visitors to Harbor Park. Several local youth programs bring young children to Goodies beach, including the YMCA. In response to 7 bacterial exceedances in 2009, MHB supported enhanced monitoring throughout the harbor and within the watershed in 2010 and 2011. Monitoring sites targeted fresh water inputs including the Pascal Avenue storm drain network that empties onto Goodies Beach and the mouths of Goose River and Lily Pond Stream located in the inner harbor. MHB Boater's Education Campaign materials were also distributed to the Rockport Harbor Master and Rockport Marine.

As a part of this effort, 62 Enterococci samples were analyzed at 20 monitoring sites. Additionally, 58 samples were processed for optical brightener concentrations at those locations and at sites identified by the Rockport Conservation Commission. Enterococci results ranged from <10 MPN to >24,192 MPN/100mls of sample water with the greatest bacterial concentration recorded in the Pascal Avenue storm drain network. Potential pollution sources include: waterfowl, wildlife, cattle, pet and human waste. MHB Program staff planned and facilitated meetings with municipal staff and partners to share data and remediation strategies

and compiled a technical report[16] capturing the multi-year efforts to identify and remediate sources of bacterial pollution.

As a result, Rockport remediated two malfunctioning subsurface wastewater disposal systems adjacent to the Goose River in the winter of 2010. The town also hired a seasonal intern in 2011 to assist with harbor responsibilities, which included an active role in water quality monitoring. Rockport plans to continue enhanced monitoring within the Pascal Avenue storm drain network and will conduct a sanitary survey of 54 residences in the direct drainage basin of Goodie's Beach in the spring of 2012. Rockport is also in the process of installing a boat pump out station in the harbor that should be complete by May 1, 2012.

Saco and Old Orchard Beach

Goosefare Brook divides the towns of Saco and Old Orchard Beach (OOB) and since 2008, routine monitoring of the mouth of Goosefare Brook has documented numerous exceedances in recreational water contact safety standards. In response, monitoring was expanded upstream in 2009 and further in 2010 to help identify pollution sources in Goosefare Brook and associated tributaries (Bear Brook). In 2010, MHB partnered with Saco volunteers and US EPA Region 1 to conduct six intensified monitoring days between June and September.

In 2011, the partnership was expanded to include DEP's Division of Environmental Assessment (DEA) as Goosefare Brook and associated tributaries are on the state 303d list for bacterial impairment. US EPA also helped expand the source-tracking toolbox to include nutrient and pharmaceutical analysis. As a part of this effort, 177 samples were analyzed for Enterococci at 37 sites, 145 optical brightener samples were analyzed at 25 sites, 24 samples were analyzed for various pharmaceuticals at 13 sites, and 23 samples were analyzed for nutrients at 21 sites.

Both MHB (Enterococci) and DEA (*E. coli*) results indicate widespread bacterial contamination throughout Goosefare Brook. Additional parameters such as optical brighteners and pharmaceuticals indicate a high likelihood of human-sourced fecal contamination, especially in Bear Brook. In 2011, MHB planned and facilitated a meeting with municipal officials from Saco and OOB, OOB Conservation Commission, DEP and US EPA to share data and remediation strategies.

Municipal and private sewer services the majority of the Goosefare Brook watershed. Saco and OOB have implemented Illicit Discharge Detection and Elimination (IDDE) studies using video surveys, smoke and dye testing to identify illicit cross connections between the sewer and storm drainage networks and damaged sewer lines (some are clay, some asbestos). Both towns have created and updated GIS layers of sewer and storm water networks to assist with source-tracking efforts. Additionally, both towns have made infrastructure improvements by replacing sewer lines, storm water catch basins, etc. Upgrades are costly and must be spread out over time. Saco is exploring funding to develop a watershed management plan to help prioritize needed improvements and OOB is working to upgrade 20,000 feet of pipe over the next 5 years. OOB also offers a bi-annual tax credit for property owners who pump out their septic systems. In 2012, MHB will continue working with local, state and federal partners to conduct enhanced monitoring to help further direct IDDE investigations and to verify improved areas are clean.

[16] See *Rockport Harbor Water Quality Project 2010-2011*, **Appendix H**.

Kennebunk
Since 2005, MHB has supported enhanced monitoring in the Kennebunk River that impacts water quality on neighboring Goochs Beach. In 2007, MHB partnered with the Maine Geological Survey to conduct an Oceanographic and Meteorological Study of Microbial Pollution Levels and Transport Pathways. Potential sources include: subsurface wastewater systems, storm water, boats, seaweed, waterfowl, and pet waste. Improving water quality has been a multi-year collaborative effort involving MHB, multiple towns within the shared watershed, volunteers, state agencies and US EPA. MHB has held several Stakeholder Workshops to share data and remediation strategies.

As a result, a task force of MHB, DEP and the local Codes Enforcement Officer/Plumbing Inspector conducted a sanitary survey of 36 properties with subsurface wastewater disposal systems in 2009. Kennebunk also expanded and made improvements to sewer and storm water infrastructure including installation of 4 "ultra urban filters" utilizing UV radiation to treat storm water along approximately 920 feet of roadway and surrounding area. Additionally, the Kennebunk River Action Committee installed a free pump-out barge in the river and has launched several education and outreach efforts.

In 2011, MHB compiled the technical report: *Kennebunk River Watershed Water Quality Project* [17] to document the multi-year enhanced monitoring efforts, special studies, major findings, actions to date and recommendations. MHB met with municipal staff in December 2011 to discuss recommendations including: continue surveying priority properties with subsurface wastewater disposal systems, expand sewer infrastructure, create ordinances to help improve and maintain water quality throughout the watershed including requiring pump-out of septic systems, Low Impact Development guidelines, etc. MHB will continue to work with partners to protect water quality on Gooch's beach and the Kennebunk River.

Cape Neddick River
In 2011, the MHB continued to support intensified monitoring in the Cape Neddick River that impacts water quality on the neighboring Cape Neddick Beach. As a part of this effort, 130 samples were analyzed for Enterococci and optical brightener concentrations at 18 locations throughout the watershed. Enterococci levels ranged from <10 MPN to >24,192 MPN/100mls of sample water in 2011.

MHB also supported the pilot study: *Microbial Source Tracking to Identify Human Sources of Fecal Contamination in Coastal York County in Summer 2011*[18] This microbial source tracking (MST) study utilized qPCR to target human Polyomavirus, human-associated *Bacteroidales* and all *Bacteroidales* in water samples collected from freshwater inputs to Long Sands, Short Sands and Cape Neddick Beaches in York. These methods were chosen as they have low cross-reactivity with other warm-blooded animals. As a part of this effort, 40 samples were analyzed for Enterococci, optical brighteners, and 3 MST targets at 11 sites located in tributaries and storm water outlets.

[17] **Appendix I**
[18] **Appendix J**

Results indicate that MST can be an effective tool to augment the source-tracking toolbox and that human-sourced fecal contamination was present in the Cape Neddick River as well as fresh water storm drainage from upland areas on Longs Sand and Short Sands beaches. The study sites are "high-risk" fresh water inputs specifically targeted due the likelihood of elevated bacteria levels and are not indicative of ambient beach water quality. MHB will bring the researcher and local, state and federal partner together to share findings, lessons learned and recommendations in 2012. This pilot study will also inform the MHB Tiered Monitoring Plan for York's beaches and will help guide the town in their continued source tracking efforts.

VIII. Success Stories

MHB Supports Local Initiatives to Improve Wastewater Infrastructure in Lincolnville, Maine.

Despite an in-depth sanitary survey and remediation of pollution sources, water quality in Frohock Brook and the storm drainage network adjacent to Lincolnville Beach remains impaired for bacterial water quality. Unsafe fecal bacteria levels degrade ecosystems and threaten public health and local economies largely based on tourism. The watershed area surrounding Lincolnville Beach is densely developed, historically tidal wetlands with unsuitable soils and limited space for subsurface wastewater disposal systems. Sewer is needed, especially along the US Route One Corridor, yet Lincolnville currently lacks funding to implement local infrastructure improvements.

MHB supported multi-year enhanced monitoring and source-tracking efforts in Frohock Brook and throughout the storm drainage network along US Rt. One. This includes collection and analysis of multiple water quality parameters, trainings, equipment and the technical expertise of program staff and state agency partners. Program staff compiled technical reports including a sanitary survey; facilitated meetings, delivered presentations and more regarding impaired water quality and strategies on how to improve it.

A task force of MHB, the local Codes Enforcement Officer and Maine DEP surveyed 70 properties in the Frohock Brook/Lincolnville Beach Watershed. As a result, 10 wastewater disposal systems were either repaired or replaced between 2005 and 2007. Additionally, the Codes Enforcement Officer worked with local businesses to improve the quality of discharges entering Frohock Brook and local citizens conducted a beach cleanup of the area. Lincolnville also contracted with the engineering firm Woodard & Curran to prepare a feasibility study of public water and wastewater infrastructure. In 2010, *LD 1601 – An Act to Create the Lincolnville Sewer District*, was approved by the Maine State Legislature and signed into law by the Governor. This legislation created the quasi-municipal District and town-appointed Board of Trustees to address wastewater disposal and water supply for the Town.

Since 2011, the town of Lincolnville, the Lincolnville Sanitation District Board of Trustees, and the Water Resources Committee have partnered with Maine Rural Water Association/New England Utility Management Enterprises to focus on legislation, and State and Federal funding to subsidize the improvements. MHB will continue supporting enhanced monitoring and source-tracking efforts contributing to meaningful initiatives aimed to improve water quality and wastewater infrastructure.

MHB Supports Enhanced Monitoring, Sanitary Surveys and Restoration Efforts in the Cape Neddick River, York, Maine.

The Cape Neddick River (CNR) and neighboring beach area have a history of impaired water quality. Unsafe fecal bacteria levels threaten ecosystems, public health and local economies largely based on tourism. Pollution source identification is often difficult requiring complicated, expensive and labor-intensive source-tracking tools and techniques.

In response, MHB supported multi-year enhanced monitoring and source-tracking efforts in the CNR Watershed. This includes collection and analysis of multiple water quality parameters, trainings, equipment and the technical expertise of program staff, state and federal partners. Using Geographical Information Systems, bacteria results, optical brightener levels and watershed characteristics were used to identify sub-watersheds likely impacted by human sources. This generated a list of priority properties needing further investigation. MHB planned and facilitated a Stakeholder Workshop to share data, watershed risk analysis results and remediation strategies with municipal officials and partners.

As a result, York's Community Development Department has an annual water quality budget and devotes 200 staff hours on water quality monitoring and assessment efforts in the CNR Watershed. In April 2011, Department staff developed a detailed work plan[19] including enhanced monitoring, a windshield survey of the watershed, and enforcement of the local septic system pumping ordinance where 60 notification letters were mailed in 2010 and 700 in 2011. The town will expand the enforcement area in 2012. The plan also includes sanitary surveys of priority areas and Department staff surveyed 40-50 properties for malfunctioning septic systems, where two permitting issues were discovered in 2011. York has also worked to improved GIS data and maps and has generated a data layer to compile septic system information and track survey progress. This information will be added to the storm water infrastructure data and maps will be generated for each sub-watershed. The plan also addresses municipal policy changes including amending the comprehensive plan and zoning ordinances to protect and restore buffers along the river.

In 2011, the York Board of Selectmen appointed the Cape Neddick Beach Task Force to support the local CEO's work-plan as well as develop a proposal to provide public services (e.g. parking, restrooms, sidewalks, lifeguards, etc.) at the beach. The town also approved a $35,000 budget to restore water quality in CNR including hiring consultants to develop a 319-compliant Watershed Restoration Plan. MHB will continue to support York's extensive efforts to restore the health of the CNR Watershed.

MHB-supported enhanced monitoring, source-tracking efforts and applied research efforts contribute to local initiatives aimed to improve water quality in Ogunquit, Maine.

The Ogunquit River and neighboring beach areas have a history of impaired water quality that threatens public health and the local economy. Pollution source identification is often difficult requiring complicated, expensive and labor-intensive source-tracking tools and techniques.

[19] **Appendix K**

Malfunctioning septic systems are not always obvious and may go undetected during property surveys. Knowledge of local circulation patterns is also needed to determine the fate and transport of contaminants.

In response, MHB supported multi-year enhanced monitoring and source-tracking efforts in the Ogunquit River and Beach Watersheds. This includes collection and analysis of multiple water quality parameters, trainings, equipment and the technical expertise of program staff, state and federal partners. MHB supported a Circulation and Transport Pathways Study to determine the fate of contaminants leaving the river mouth as well as bacteria's relationship to multiple parameters (e.g. rainfall, tide stage). MHB compiled technical reports including a sanitary survey; facilitated meetings, held Stakeholder Workshops, delivered presentations and more regarding impaired water quality and strategies on how to improve it.

As a result, the local Codes Enforcement Officer and agency partners surveyed approximately 90 properties in the Ogunquit River Watershed. The Ogunquit Sewer District improved and expanded the sewer infrastructure to service more users and to handle major storm events. The District has also conducted IDDE studies investigating sewer lines in a problematic sub-watershed area. No malfunctioning septic system or sewer issues were identified. Ogunquit also worked with MHB and the Maine Department of Marine Resources to conduct property surveys needed to complete a sanitary survey allowing sections of their shellfish growing areas to be "seasonal conditionally approved" for clamming. Opening of Shellfish Growing Areas in Ogunquit created $13,000 in revenue from licensing, plus food and a source of income to clammers.

With the assistance of the Ogunquit Conservation Commission (OCC), Ogunquit has amended the Zoning Ordinance to expand the "Shore Land Zone" to include additional water bodies, a 75-ft. setback requirement along each new stream, and additional Resource Protection District areas within the town. Another amendment mandates that residential septic systems within the "Shore Land Zone" be pumped out every 3 years and systems outside of this area, every 5 years. The OCC was also awarded a $10,000 grant from the Maine Coastal Program to conduct a storm water mapping and drainage study. Additionally, Ogunquit installed a Bio Skirt /Snout in a storm drain designed to capture solids before they reach the river/ocean and installed 3 waterless urinals at public restrooms that have shown a significant reduction in the use of water. All of the above actions helped Ogunquit recently secure a $30,000 grant from the Gulf of Maine Council to study the effects of sea level on the town's short and long term planning, and waste treatment facility. MHB will continue working with local and agency partners to address bacterial pollution impacting water quality on Ogunquit's valued beaches.