

**Maine Healthy Beaches Program
2009 Report to EPA
April 2010**

I. Program Activities

Maine Healthy Coastal Beaches 2009 Program Staff included:

Program Manager: Mark Margerum, Maine Department of Environmental Protection

Program Coordinator: Keri Lindberg, University of Maine Cooperative Extension/

Maine Sea Grant (UMaine Extension/SG)

Program Field Staff: Sarah Mosley, University of Maine Cooperative Extension

Temporary Field Intern: Katy Morrison

State Agency Partners include: Maine State Planning Office, Department of Health and Human Services, Department of Marine Resources, Department of Conservation: Maine Park Service and Maine Geological Survey, and the Department of Agriculture.

Maine Healthy Beaches (MHB) Program 2009 Accomplishments:

- Successfully transitioned program management from the Maine State Planning Office to the Department of Environmental Protection.
- Conducted routine monitoring for 28 towns/state parks encompassing 60 beach management areas. Including field/lab duplicates, processed 2,008 Enterococci samples at 100 beach monitoring sites and 419 samples at 98 special study locations.
- Held 42 formal trainings (field, database, laboratory, follow up observational field trainings) for a total of 205 local level staff and volunteers.
- Held collaborative problem solving meetings and conducted additional monitoring and special study work in the following watersheds: Ducktrap River, Kennebunk River, Ogunquit Beach and Ogunquit River, and the Cape Neddick River. To assess their impact on beach water quality, samples were also collected in the Spurwink River, Saco River, and Goosefare Brook.
- Provided GIS support including mapping and “hot-spot” analysis to the towns of Ogunquit, Wells, Kennebunk, Kennebunkport, Arundel and Lyman to communicate monitoring results, sanitary survey work, and to create a list of priority areas needing further investigation.
- Planned and facilitated a Stakeholder Workshop for the towns of Kennebunk, Kennebunkport, Arundel and Lyman, the Maine Department of Marine Resources

and community members. The purpose of this workshop was to share information and to make plans for next steps in the Kennebunk River/Goochs Beach watershed.

- Partnered with Tim Bridges (EPA Environmental Scientist) to conduct discrete and flow-through fluorometry analysis in the Kennebunk, Ogunquit and Nonesuch River Watersheds. MHB staff worked with EPA to collect additional parameters including: Enterococci, E. Coli, B (boron), Cl (chlorine), F (fluorine), NO₃ (nitrate), NO₂ (nitrogen dioxide), SO₄ (sulfate), O-PO₄ (organic phosphate), NH₃, and surfactants.
- MHB provided fluorometry analysis in the Cape Neddick River Watershed and assisted FB Environmental with fluorometry work in the Spruce Creek Watershed.
- Conducted an optical brightener and Enterococci study at 11 beach monitoring sites throughout the 2009 season.
- Completed a sanitary survey report for the Ogunquit Beach and Ogunquit River Watersheds. The MHB Program plans on meeting with the towns within the shared watersheds and partners to discuss survey findings, recommendations and to make plans for next steps within the watersheds.
- Partnered with the Wells National Estuarine Research Reserve (WNERR) to disseminate information and support implementation of an Ogunquit River Watershed Management Plan in 2009.
- Partnered with a Woods Hole/MIT researcher to investigate the role of marine sediments as a reservoir for Enterococci.
- Partnered with the Community Health and Environmental Testing Laboratory at Mount Desert Island Biological Laboratory to examine the relationship between Enterococci levels and light intensity.
- Examined the relationship between Enterococci bacteria levels and rainfall for targeted beach management areas.
- Conducted monthly monitoring/assessment of Washington County Beaches (Roque Bluffs & Lamoine) and bi-monthly monitoring in Clam Cove (Knox County).
- Partnered with the Maine Geological Survey (MGS) to conduct Acoustic Doppler Current Profiler (ADCP) studies in the vicinity of Goosefare Brook, Old Orchard Beach.

- Developed *Municipal Guide to Clean Water: Conducting Sanitary Surveys to Improve Coastal Water Quality*.
- Participated in the Maine coastal TMDL process; shared special study monitoring data, MHB reports, and success stories with program partners.
- Conducted 9 Healthy Beaches presentations with a collective audience of approximately 600 people. Presentations were delivered to a diverse audience through the Maine Beaches Conference, Ogunquit River Conference, UMaine School of Marine Sciences Symposium, DEP Watershed Roundtable, local cable television, board of selectmen meetings, Southern Maine Children’s Water Festival, etc.
- Developed new program signage for all major beach access points.
- Recruited the town of Rockport to participate in the MHB Program.

Table 1. Beach Management Areas added in 2009

County	Nearest Town	Beach	# samples/week
Knox	Rockport	Goodies	1
York	Biddeford	Gil Bouche Park/ Biddeford Pool	1

Budget Information¹

The funding provided by EPA for the MHB Program 2009 budget supported portions of the salaries of the program staff listed above. This team of personnel coordinates, manages, and provides extensive support to the 28 communities and state parks participating in the program. This funding also provided partial support for a data specialist at DEP to provide data management services to the MHB Program, transferring beach monitoring data to DEP’s EGAD system and managing the submission of MHB data to EPA databases. In past years MHB relied on outside consultants for these functions.

The EPA funding supports all monitoring, assessment, and notification aspects of the MHB Program. Funds were utilized for labor, supplies, equipment and QA/QC support for six Enterococci laboratories, and routine monitoring of 60 beach management areas. Maine’s beaches and the laboratories MHB relies on for sample analysis are geographically dispersed along the Maine coast. Funding provided sample transport (laboratory courier) and travel costs for staff. Funding also supported the labor costs of Nelson Analytical Laboratory, which analyzed the majority of samples collected for the MHB Program in Southern Maine and the Community Environmental Health Laboratory located at the MDI Biological Laboratory which serviced beaches in Hancock County.

¹ See MHB Functional Budget 2009, **Appendix A**

Additionally, funding supported the supplies, transport, collection and analysis of special study samples and pollution identification efforts along the coast. Intensive monitoring was conducted in the following watersheds: Ducktrap River, Ogunquit Beach and Ogunquit River, Kennebunk River, and the Cape Neddick River. To assess their impact on beach water quality, samples were also collected in the Spurwink River, Saco River and Goosefare Brook. Monthly monitoring and assessment of Washington County Beaches and bi-monthly monitoring of Clam Cove² was also conducted in 2009.

EPA funding supported pre-season regional meetings, and field and database trainings for approximately 200 volunteers and local level staff. Funding supported field monitoring kits including supplies and equipment, and volunteer training packets. Each year an extensive communication plan of local level staff and volunteers is developed for re-sampling efforts and beach status notification. MHB staff provided ongoing support to monitors and beach managers during the season via phone, email, and in person as needed.

EPA funding supported a contract with Relyon Media for hosting of the MHB database and public interface, as well as consultant services. This professional service included implementation of updates and improvements to these resources, and addressing technical issues. This also supported transitioning data management to DEP and successful submission of monitoring, notification and beach attribute data into DEP's EGAD system to facilitate submission into the EPA STORET and PRAWN databases. The MHB general information website was also hosted by a contractor, Perry Banks, in 2009.

EPA funding supported MHB Program presentations, stakeholder workshops, GIS training for MHB staff, program materials such as new program signage,³ posters, fact sheets, displays, brochures, and other education/outreach materials. EPA funding also supported direct and indirect expenses such as travel, telephone, computer services, postage, office support, and photocopying. Grant funds also supported the research, training, and development of a *Municipal Guide to Clean Water: Conducting Sanitary Surveys to Improve Coastal Water Quality*.⁴

EPA funding supported the Maine Geological Survey (MGS) to conduct Acoustic Doppler profiling and additional data analysis in the vicinity of Goosefare Brook and Old Orchard Beach.⁵ Funds also supported an Enterococci Bacteria v. Light study⁶ conducted by the Community and Environmental Health Laboratory located at MDI Biological Laboratory.

² See Washington County Beaches and Clam Clove Data Summaries, **Appendix B**

³ See MHB Program Signage, **Appendix C**

⁴ See **Appendix D**

⁵ Final Report available April 2010

⁶ See An Examination of the Effect of Incident Light on Enterococci Levels at Seal Harbor Beach, **Appendix E**

Volunteer Contribution

The MHB Program is a “voluntary” program where designated beach managers are typically state park managers, health nurses, fire chiefs, town administrators, etc. Towns/state parks utilize volunteers or paid staff for sample collection, transport, and data entry. The time devoted to MHB Program tasks is generally an add-on to an already full schedule. A conservative estimate of the “volunteer” contribution (not including local level staff) is approximately 1,400 hours (\$20/hour) for a total of \$28,000 in 2009.

II. Program Deliverables/Appendices:

- Appendix A** Maine Healthy Beaches Budget Summary 2009
- Appendix B** Washington County Beaches and Clam Clove Data Summaries
- Appendix C** MHB Program Signage
- Appendix D** Municipal Guide to Clean Water: Conducting Sanitary Surveys to Improve Coastal Water Quality
- Appendix E** An Examination of the Effect of Incident Light on Enterococci levels at Seal Harbor Beach
- Appendix F** Maine Healthy Beaches Tiered Monitoring Plan
- Appendix G** MHB Program Beach Notification Activity 2009
- Appendix H** GIS Documents: Kennebunk Flow Through 2009 Fluorometry Results; Kennebunk River Watershed and Septic System Risk Analysis; Kennebunk Sanitary Survey Work; Ogunquit Beach and River Watersheds Septic System Survey Status.
- Appendix I** DRAFT Maine Healthy Beaches Sanitary Survey of Ogunquit Beach and River Watersheds
- Appendix J** Bacteria and Rainfall Project Supporting Documents
- Appendix K** Southern Maine Optical Brightener Study Supporting Documents

III. Performance Criteria

Beach Management Area Classification/Tiered Monitoring Plan for Maine Coastal Beaches

In 2009, the MHB Program revised the *MHB Program Tiered Monitoring Plan*,⁷ including outlining the criteria for MHB Program participation. 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 Program protocols and conditions set forth in the MHB QAPP and MHB Program Agreement. New beaches will continue to be recruited over time, as resources and funding allow and/or circumstances change eligibility for program participation.

For the 28 towns and state parks participating in the MHB Program in 2009, 56 out of 60 “beach-management areas” are classified as “Tier-1,” and the remaining 4 beach management areas are classified as “Tier-2” beaches. The monitoring effort is reduced

⁷ See **Appendix F**

for “Tier-2” beaches. “Tier-3” beaches are monitored for informational purposes only or are not monitored because they do not currently meet the criteria for MHB Program participation.

Table 2. MHB Program Beach Management Area Classification.

<i>Beach Management Area Classification/Tiered Monitoring Plan</i>						<i>Tier 1 sites are monitored once/week, except as noted below</i>
COUNTY	TOWN	BEACH MANAGEMENT AREA	TIER 1	TIER 2	TIER 3	MONITORING NOTES
CUMBERLAND	CAPE ELIZABETH	CRESCENT (Crescent Beach State Park)	X			
CUMBERLAND	CAPE ELIZABETH	KETTLE COVE (Crescent Beach State Park)	X			
CUMBERLAND	FREEMPORT	WINSLOW PARK		X		Monitored twice per month
CUMBERLAND	PORTLAND	EAST END	X			Monitored 3 times per week
CUMBERLAND	SCARBOROUGH	FERRY	X			
CUMBERLAND	SCARBOROUGH	HIGGINS	X			
CUMBERLAND	SCARBOROUGH	PINE POINT	X			
CUMBERLAND	SCARBOROUGH	SCARBOROUGH (Scarborough Beach State Park)	X			
CUMBERLAND	SOUTH PORTLAND	WILLARD	X			Monitored twice per week
HANCOCK	BAR HARBOR	HADLEY POINT	X			
HANCOCK	BAR HARBOR	HULLS COVE	X			
HANCOCK	BAR HARBOR	SAND (Acadia National Park)	X			
HANCOCK	BAR HARBOR	SEAL HARBOR			X	Discontinued monitoring
HANCOCK	BAR HARBOR	TOWN	X			
HANCOCK	LAMOINE	LAMOINE			X	Monthly assessment
KNOX	CAMDEN	LAITE	X			
KNOX	ROCKLAND	SANDY	X			
KNOX	ROCKPORT	GOODIES	X			
LINCOLN	BRISTOL	PEMAQUID		X		Sites 1 & 2 twice per month, site 3 discontinued
SAGadahoc	GEORGETOWN	EAST (Reid State Park)		X		Site 1 monitored once/month, Site 2 monitored once/week
SAGadahoc	GEORGETOWN	HALF-MILE (Reid State Park)		X		Sites 6 & 7 monitored 1 time per month
SAGadahoc	GEORGETOWN	LAGOON (Reid State Park)	X			
SAGadahoc	GEORGETOWN	MILE (Reid State Park)	X			
SAGadahoc	PHIPPSBURG	CENTER (Popham Beach State Park)	X			Popham Beach was split into 3 beach management areas in 2007
SAGadahoc	PHIPPSBURG	EAST (Popham Beach State Park)	X			Popham Beach was split into 3 beach management areas in 2007

SAGADAHOC	PHIPPSBURG	WEST/MORSE RIVER (Popham Beach State Park)	X			Popham Beach was split into 3 beach management areas in 2007
WALDO	LINCOLNVILLE	DUCKTRAP	X			
WALDO	LINCOLNVILLE	LINCOLNVILLE	X			
WASHINGTON	ROQUE BLUFFS	ROQUE BLUFFS (Roque Bluffs State Park)			X	Monthly Assessment
YORK	BIDDEFORD	FORTUNE ROCKS	X			
YORK	BIDDEFORD	GIL BOUCHE PARK/BIDDEFORD POOL	X			
YORK	BIDDEFORD	HILLS	X			Site 3 and 3A discontinued
YORK	BIDDEFORD	MIDDLE	X			
YORK	KENNEBUNK	GOOCH'S	X			
YORK	KENNEBUNK	LIBBY COVE	X			
YORK	KENNEBUNK	MIDDLE	X			
YORK	KENNEBUNK	MOTHER'S	X			
YORK	KENNEBUNK	PARSON'S			X	Monitoring discontinued; private
YORK	KENNEBUNKPORT	COLONY	X			
YORK	KENNEBUNKPORT	GOOSE ROCKS	X			Site 3 discontinued
YORK	KITTERY	CRESCENT	X			
YORK	KITTERY	FORT FOSTER	X			
YORK	KITTERY	SEA POINT	X			
YORK	OGUNQUIT	FOOTBRIDGE	X			Ogunquit Beach divided into 3 beach management areas in 2007
YORK	OGUNQUIT	LITTLE	X			
YORK	OGUNQUIT	MAIN	X			Ogunquit Beach divided into 3 beach management areas in 2007
YORK	OGUNQUIT	MOODY	X			Ogunquit Beach divided into 3 beach management areas in 2007
YORK	OGUNQUIT	RIVERSIDE	X			
YORK	OOB	CENTRAL (OOB)	X			OOB divided into 3 beach management areas in 2007
YORK	OOB	NORTH END (OOB)	X			OOB divided into 3 beach management areas in 2007
YORK	OOB	OCEAN PARK (OOB)	X			OOB divided into 3 beach management areas in 2007
YORK	SACO	BAY VIEW	X			
YORK	SACO	FERRY (Ferry Beach State Park)	X			
YORK	SACO	KINNEY SHORES	X			
YORK	WELLS	CASINO SQUARE	X			Wells Beach divided into 3 beach management areas in 2007

YORK	WELLS	CRESCENT	X			Wells Beach divided into 3 beach management areas in 2007
YORK	WELLS	DRAKES ISLAND	X			Site 1 discontinued in 2008
YORK	WELLS	LAUDHOLM (WNERR)	X			
YORK	WELLS	WELLS	X			Wells Beach divided into 3 beach management areas in 2007. Site 7 discontinued in 2007.
YORK	WELLS	WELLS HARBOR	X			Wells Beach divided into 3 beach management areas in 2007
YORK	YORK	CAPE NEDDICK	X			
YORK	YORK	LONG SANDS	X			
YORK	YORK	SHORT SANDS	X			
YORK	YORK	YORK HARBOR	X			
Totals	28	64	56	4	4	

Performance Measures

95.7 % of beaches monitored were open and safe for swimming during the 2009 season.
100% of Tier 1 beaches were monitored in 2009.

Beach Water Quality Monitoring, Assessment and Notification⁸

MHB Program is committed to implementing an adaptive monitoring regime, routinely assessing the risk of pollution at each beach management area and improving public notification of water quality conditions on Maine’s coastal beaches. The MHB Program is a unique partnership among municipalities, state parks, the University of Maine Cooperative Extension/Sea Grant, Maine Department of Environmental Protection, nonprofit organizations, other state agencies and volunteers.

Each beach management area monitored has a local level beach manager who determines the status of the beach in partnership with MHB staff based on water quality parameters, risk of pollution, history of high bacteria levels, etc. Parameters monitored are: air and water temperature, salinity, Enterococci bacteria, tidal stage, rainfall, and weather conditions, plus field observations of conditions that might affect beach water quality. The standards for Enterococci are based on EPA guidance, and are adopted by ME DEP.

The QA/QC for the program is documented in the Maine Healthy Beaches Quality Assurance Project Plan. Trainings and protocols have been developed by the State Health Environmental Testing Laboratory, the Maine Department of Health and Human Services Laboratory Certification Officer, UMaine Extension/SG, and reviewed by agency partners. Town/state park personnel, along with UMaine Extension/SG, selected the monitoring sites for each beach management area based on recommended criteria from EPA: Sites where people swim (and in 2 to 3 feet of water which changes according to tide stage), at sources of freshwater inputs to the beach, and areas with a

⁸ For further details, see the MHB Program QAPP

higher risk of experiencing bacteria levels above the safety limit (i.e. close proximity to STP outfalls, wildlife, seaweed wrack, etc.).

UMaine Extension/SG staff conducted pre-season regional meetings to: communicate program updates, revise Communication Plans, address the needs of program participants, distribute program materials, obtain signed copies of the MHB Program Agreement Form, schedule field trainings, modify monitoring site locations, etc. Due to turnover at the local level, regional meetings and the subsequent Communication Plans are useful tools essential to the success of the MHB Program. Regional meetings also provide an opportunity for towns/state parks within the same or neighboring watersheds to get to know one another, collaborate on projects and share resources.

Routine monitoring was conducted on a weekly basis, Memorial Day and Labor Day, unless there was a need to intensify the effort due to elevated Enterococci levels or otherwise noted in the Beach Management Area Classification/Tiered Monitoring Plan Table. Priority areas experiencing chronic pollution problems are candidates for further special study and sanitary survey work. Towns/state parks participating in the MHB Program utilized either town/state park staff or local volunteers to perform routine monitoring. UMaine Extension/SG assisted in recruiting local volunteers for towns/state parks that do not utilize staff to conduct the field monitoring and environmental field data entry.

MHB staff provided formal trainings in the field, database, and laboratory components of the MHB Program. Additionally, one-on-one field follow-up/observational trainings were conducted during the course of the monitoring season. A performance checklist was completed for each monitoring team, the findings reviewed, and action taken when necessary with the appropriate beach manager. MHB staff conducted annual laboratory trainings and all laboratories completed an annual *Enterococci Laboratory QA/QC Checklist* developed in partnership with the DHHS state laboratory certification officer.

A courier service was employed through Nelson Analytical Laboratory for the majority of the beaches in southern Maine plus Reid and Popham Beach State Parks. South Portland and Portland are two exceptions which have their own local laboratories. In the midcoast region, the samples for Bristol, Rockland, Rockport, Camden, and Lincolnville were couriered by volunteers and staff to the UMaine Extension/SG Waldoboro laboratory. Hancock county beaches were serviced by the Community Environmental Health Laboratory located at the MDI Biological Laboratory. The MHB Program also trained DEP staff and provided supplies/equipment for two additional Enterococci laboratories at DEP regional offices in Portland and Bangor. The MHB/DEP Portland laboratory processed Enterococci and discrete fluorometry special study samples while the Bangor DEP facility processed Washington County beach samples.

All Enterococci results were recorded in the MHB Program internal database when read by the laboratory technicians. When results were in exceedance of the safety criteria (\geq 104 MPN per 100 ml of sample), an automatic email alert was generated and sent to the beach managers, local officials designated by the town/state park, MHB Staff, SPO,

DHHS, and in some instances the regional epidemiologist. MHB staff worked with the towns/state parks to coordinate beach posting and the re-sampling effort. Some participants immediately notified MHB staff of their intentions or asked for advice; others required several calls to locate a designated decision maker in their town/state park. Each year this process is improved through MHB support, educational efforts, and implementation of the Communication Plan.

In 2009, the decision to post the beach was the responsibility of the town/state park and often included MHB staff guidance. Posting at major beach access points and in the MHB internal database (which automatically transfers and can be viewed by the public on the www.MaineHealthyBeaches.org website) was also the town/state park's responsibility. Although the beach was physically posted, in some cases local beach managers had difficulty entering the beach status online in a timely manner. In addition to the MHB Program signage, website, and public interface, the town of Kennebunkport supported and maintained their own signage, website and hotline. Some participating towns/state parks have embedded links to the MHB website from their individual websites.

In 2009 the MHB Program continued to provide targeted database notification training to program participants. On a daily basis, UMaine Extension/SG staff checked the MHB database for QA/QC purposes and closely monitored the entry of field, laboratory, and notification data. MHB staff followed-up with every water quality exceedance and ensured that the protocols set forth in the MHB QAPP were followed correctly and in a timely manner.

The MHB Program has continued to make the GIS files of routine monitoring locations and corresponding water quality data more easily accessible by the public. In 2009, MHB staff successfully submitted beach attribute and length data into the EPA PRAWN system. Moreover, MHB and DEP staff worked with Relyon Media to transfer all MHB data to DEP's EGAD system for final submission into EPA's STORET and PRAWN databases.

IV. Flagship Beach Status

The two "flagship" beaches: Ferry Beach State Park and Wells Beach have continued to uphold all policies and guidelines set forth in the program. Ferry Beach has sustained good water quality with zero beach action days in 2009. Wells Beach was divided into 3 separate beach management areas (Casino Square, Wells Beach and Wells Harbor) in 2007. In 2009, each of the three areas had 2 beach action days for a collective total of 6 days all of which followed heavy rainfall conditions.

V. Data Summaries

- Collected and analyzed (including field and laboratory duplicates) 2,008 Enterococci samples at 100 coastal beach sites.
- Collected and analyzed (including duplicates) a total of 419 Enterococci samples at 98 special study monitoring locations.
- Reported 250 beach action days at 36 beach management areas.⁹
- Submitted beach attribute and length data to PRAWN for 64 beach management areas for a total of 32.49 beach miles.

Based on the EPA PRAWN notification day duration criteria (<24 hours = 1 day; <48 hours = 2 days), the number of beach action days (250) was higher in 2009 compared to the number of days (174) reported in 2008. The number of beach action days in 2009 is likely inflated due to the record amount of rainfall throughout the season.

Goose Rocks Beach (Kennebunkport) with historically poor water quality continued a positive trend of fewer beach actions days compared to previous years. There were only 11 beach action days in 2009, 9 in 2008, compared to 39 days in 2007. Laite Beach (Camden) had 2 beach actions days in 2009 compared to 24 in 2008. Wells Harbor Beach (Wells) had only 2 beach action days in 2009 compared to 8 in 2008. Kinney Shores and Bay View beaches in Saco which were posted for a week following heavy rainfall in August 2008, each had zero beach action days in 2009. Similarly, Crescent Beach (Kittery), Little Beach (Ogunquit), Ferry Beach (Scarborough), Pine Point (Scarborough), Kettle Cove Beach (Cape Elizabeth), and Lincolnville Beach had zero beach action days in 2009 compared to 9 days (Crescent), 7 days (Little), 6 days (Ferry), 2 days (Pine Point), 4 days (Kettle Cove) and 8 days (Lincolnville) in 2008.

Four beach management areas (Willard, East End, Goodies, Ducktrap) accounted for 37% of the reported beach action days in 2009. Both Willard and East End beach are considered “urban” beaches with stormwater issues. Goodies beach is a newly recruited area and potential sources include boats, the mouth of the Goose River, and stormwater.

Several areas with historically good water quality experienced issues in 2009. This is most likely due to the large volume and frequency of rainfall throughout the season. For example, York Harbor Beach (York), which has never had a water quality exceedance since joining the program in 2003, had 9 beach action days in 2009. The source(s) of bacteria are unknown.

There was 24.79 inches of rainfall reported in the Portland area during the 2009 beach season and which is approximately 2.5 times above average. In response to the high number of beach actions days in 2009, the MHB Program examined the relationship between rainfall and Enterococci levels¹⁰ for targeted beach management areas.

⁹ See MHB Program Beach Notification Activity 2009, **Appendix G**

¹⁰ See Bacteria and Rainfall Project, **Section VI**.

VI. Special Studies & Inter-agency Collaboration

The MHB Program Inter-agency Advisory Committee has provided support in the field, laboratory, notification, and pollution source identification and remediation aspects of the MHB Program. As a statewide coastal program, MHB collaborated with several state agencies and the EPA to conduct special study monitoring and pollution source identification work in problematic watersheds. Special Studies were conducted in the following watersheds: Ducktrap River, Kennebunk River, Ogunquit Beach and Ogunquit River, and the Cape Neddick River.

Ducktrap River Special Study

The Ducktrap Beach Area at the mouth of the Ducktrap River officially joined the MHB Program in 2008. This area has historically poor water quality and is classified as “prohibited” by Maine Department of Marine Resources for shellfish harvesting. It is also one of the last remaining areas with a native Atlantic salmon population. In 2008, the MHB Program routinely collected Enterococci samples upriver to help pinpoint bacteria “hot-spots.” Results indicated that contamination issues were primarily concentrated in the lower reaches of the river, below the head of tide region.

Enterococci levels were surprisingly low at Ducktrap River beach management area (located at the mouth of the river) for most of the 2009 season. Enterococci and fluorometry samples were collected in the watershed to help pinpoint pollution sources. The majority of bacteria results were below the safety limit and the optical brightener analysis was inconclusive. This is likely due to a flushing effect caused by record rainfall levels and the consistently high water level and flow velocity of the Ducktrap River throughout the 2009 season.

Bacteria levels spiked at the mouth of the Ducktrap in mid-August 2009 prompting a survey of adjacent properties. MHB staff joined the Local Plumbing Inspector (LPI) and DEP Enforcement staff in surveying 12 properties with subsurface wastewater disposal systems. One small cottage near the river bank had a pvc pipe under the house with no apparent electric to pump up to the larger cottage’s subsurface wastewater disposal system. The holding tank was replaced in the fall of 2009 with an adequate septic field to service this property. Another malfunctioning system was identified on a seasonal property and the owner has been contacted to remediate the problem. The remaining suspect properties will be revisited in spring, 2010, to determine their status/impact on water quality.

Kennebunk River Watershed Special Study

The 2009 Kennebunk River Watershed special study’s primary focus continued to be within the head of tide region. Monitoring was intensified in the lower reaches of the river to pinpoint pollution sources. Monitoring was conducted over 5 days, which included both land and boat sample collection. A total of 36 sites were monitored by a revolving group that included MHB staff, EPA staff, Maine DEP staff, and local Kennebunk Conservation members. The monitoring locations have been mapped using

ArcGIS 9.3 software. Approximately 83 samples were collected over the course of the season.

Through EPA support, additional parameters were analyzed to supplement the Enterococci monitoring efforts in 2009. These parameters included: E. coli, optical brighteners, dissolved oxygen, pH, and conductivity.

MHB staff also partnered with EPA in June, August and September 2009 to conduct flow-through fluorometry analysis in the Kennebunk River.¹¹ The MHB field fluorometer was transported in a canoe in June and an inflatable motorized raft in August and September to achieve flow-through or “real time” analysis. Additionally, bacterial samples were collected to target specific sites along the river. Optical brightener results from the monitoring days indicate a number of “hot-spots” in the river and have been integrated into a useful GIS map.¹² MHB plans to continue working with EPA experts to analyze the data collected in 2009 and to use previous years’ bacteria and optical brightener data to form a work plan for monitoring and pollution source tracking in 2010.

Ogunquit River and Ogunquit Beach Watersheds Special Study and Sanitary Survey

The MHB Program continued this multi-year special study in 2009. Eight days of intensive monitoring was conducted by local volunteers, and MHB and EPA staff between May and October 2009. Approximately 160 samples were collected at 28 monitoring sites focused on the Ogunquit Beach and Leavitt Stream watersheds, and adjacent areas. Fourteen new sites were monitored in 2009 to further pinpoint potential pollution sources. The parameters monitored included: Enterococci, optical brighteners, pH, dissolved oxygen, and conductivity. Additional analysis of the monitoring data will be completed with EPA assistance.

Effective April 2009, with the backing of the Conservation Commission, the Ogunquit Stream Protection District was amended to include Quarry, High Rock, and Leavitt Streams. This created 75 foot setbacks along each new stream and additional resource protection areas within the Town of Ogunquit. The Conservation Commission advocated having the snow dumps moved from the multiple parking lots adjacent to the beach and estuary. As of the winter of 2009, the Town of Ogunquit Public Works no longer maintains snow dumps at these locations. Additionally, the Conservation Commission is working with Paul Lempicki, Ogunquit Code Enforcement Officer, to create a septic system ordinance similar to the Town of York that requires mandatory pump-out of systems that meet certain criteria (e.g. change of ownership). The town of Ogunquit has also created a new ordinance prohibiting horses from beaches.

A sanitary survey report¹³ was compiled in 2009 to capture the multi-year effort of special studies and sanitary survey work. The report documents actual/potential

¹¹ See GIS Documents: Kennebunk Flow Through 2009 Fluorometry Results, **Appendix H**

¹² See GIS Documents: Kennebunk Risk Analysis and Sanitary Survey Work, **Appendix H**

¹³ See DRAFT Maine Healthy Beaches Sanitary Survey of Ogunquit Beach and River Watersheds, **Appendix I**.

pollutions sources including subsurface wastewater disposal systems, wildlife, and non-point sources impacting water quality on Ogunquit's Beaches. Recommendations based on the survey findings include: reducing impervious surfaces, routine inspection of septic systems, and public education and awareness regarding stormwater runoff, dog waste, and best management practices at beach and throughout the larger watershed area. This report requires periodic updates to capture any changes in potential sources, as well as any actions taken by municipal officials and stakeholders within the shared watershed.

Cape Neddick River

Like many coastal communities, the town of York's beautiful sandy beaches are integral to the local economy. High bacteria levels impair water quality, threaten public health and lead to advisories/closures of valued coastal beaches. Routine monitoring of the Cape Neddick River (CNR) and neighboring beach has highlighted extensive bacteria issues with unidentified sources. In 2007 the town of York hired a Shoreland Resource Officer allowing the town to expand its water quality program beyond the shoreline.

In 2009, the CNR Watershed Special Study was coordinated by the Shoreland Resource Officer and volunteer monitors collected 137 bacteria samples over 10 days at 14 monitoring stations. Additionally, the town of York GIS Office provided support through mapping monitoring stations, municipal sewer lines, storm drains, etc. Maine Healthy Beaches provided technical support and analyzed optical brightener samples to augment this effort.

Bacteria and Sand Project

MHB staff assisted in a study to investigate the role of marine sediments as a reservoir for Enterococci and specific pathogens, and test the influence of environmental conditions on the presence or abundance of these organisms in the marine environment. Beaches located in Ogunquit and Wells were chosen as the study sites because these areas tend to have dry-weather bacteriological exceedances during the late summer. The MHB Program assisted the researcher in collecting water, dry and wet sand samples in late-summer to assess pathogen presence and Enterococcal cell abundance. Quantitative PCR and PCR was used to make high-frequency, quantitative measurements of Enterococci populations and corresponding high-frequency, non-quantitative measurements of targeted pathogens in waters and sediments. An array of nutrients, water quality parameters and meteorological conditions were also measured.

Findings from this study will likely increase our understanding of the conditions which lead to exceedances of bacterial standards. It is also possible that information from this study can be used in the future for predictive models and to test the rates of false positives and false negatives in beach advisory decisions. The final report will be available summer 2010.

Bacteria and Rainfall Project¹⁴

In response to the high number of beach action days in 2009, the MHB Program examined the relationship between Enterococci levels and rainfall at five beach management areas (BMAs). Rainfall can transport harmful bacteria to the beach via

¹⁴ See Bacteria and Rainfall Supporting Documents, **Appendix J**

direct runoff and through inputs such as rivers, streams, and storm drains. Some states have implemented automatic advisories/closures of beaches after significant rainfall (e.g. Massachusetts, New Jersey, California, and Ohio). Findings from this study could be used to support precautionary rainfall advisories at these locations. Precautionary rainfall advisories may protect public health during the potentially harmful lag-time in obtaining bacteria results or between the scheduled monitoring days.

Analysis was completed using the statistical program MYSTAT. The five BMAs included: Willard Beach, South Portland; Goochs Beach, Kennebunk; Riverside Beach, Ogunquit; Goose Rocks Beach, Kennebunkport; and Cape Neddick Beach, York. These BMAs were selected because they have a history of bacteria issues and have freshwater inputs directly impacting the public swimming area.

The first analysis conducted was a simple Pearson's Correlation with Bonferroni probabilities as output values. This test examines how the data reacts in relation to each other. Data from the 2008 and 2009 seasons were first analyzed separately and then together. The rainfall data used in this analysis was from the MHB database for the period of forty-eight (48) hours prior to sample collection. Although several of the Bonferroni probabilities were significant ($p < 0.05$), none of the correlation coefficients for any combination of data indicated relationships more significant than a moderate association between rainfall and bacterial levels. The highest correlation coefficient was found at Willard Beach, an urban beach, with an r value of 0.669 and a p -value of 0.0.

The next analysis conducted was a Yule's Q correlation using Two-Way Table analysis. This test examines the frequency of rainfall, or amount of rainfall, compared to the frequency of bacteria exceedances to determine if the exceedances are dependent on these factors. Initial Yule's Q correlation analysis exhibited moderate to very strong relationships between rainfall and bacterial exceedances for some of the BMAs. A Chi-Squared analysis was conducted to determine if rainfall significantly affected the frequency of bacterial exceedances. This analysis showed that at some locations rainfall and bacterial exceedances were not independent of each other.

Although the Yule's Q correlation and the Chi-Squared analysis results strongly indicated relationships between rainfall and bacterial exceedances, further analysis showed that the association was potentially over emphasized, as shown in the associated tables, by the large number of days where there was no prior rainfall and no bacterial exceedances. Although analysis showed that a majority of the exceedances were recorded following a rain event, the majority of rain events did not generate exceedances.

Initial results of this project did not find any strong statistical evidence to support the theory that the presence of rain results in a bacteria exceedance, nor could it statistically support the implementation of precautionary rainfall advisories at the BMAs studied.

Additional analysis was conducted for Willard Beach using daily rainfall amounts collected at the South Portland Water Resource Protection's sewage plant between 2003 and 2009. The location of the rainfall gauge is about 1.5 miles from the beach. The

Pearson's Correlation test was again used and the results did not show any strong relationships between rainfall and bacteria levels. Analysis of the Two-Way Tables used for the Yule's Q test showed one absolute relationship. For the six monitoring days where rainfall of 2.28 inches or more was recorded in the twenty-four hour period before the samples were collected, the bacteria results were in exceedance 100% of the time.

The additional analysis conducted for Willard Beach supports the need for precautionary rainfall advisories following rainfall events of two inches or more within a 24 hour period. MHB will work with the town of South Portland to implement precautionary advisories in 2010. A possible explanation for the lack of bacteria exceedances following 2009 rainfall events for the 10 other beaches examined may be due to the large amount of rainfall and a flushing effect.

Southern Maine Optical Brightener Study¹⁵

In an effort to better understand the source of pollution at selected beaches, the MHB began a beach fluorometry study in 2009. Optical brighteners are fluorescent white dyes that are added to laundry soaps, detergents, paper products, and textiles that make clothing appear whiter.¹⁶ Because household plumbing systems mix effluent from washing machines and toilets together, optical brighteners can be associated with human sewage in septic systems and waste water treatment plants.¹⁷ While optical brighteners alone are not an indicator, when high concentrations are measured alongside elevated bacteria results, it is likely an indicator of human fecal contamination.

This study was conducted to track bacteria and optical brightener concentrations at selected monitoring sites chosen due to a history of elevated Enterococci bacteria levels and the site's proximity to a fresh water input (e.g. rivers, streams).

Table 3. Optical Brightener Monitoring Locations at Selected Beaches.

Site #	Station	River	Town
YK-02	Cape Neddick Beach	Cape Neddick River	York
OG-04	Riverside Beach	Ogunquit River	Ogunquit
OG-06	Riverside Beach	Ogunquit River	Ogunquit
W-04	Wells Harbor Beach	Webhannet River	Wells
GR-01	Goose Rocks Beach	Little River	Kennebunkport
GR-05	Goose Rocks Beach	Baston River/Smith Brook	Kennebunkport
Saco-00	Goosefare Brook	Goosefare Brook	Saco
Saco-01	Kinney Shores	Goosefare Brook	Saco
OOB-08	Ocean Park	Goosefare Brook	Old Orchard Beach
HIG-00	Spurwink River	Spurwink River	Scarborough

¹⁵ See Southern Maine Optical Brightener Study Supporting Documents, **Appendix K**

¹⁶ MCHD Presentation, <http://co.monmouth.nj.us/documents/121/MSTpresentation.pdf>

¹⁷ Hartel et al., 2007

Bacteria and optical brightener concentration levels were analyzed and the strength of the association between the two parameters was measured using Pearson's Correlation analysis. The analysis conducted on the Goosefare Brook monitoring site (Saco-00) indicated human source contamination issues within the watershed. Over half of the concentrations of Enterococci and optical brightener levels recorded at this site exceeded water quality standards and had optical brightener levels indicating human influence. The site also had the strongest Pearson's "R" Coefficient (0.759) with a positive association.

The other 10 monitoring sites exhibited elevated Enterococci and optical brightener levels; however, the strength of association for the remaining sites only ranged from potentially no association to moderate association between the two parameters. This study will be continued in 2010 at the same monitoring sites with some additional monitoring upstream of selected stations. The added data will increase the effectiveness of the analysis and may reveal stronger associations than what were observed in 2009.

US EPA

In an effort to increase the knowledge and utilization of the field fluorometer unit as a part of the water quality monitoring toolbox, Tim Bridges (US EPA) and MHB staff provided informational trainings in 2009 to state agencies, and local water and sewer district staff.

MHB staff and EPA established a work plan for the 2009 field season which included monitoring the Kennebunk River Watershed, and Ogunquit Beach and Ogunquit River Watersheds. In addition to the routine environmental and Enterococci data collected by the MHB Program, the parameters monitored in each waterbody also included: E. coli, optical brighteners, dissolved oxygen, pH, and conductivity.

In 2009, EPA staff reviewed the *Municipal Guide to Clean Water: Conducting Sanitary Surveys to Improve Coastal Water Quality*.

Maine Department of Marine Resources (DMR)

Beaches and shellfish growing areas overlap in certain areas along the coast of Maine. Although the DMR Shellfish Sanitation Program utilizes fecal coliform as an indicator, bacterial data collected by both programs can be used together to build an overall bacteria profile of these coastal areas. DMR beach monitoring site locations and corresponding fecal coliform data helped inform the initial placement of MHB Program monitoring sites. Moreover, consistently problematic DMR monitoring locations have helped inform MHB special study/sanitary survey work and vice versa. Both the MHB Program and DMR have shared sanitary survey report information and have also collaborated on sanitary surveys. In 2009, DMR reviewed the *Municipal Guide to Clean Water: Conducting Sanitary Surveys to Improve Coastal Water Quality*. The MHB Program plans on partnering with DMR staff to conduct sanitary survey training for municipal staff in 2010.

Maine Department of Environmental Protection (DEP)

In addition to the management role which DEP has assumed for the MHB program, and the data management support as described above, MHB collaborated with staff from the DEP's Division of Water Quality Management (DWQM) on several sanitary surveys including the Ducktrap River watershed and Kennebunk River/Goochs Beach watershed area. DEP staff have provided technical support in the field for special studies and sanitary survey work, and also provided additional expertise at the Kennebunk River Symposium in 2009. DEP staff have also reviewed and contributed substantially to development of the *Municipal Guide to Clean Water: Conducting Sanitary Surveys to Improve Coastal Water Quality*. In 2009, the MHB Program also worked closely with DEP staff to help transition program management over to DEP.¹⁸ The MHB Program is also planning on utilizing the expertise of DWQM staff for upcoming sanitary survey trainings for municipal officials.

Maine Geological Survey (MGS)

In 2009 the MHB Program continued to partner with MGS on presentations and special studies in problematic areas. For example, MGS researchers and MHB staff presented findings and recommendations from the Acoustic Doppler profiling study and additional data analysis conducted in the Kennebunk River/Goochs Beach area at the Kennebunk River Stakeholder Symposium and at the Wells National Estuarine Research Reserve's (WNERR) Kennebunk River Conference in the spring of 2009. The MHB Program and MGS also jointly presented *The State of Maine's Beach in 2009* at the Maine Beaches Conference. Similarly, MHB staff partnered with MGS researchers to present results and recommendations from the Acoustic Doppler profiling study and additional data analysis and conducted in the Ogunquit River/Ogunquit Beach area at the Ogunquit River Conference hosted by WNERR in November 2009.

In order to better understand and predict coastal circulation patterns, the MHB Program partnered with MGS to conduct a survey of the structure of ocean currents near the mouth of Goosefare Brook and nearby Old Orchard Beach utilizing an Acoustic Doppler Current Profiler (ADCP). The survey was completed to capture near shore circulation adjacent to the mouth of the brook and along the beach in order to characterize flow during an ebbing tide when currents near the river are expected to be strongest. Additionally, the field conditions for this study were selected to provide a "worst-case-scenario" when tidal currents could carry water directly from the contaminated Goosefare Brook to Old Orchard Beach. MGS collected 9 shore-perpendicular and 5 shore-parallel ADCP current survey transects on a flooding tide.

Results from this study are suspect likely due to an internal compass error in the ADCP, which may have been caused by a power short from vessel impact. A secondary survey was completed at the mouth of the Scarborough River the day before. Analysis showed good results, with strong flooding currents in the main channel of the river, with a smaller secondary channel directing incoming tidal currents directly towards Ferry Beach. A follow up survey is planned for Goosefare Brook in Summer 2010.

¹⁸ See Success Stories, **Section VII**.

VII. Success Stories

The Maine Healthy Beaches Program Successfully Transitions Program Management from the State Planning Office to the Maine Department of Environmental Protection

Starting January 1st 2009 MHB Program management was the responsibility of the Maine Department of Environmental Protection (DEP). DEP is responsible for program oversight, interagency collaboration, data management, expanding the notification system, program evaluation, securing on-going funding from U.S. EPA, etc. This transfer augments MHB Program data and GIS capabilities, data sharing, and source identification efforts.

MHB and DEP staff successfully quality checked and transferred all of the MHB data into DEP's Environmental Geographic Analysis Database (EGAD). This will facilitate easier access by resource managers, agency partners, non-profits, and the general public. Moreover, EGAD scripts will be used to check for completeness and consistency in data reporting; transfer beach monitoring data to STORET via the Water Quality Exchange (WQX); and transfer notification data to PRAWN via the Central Data eXchange (CDX). Additionally, EGAD offers increased functionality over the current MHB database, providing advanced automated analysis, graphing, and mapping tools.

This important partnership with DEP also provides additional support and technical assistance to local municipalities in pollution prevention and investigation efforts. DEP staff have in-depth knowledge and expertise regarding potential pollution sources (e.g. subsurface wastewater disposal systems, POTW outfalls, OBD's).

Additionally, this transition has facilitated greater MHB Program collaboration with different departments within the DEP network. For example, MHB staff presented at the DEP Watershed Roundtable and to the Division of Environmental Assessment to share information and to collaborate on overlapping areas of interest. MHB data has also been incorporated into the TMDL process. MHB staff shared resources and trained DEP River monitoring program staff. Moreover, two Enterococci laboratories were outfitted in DEP regional offices and DEP staff trained to process Enterococci samples. This will enhance DEP's monitoring and assessment capabilities as well as the MHB Program.

The 2009 management transition will continue to improve the monitoring, assessment, notification, education/outreach aspects of the program, as well as helping communities find and fix pollution sources.

Municipal Guide to Clean Water: Conducting Sanitary Surveys to Improve Coastal Water Quality¹⁹

Elevated fecal bacteria levels may pose a human health risk, leading to closures of valued coastal beaches and shellfish growing areas. Tourism and the shellfish industry are both integral components of the Maine economy and way of life. Identification and

¹⁹ See **Appendix D**

remediation of harmful bacteria sources can be a complicated and arduous task requiring special studies and in-depth sanitary surveys beyond the immediate shoreline area.

Maine has over 5,300 miles of coastline. There are limited resources and staff to conduct sanitary surveys and a dearth of comprehensive resources addressing shoreline, watershed, and offshore sources of fecal contamination. In response to this issue, the MHB Program developed a *Municipal Guide to Clean Water: Conducting Sanitary Surveys to Improve Coastal Water Quality*. This resource was reviewed by almost 30 professionals at the local, state and federal level and will be distributed to coastal communities and beyond in 2010.

This resource is meant to build local level capacity to find and fix bacteria sources, reduce the time and effort (i.e. transaction costs) needed to complete sanitary surveys, and ultimately improve the health of water resources. The MHB Program plans on distributing this resource to all LPIs in watershed areas impacting coastal water quality. It will also be available for downloading on the MHB Program and Sea Grant websites for distribution beyond coastal watersheds and the state of Maine. Additionally, this resource will augment sanitary survey trainings for municipal officials, which MHB plans on conducting in partnership with DMR and DEP Enforcement in 2010.

The MHB Program is committed to continuing collaborative efforts to identify and remediate pollution sources bringing together local/state officials, partnering state agencies, non-profits and citizens with a focus of shared resources and problem solving.

The Maine Healthy Beaches Program Collaborates with Local, State and Federal Partners to Improve Water Quality on Goochs Beach, Kennebunk Maine

Kennebunk's beaches are valued resources and high bacteria levels pose a threat to public health and the local economy. Since 2005, the MHB Program has supported special study work in the Kennebunk River which adversely impacts water quality on the neighboring Goochs Beach. Addressing the sources of contamination has been a multi-year collaborative effort involving MHB Program staff, multiple towns within the shared watershed, volunteers, state agencies, and the EPA.

A Kennebunk River Watershed Stakeholder Workshop was planned and facilitated by MHB Program staff in 2009. Workshop attendees included the towns of Kennebunk, Kennebunkport and Arundel, the Kennebunk Conservation Commission, local residents, the Maine Department of Marine Resources, Maine Department of Environmental Protection, and U.S. EPA. The purpose of the Workshop was to share data, raise awareness, present the sanitary survey process, and to plan for source identification and remediation efforts.

This Workshop utilized the expertise of Maine Geological Survey researchers who presented the findings and recommendations from the Acoustic Doppler profiling study and additional data analysis conducted in the Kennebunk River/Goochs Beach area. DEP enforcement staff presented how to conduct house-to-house sanitary surveys targeting

malfunctioning subsurface wastewater disposal (septic) systems. MHB staff also provided Enterococci and optical brightener data summaries and recommendations.

In addition to data summaries, MHB staff shared GIS “hot-spot” and risk analysis maps for the Kennebunk River Watershed and for properties with subsurface wastewater disposal systems.²⁰ This project incorporated potential pollution sources, monitoring data, topological features, and characteristics of the watershed to create a ranking system to highlight areas with the greatest pollution potential.

As a result of the Workshop, the towns of Kennebunk and Arundel LPIs became familiar with the sanitary survey process and committed to inspecting septic systems within the watershed. A targeted monitoring plan was also implemented to pinpoint sources in the head of tide region in 2009. A list of priority properties was distributed to Kennebunk, Kennebunkport, Arundel and Lyman to assist LPIs in targeting areas for further investigation and property surveys. Additionally, the town of Kennebunk conducted a sanitary survey²¹ of 31 “priority” properties. A task force of MHB staff, DEP Enforcement and the LPI walked 19 properties, and 15 properties of 31 properties considered need follow-up due to some type of malfunction (e.g. hydraulic, bacterial) or the location/status of the system was unknown.

With the support of MHB Program monitoring data and assessment, the town of Kennebunk has made significant improvements to the stormwater system draining directly onto Goochs beach. As part of the Gooch’s Beach Seawall Reconstruction project, the storm water system along Beach Avenue was modified to coincide with the Seawall Construction. The town designed the system to allow for the implementation of a stormwater treatment device referred to as an Ultra Urban Filter. These devices were installed in four catch basins to provide treatment of stormwater by removing waterborne pollutants which have historically been allowed to discharge directly to the beach. This will provide treatment of approximately 920 feet of roadway and surrounding area.

Data generated by the special study work in the Kennebunk River has also supported efforts to increase the number of properties serviced by municipal sewer. The town Planning Board approved the redevelopment of the Cottage Colony on the “Point” close to the mouth of the Kennebunk River. This is a 30 acre parcel with 15 dwellings that were on septic that will be converted to municipal sewer. In the past these units were a mix of seasonal and year round homes with limited information about the status of the septic systems. The construction started in November 2009 and all the units will be connected by the spring of 2010. Similar to the stormwater improvements, this upgrade is a proactive approach by the town to improve water quality.

Additionally, the Kennebunk River Action Committee (KRAC), comprised of citizen volunteers from within the shared watershed, has been instrumental in promoting best management practices. The KRAC has implemented education/outreach efforts such as Septic Socials and workshops targeting property owners within their towns and the

²⁰ See GIS Documents: Kennebunk River Watershed and Septic System Risk Analysis, **Appendix H** maps.

²¹ See GIS Documents: Kennebunk Sanitary Survey Map, **Appendix H**.

Kennebunk River watershed. KRAC has also worked the DEP to site a marine pump-out barge in the lower reaches of the Kennebunk River.

The Maine Healthy Beaches Program plans to continue special study and sanitary survey work within the Kennebunk River Watershed and to complete a sanitary survey report in 2010. MHB Program staff in partnership with LPIs and agency partners will continue to focus on property inspections and remediation of sources.