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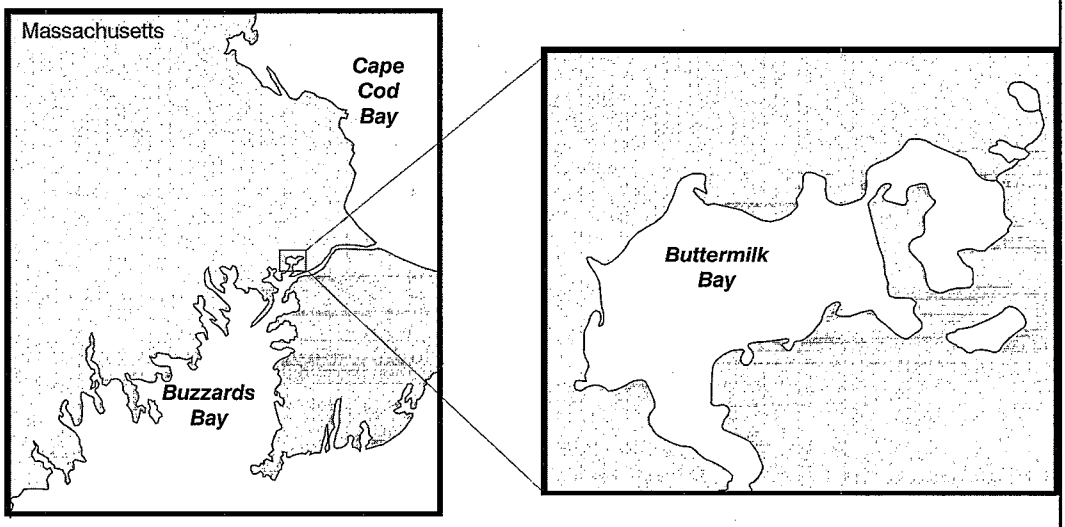
Buttermilk Bay Coliform Control Project

Demonstrating Practical Tools For Watershed Management Through The National Estuary Program

Buzzards Bay, Massachusetts

Characteristics:

- The Buzzards Bay watershed includes 228 square miles, with nearly 236,000 people living in its drainage basin.
- Buttermilk Bay, located at the north end of Buzzards Bay, is a tidal embayment where many residents and visitors enjoy shellfishing, sun bathing, boating, and recreational fishing.
- Much of Buttermilk Bay's 19 square mile drainage basin is undeveloped, with some homes and businesses located along the coast.



The Problem: Recurring high fecal coliform levels have resulted in periodic closure of Buttermilk Bay and its beaches to shellfishing and recreational activities. At the start of this project, the entire Buttermilk Bay was closed to shellfishing due to the high fecal coliform levels.

The Project: The Buttermilk Bay Demonstration Project was designed to control the discharge of fecal coliform into the bay. Project objectives included identifying sources of fecal coliform, employing Best Management Practices (BMPs) to control runoff, and implementing local regulations to control coliform input.

The National Estuary Program

Estuaries and other coastal and marine waters are national resources that are increasingly threatened by pollution, habitat loss, coastal development, and resource conflicts. Congress established the National Estuary Program (NEP) in 1987 to provide a greater focus for coastal protection and to demonstrate practical, innovative approaches for protecting estuaries and their living resources.

As part of this demonstration role, the NEP offers funding for member estuaries to design and implement Action Plan Demonstration Projects that demonstrate innovative approaches to address priority problem areas, show improvements that can be achieved on a small scale, and help determine the time and resources needed to apply similar approaches basinwide.

The NEP is managed by the U.S. Environmental Protection Agency (EPA). It currently includes 28 estuaries: Albemarle-Pamlico Sounds, NC; Barataria-Terrebonne Estuarine Complex, LA; Barnegat Bay, NJ; Buzzards Bay, MA; Casco Bay, ME; Charlotte Harbor, FL; Columbia River, OR and WA; Corpus Christi Bay, TX; Delaware Estuary, DE, NJ, and PA; Delaware Inland Bays, DE; Galveston Bay, TX; Indian River Lagoon, FL; Long Island Sound, CT and NY; Maryland Coastal Bays, MD; Massachusetts Bays, MA; Mobile Bay, AL; Morro Bay, CA; Narragansett Bay, RI;New Hampshire Estuaries, NH; New York-New Jersey Harbor, NY and NJ; Peconic Bay, NY; Puget Sound, WA; San Francisco Bay-Delta Estuary, CA; San Juan Bay, PR; Santa Monica Bay, CA; Sarasota Bay, FL; Tampa Bay, FL; and Tillamook Bay, OR.

Introduction To Buzzards Bay

Along the western shore of Cape Cod in southeastern Massachusetts lies a 28-mile long body of water known as Buzzards Bay. With 210 miles of shoreline, the bay's beautiful, ragged coast provides many opportunities for fishing, boating, and sun bathing. The bay's diverse habitat of salt marshes, eelgrass beds, and tidal streams lends itself to the support of numerous animal species such as muskrat, great blue herons, and Canadian geese. The harbors in Buzzards Bay, scattered along the 11 miles of public beaches, are used for shellfishing, swimming, and other recreational activities.

Buzzards Bay is still considered a relatively healthy waterway. However, the diversity and vitality of the ecosystems and recreational qualities of Buzzards Bay and of specific tidal embayments, such as Buttermilk Bay, are threatened by increasing amounts of contamination. Pollution associated with rapid residential development, industrial wastes, and sewage contaminants, such as fecal coliform, contributes to the loss of habitat and the decline of water quality and related water activities including shellfishing and swimming.

Overview Of Buttermilk Bay

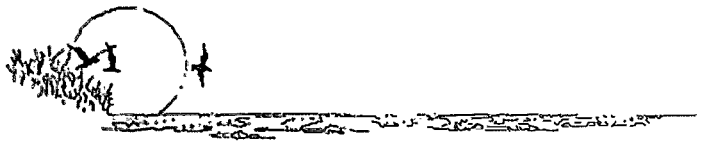
Buttermilk Bay is a small tidal embayment located in the towns of Bourne and Wareham, Massachusetts, at the north end of Buzzards Bay. In 1984, Buttermilk Bay was closed to shellfishing due to high fecal coliform levels. Since that time, portions of the bay have been reopened for shellfishing, only to be closed again due to recurring high fecal coliform levels. Fecal coliform bacteria, present in the fecal matter of warmblooded animals, are indicators that human pathogens may be present.

In 1988, EPA joined forces with the Massachusetts Executive Office of Environmental Affairs, Barnstable County Health and Environmental Department, the Buzzards Bay Project, and Boston University to plan and implement a restoration and protection project in Buttermilk Bay. Buttermilk Bay was selected as the demonstration project site because of its similarity to other tidal embayments in the region. These similarities will enable other citizens and local governments in the region to apply the knowledge gained concerning sources, effects, and mitigation of fecal coliform pollution in estuaries.

Project Objectives

The objective of the Buttermilk Bay Project was to create and implement a management plan for the control of coliform entering the bay. The project included the implementation of:

- Techniques to demonstrate stormwater control.
- Beach cleanup.
- Other best management practices for other city improvements.
- Public education activities.



Implementing The Project

A 1985 study of water quality in Buttermilk Bay produced an inventory of sources of fecal coliform, which included storm drains, septic systems, wildlife waste, marina discharges, and freshwater inputs (streams, marsh areas). The inventory showed that closure of the shellfishing areas was often required following periods of rain due to contamination by pollutants in stormwater runoff. The survey illustrated that storm drains were the greatest source of fecal coliform bacteria.

It was also discovered that beach wrack, which is decaying grass and algae, seemed to provide a "home" for fecal coliform by providing protection and promoting growth. Once the primary pollution sources had been identified, the first step in implementing the project was to develop techniques and management practices that would reduce or eliminate coliform inputs.

Stormwater Control

Of the approximately 30 storm drains that discharge into Buttermilk Bay, the storm drains at Electric Avenue Beach in the City of Bourne, and at Red Brook in the City of Wareham, were chosen for inclusion in the demonstration project. These two sites were selected based on their high fecal coliform contamination counts. Local officials and residents supported treatment of the stormwater discharge as a way to improve water quality and enhance the communities' enjoyment of the bay's natural resources.

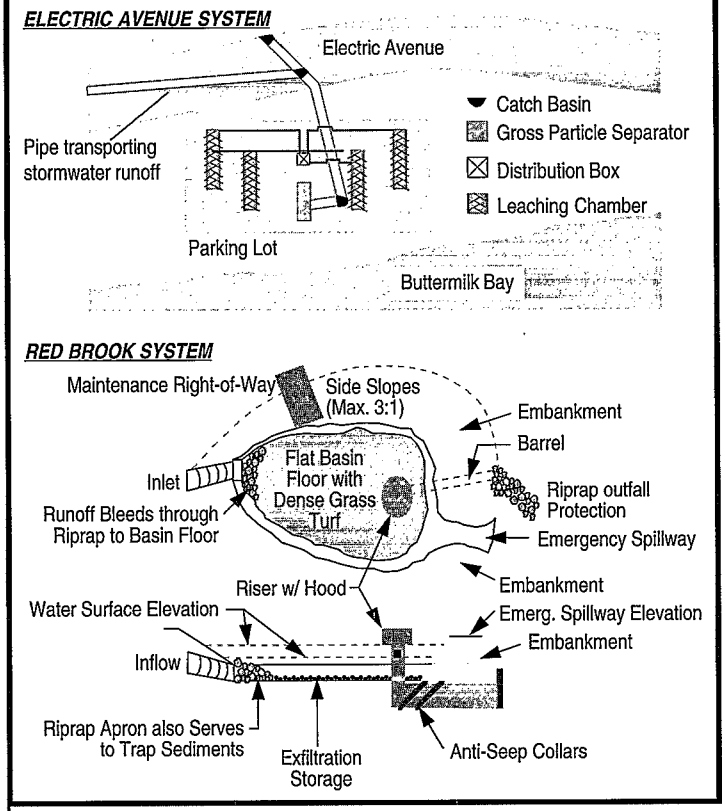
About 8 acres of residential area drain to Electric Avenue Beach. A storm drain outlet pipe, visible from the public beach at low tide, discharged stormwater from the watershed directly into the bay. Stormwater also traveled to the bay through sheetflow at the end of a public boat ramp.

Construction of the Electric Avenue Beach stormwater control system began in 1989 and was completed in 1990. The control plan was aimed at diverting stormwater to three separate treatment systems. The idea behind each design was similar:

- Divert the water to low areas where catch basins or, in the case of the boat ramp, a collection trench, were located.
- Pipe the collected stormwater to a gross particle separator where suspended grit and solids settled out due to the decreased water flow velocity.
- Discharge the remaining liquid to nearby leaching pits filled with crushed stone which provide additional treatment by straining out both fecal coliform and other potential contaminants.
- Periodically clean out the particle separator units and properly dispose of the solids.

A second stormwater treatment system using a detention-recharge basin is planned at Red Brook. The project was on hold while an investigation of the area's archeological resources was completed. A new site has been selected and the project is awaiting design. In the interim, vegetative swales have been built along the waterway to filter stormwater. As the stormwater flows through the grass and is absorbed into the ground, the vegetation and soil act as natural filters. This method is successful in removing fecal coliform bacteria and in

STORMWATER CATCH BASIN DESIGNS IN BUTTERMILK BAY



reducing concentrations of other pollutants such as metals, pesticides, and hydrocarbons.

Beach Wrack Removal

Although beach wrack is not the major contributor of fecal coliform to the bay, it does appear to aid in the survival and growth of coliform bacteria. The residents of the Buttermilk Bay area displayed a shared commitment to their environment by volunteering to participate in beach wrack cleanup at several beaches. Eager to help restore the vitality of their neighborhood environment, over 3,000 residents applied a hands-on approach to fighting fecal coliform pollution in Buttermilk Bay.

To determine the effectiveness of the beach wrack removal project, the coliform levels of outgoing tides were measured at one site. The results indicated a distinct reduction in coliform bacteria counts after the beach wrack was removed. Although the cleanup effort was a success, the demonstration project showed that this method of bacteria reduction was extremely labor intensive and it was not continued as a management practice.

Other Best Management Practices

The Buttermilk Bay Demonstration Project also helped implement best management practices as a part of other city improvements. For example, the citizens of Wareham and Bourne, with the help of the Buttermilk Bay Demonstration Project, the Buzzards Bay Project, and local and state officials, rallied together to reduce coliform input from failing septic systems. Through state, local, and homeowner funding, 850 septic systems were replaced using a sewer line extension. This eliminated faulty septic systems that potentially contributed to coliform discharges.

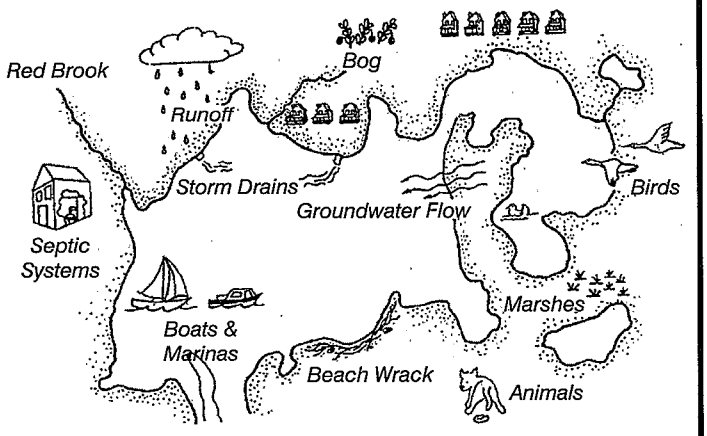
Public Education And Outreach

While the research was conducted by federal and state agencies, citizen groups played a crucial role in the project. The residents organized community information and education programs, including community surveys and meetings. This form of public involvement enabled citizens to become informed and educated on the pollution problems that face the bay, and provided guidance on how residents could become part of the solution.

The success of the public outreach can be seen in the actions taken by Wareham residents when a road paving project was initiated. Realizing the potential for impacts associated with increased runoff from the project and a subsequent increase in bay pollution, the residents notified the Buzzards Bay Project and local officials. The project was modified to include basins to filter the runoff before it flowed into the bay.

The communities' high degree of involvement was evidence that they were aware of the problems and determined to save their bay.

SOURCES OF FECAL COLIFORM IN BUTTERMILK BAY



The Buttermilk Bay Success Story

By all accounts, the Buttermilk Bay Demonstration Project is a success story. The stormwater control system at Electric Avenue Beach achieved a 98 percent reduction in fecal coliform levels. In addition, the community has replaced failing septic systems, reducing the potential for pollution. As a result, the Buttermilk Bay's water quality shows marked improvement. At the start of the project, the entire Buttermilk Bay was closed to shellfishing and recreational activities due to high coliform levels. Today, thanks to stormwater control and septic system improvements, 90 percent of the bay is presently open, and residents and visitors are once again enjoying the bay's resources.

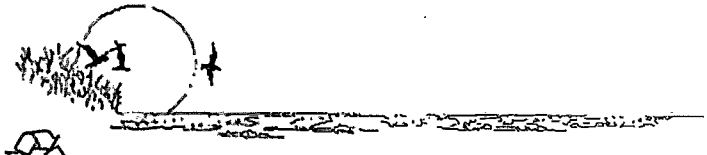
The success of the project has encouraged the communities of Bourne and Wareham to commit to the restoration of the four small coves in Buttermilk Bay which still remain closed to shellfishing and recreational activities. The communities, now aware of the solutions to high fecal coliform levels, are dedicated to installing similar stormwater control systems and repairing failing septic systems in those areas of the bay that are in need of pollution prevention devices. The success of this demonstration project will ensure the health of the Buttermilk Bay waterway, and the long-term enjoyment of its resources.

Lessons Learned

The Buttermilk Bay Project demonstrated that a management approach focused on a single embayment is one of the most effective ways of mitigating pollution from nonpoint sources such as storm drains and septic systems. Since these nonpoint sources are a result of local conditions, they are harder to regulate on an entire Buzzards Bay-wide scale. Other lessons learned include:

- An initial inventory of possible sources of contamination is essential in creating the proper focus of any embayment project. The information gathered during sanitary surveys around Buttermilk Bay provided the evidence that indicated stormwater discharges were by far the most significant factor in coliform entry into the bay.
- While outreach activities may not always result in high active citizen involvement, informed citizens can send a strong message of support to elected officials and city management for environmental projects. Additionally, informed citizens can alert local and state officials of events that could have negative effects on the environment.
- Once the stormwater collection and control systems were in place, minimal maintenance was required to keep the systems in good working order. Workers from the City of Bourne found that regular pumping out of the particle separators optimized hydraulic performance.
- The impact of individual projects on the overall water quality of larger connecting waters is difficult to assess. Fecal coliform levels in Buzzards Bay still increase during rain events, but the overall levels have decreased. Monitoring stations close to the stormwater control project show marked decreases in fecal coliform during dry weather, and reduced increases during rainy periods. Monitoring of the treatment systems has revealed a substantial reduction of pollutant loading.
- The permitting process can slow and possibly derail projects. The potential for delay should be anticipated and strategies developed prior to beginning a project. The staff of the Buzzards Bay Project found that providing technical assistance to local government staff can go a long way in preventing permitting delays.

This project provides a starting point for actions needed to reduce fecal coliform in local and regional watersheds which ultimately discharge into Buzzards Bay. The lessons learned in the Buttermilk Bay Project are helping other communities in the region, and could be used nationwide to restore and protect waterways.



For more information contact:

Bruce Rosinoff	Joseph Costa, Director
U.S. EPA Region 1	Buzzards Bay Project
JFK Building	2 Spring Street
Boston, MA 02203	Marion, MA 02738
(617) 565-3508	(508) 748-3600
(617) 565-4940 FAX	(508) 748-2845 FAX

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Agency
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