THE COALITION FOR
BUZZARDS BAY
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The Coalition for Buzzards Bay is a nonprofit, membership organization dedicated to the restoration, protection and sustainable use and enjoyment of our irreplaceable Bay and its watershed. The Coalition works to improve the health of the Bay ecosystem for all through education, conservation, research, and advocacy.

Glossary

Algae: Simple rootless plants that grow in bodies of water (e.g. estuaries) at rates in relative proportion to the amount of nutrients (e.g. nitrogen and phosphorus) available in water. Algal blooms are the result of excessive nitrogen levels.

Ecosystem: All the organisms in a particular region and the environment in which they live. The elements of an ecosystem interact with each other in some way, and so depend on each other either directly or indirectly. A system such as Buzzards Bay is considered a sum of many elements.

Estuary: The place where the river meets the sea. A partially enclosed body of water of variable salinity, with a freshwater inflow at one end and seawater introduced by tidal action at the other.

Nitrogen: Essential chemical (nutrient) needed by plants and animals for growth. Excessive nitrogen can lead to degradation of water quality and growth of excessive amounts of algae. Sources of nitrogen in Buzzards Bay are septic systems, sewage treatment plants, fertilizers, and acid rain.

Sprawl: Poorly-planned, dispersed development outside of urban and town centers that consumes open space and damages natural resources.

Toxic: Poisonous, carcinogenic, or otherwise directly harmful to life.

Watershed: The area of land that drains into a body of water. The Buzzards Bay watershed includes all or part of 17 towns and covers 432 square miles. Towns in the Buzzards Bay watershed are Acushnet, Bourne, Carver, Dartmouth, Fairhaven, Fall River, Falmouth, Gosnold, Marion, Mattapoisett, Middleborough, New Bedford, Plymouth, Rochester, Wareham, Westport, and Tiverton, R.I.

State of the Bay 2003

THE COALITION FOR
BUZZARDS BAY

The State of the Bay 2003

Gosnold at Smoking Rocks. William A. Wall, 1842. This painting depicts Bartholomew Gosnold landing at Smoking Rocks (on the New Bedford shore) in 1602. (New Bedford Whaling Museum)

How We Created Our Report

To create the State of the Bay report, The Coalition for Buzzards Bay collaborated with scientists and land use planners to examine the best available current and historical information for indicators in three categories: Pollution, Watershed Health, and Living Resources.

This report examines the current ecological state of Buzzards Bay. It takes an in-depth look at the impact sprawl development and it's associated pollution – nitrogen, bacteria, and toxins – are having on Buzzards Bay's watershed health, the condition of its forests, wetlands, and stream buffers, and three of the Bay's key living resources: bay scallops, eelgrass, and river herring populations.

The current state of Buzzards Bay is measured against the healthiest Buzzards Bay in recorded history – the awe-inspiring natural abundance experienced by explorer Bartholomew Gosnold in 1602. The Bay Gosnold experienced was virtually untouched by harmful human activity and rates 100 on our scale.

In examining the best available information for each of the indicators in this report, we discovered gaps in available data regarding many of our indicators. For resources such as bay scallops and river herring; for toxic pollution; and for the status of river buffers, consistent monitoring is required to focus and measure the success of protection and restoration activities. In such cases, the best judgment of CBB staff and our advisors led to the development of the reported scores.

We would like to thank the following people and agencies for their guidance and contribution to the State of the Bay 2003 Report. We could not have completed this report without their input and advice.

- Don Bourne, Ph.D., Harvard University
- Joseph Costa, Ph.D., Buzzards Bay Project National Estuary Program
- Gregory J. Fiske, Woods Hole Research Center
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- James Gurney, Alewives Anonymous
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Selected data and technical review was provided by the Buzzards Bay Project National Estuary Program.
This project was undertaken in part to help meet work plan tasks in EPA Cooperative Agreement CE-98164501.

The Chesapeake Bay Foundation's annual State of the Bay project served as a model for this report.
Suggested Citation: Haupert, C. and Rasmussen, M., 2003. State of the Bay 2003, The Coalition for Buzzards Bay.

Is Half a Bay Acceptable?

The Buzzards Bay ecosystem is an incredibly complex web of land and water; forests and eelgrass; rivers and fish; people and wildlife. Like all ecosystems, a disruption in one strand of the web may produce unknown or unexpected consequences elsewhere. Since Europeans landed on the shores of the Bay, many strands of the Bay ecosystem have been altered.

Four hundred years ago, the natural abundance that defined Buzzards Bay mystified Bartholomew Gosnold and his crew as they sailed into the Bay. They wrote of clear waters, towering ancient forests, extensive salt marsh meadows, and an astounding abundance of fish. They describe a people, the native Wampanoag, who lived in harmony with the natural world around them. They saw an intact healthy Bay ecosystem– an intricate web of life that had developed over millennia. This Bay – Buzzards Bay as it existed in 1602 – would rank a top score of 100 on our scale of Bay health.

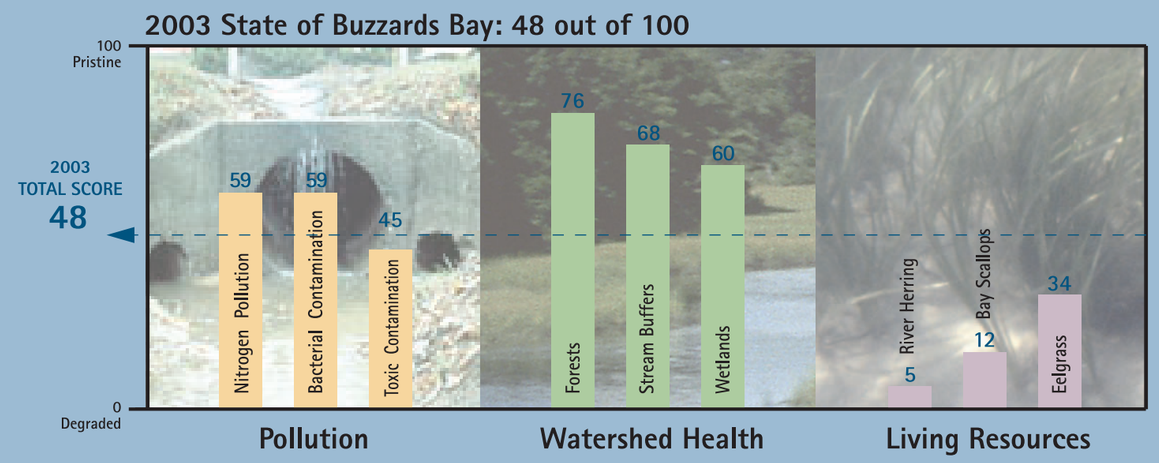
In developing this report, we evaluated the present-day health of key natural indicators – in the areas of Pollution, Watershed Health, and Living Resources – against best estimates of their condition in 1602.

The end result of our analysis? While Buzzards Bay remains healthier than other East Coast estuaries such as Chesapeake Bay and Narragansett Bay, pollution and the destruction of large amounts of the watershed's natural filters have severely impaired Buzzards Bay. The Buzzards Bay we live with today functions at roughly half of its ecological capacity. On a scale of 100, the Bay's health ranks a 48.

This State of the Bay Report is intended to establish a baseline against which individuals, local government officials, and federal and state agencies can measure the success of Bay protection and restoration. Much work has been done and, in some areas (most notably bacterial pollution), significant successes have been achieved. But the Bay's greatest challenge lies ahead, as old sewer and industrial pollution are replaced by a new type of pollution generated by the sprawl development that is currently consuming the watershed's remaining undeveloped land.

As new generations grow up with a diminished Buzzards Bay, our collective memory of the Bay's historical abundance and health fades each year. The Bay will never again reach the level of abundance described by Gosnold's crew. But could it reach 80% of its historic health? We believe that such restoration is possible, and we are dedicated to reaching that goal. We all must remember how rich the Bay was and not settle for half of what it could be.

Buzzards Bay is functioning at roughly half of its potential. With each new generation our collective memory of the Bay's historical abundance and health fades.



Pollution

Nitrogen Pollution: 59

More than half of Buzzards Bay's harbors, coves, and tidal rivers are suffering from nitrogen pollution. Due to nitrogen pollution's destructive impact on marine ecosystems, this increasing problem is regarded by scientists as the greatest long-term threat to the health and vitality of Buzzards Bay. Nitrogen-related water quality degradation is focused in the Bay's nearshore, shallow areas – the same areas that support the majority of the Bay's recreational and economic uses.

While nitrogen is a natural and essential part of all aquatic ecosystems, excess quantities reduce water quality and degrade marine habitat. Human activities and development have driven nitrogen pollution in Buzzards Bay to levels so artificially high that the Bay cannot absorb them. With increased nitrogen pollution, heavy algae growth blocks sunlight and reduces oxygen needed for healthy growth of marine species. As the health of the Bay declines, additional negative impacts occur, such as murky waters, bad odors, and loss of marine plants and animals like eelgrass and shellfish.

The principal sources of nitrogen in Buzzards Bay include septic systems, wastewater treatment plants, stormwater runoff, lawn and agricultural fertilizers, and acid rain – all coming from a growing population and increasing, poorly-planned development throughout the Bay's watershed.

The score of 59 is based on a compilation of the 5-year running average of water quality data collected in each of the Bay's 30 major harbors, coves and tidal rivers by The Coalition for Buzzards Bay's Baywatchers program. As our Bay Health Index (see below) is a compilation of several individually important indicators - water clarity, nitrogen and dissolved oxygen levels, and algae content - the nitrogen score was weighted twice in calculating the overall State of the Bay score.

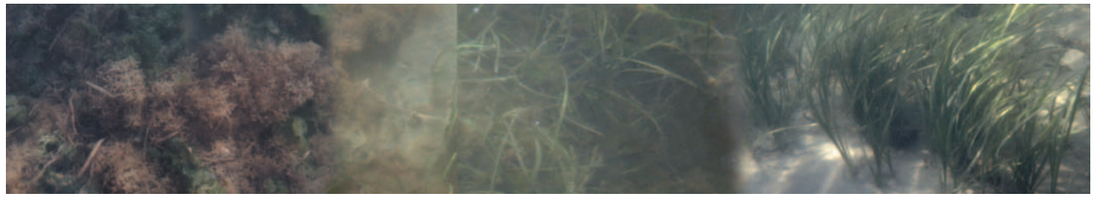
Buzzards Bay Health Index

The Buzzards Bay Health Index measures the nitrogen-related health of each of the Bay's major harbors and coves. The list below shows average water quality in each harbor/cove over the past 5 years. Central Buzzards Bay - which exhibits excellent water quality - scores close to 100 on the Health Index.

Poor							
NASKETUCKET RIVER	4.3	WILD HARBOR RIVER	49.5	APPONAGANSETT BAY, OUTER	63.3	WEST FALMOUTH, MID-HARBOR	75.1
AGAWAM RIVER	16.5	WEST FALMOUTH, SNUG HARBOR	49.7	WESTPORT RIVER, OUTER EAST BRANCH	63.4	RANDS HARBOR	76.2
EEL POND, MATTAPOISETT	18.0	LITTLE SIPPEWISSETT MARSH	50.4	HEN COVE	64.8	WEST FALMOUTH, HARBOR HEAD	76.5
WESTPORT RIVER, UPPER EAST BRANCH	18.1	WEWEANTIC RIVER, OUTER	50.8	RED BROOK HARBOR, INNER	64.9	CLARKS COVE, INNER	76.9
ACUSHNET RIVER	22.7	BROADMARSH RIVER	50.9	FIDDLERS COVE	65.2	QUISSETT HARBOR, INNER	78.5
APPONAGANSETT BAY, INNER	26.5	LITTLE RIVER, OUTER	51.0	ONSET HARBOR, SHELL POINT BAY	65.3	ONSET BAY, OUTER	80.3
SLOCUMS RIVER, INNER	29.3	MATTAPOISETT HARBOR, RIVER MOUTH	51.5	BACK RIVER	66.8	WESTPORT RIVER, INLET	80.4
WESTPORT RIVER, INNER EAST BRANCH	30.6	SLOCUMS RIVER, OUTER	53.6	BUTTERMILK BAY	67.3	MEGANSETT HARBOR	81.0
HAMMETT COVE	32.1	AUCOOT COVE, INNER	53.9	POCASSET RIVER	67.7	CLARKS COVE, OUTER	81.8
WEWEANTIC RIVER, INNER	34.8	WILD HARBOR	54.8	POCASSET HARBOR, INNER	68.6	WEST FALMOUTH, OUTER HARBOR	81.8
LITTLE RIVER, INNER	36.5	APPONAGANSETT BAY, MID-HARBOR	54.9	NEW BEDFORD HARBOR, OUTER	68.8	MATTAPOISETT HARBOR, OUTER	84.2
WAREHAM RIVER, INNER	40.8	WESTPORT RIVER, INNER WEST BRANCH	56.1	BLANKENSHIP COVE	71.3	POCASSET HARBOR, OUTER	84.3
MARKS COVE	43.9	SIPPICAN HARBOR, INNER	56.2	SIPPICAN HARBOR, OUTER	72.0	HILLER'S COVE	85.4
NEW BEDFORD HARBOR, INNER	44.4	SQUETEAGUE HARBOR	57.3	RED BROOK HARBOR, OUTER	72.4	AUCOOT COVE, MID-HARBOR	87.8
LITTLE BAY	46.8	ONSET BAY, EAST RIVER	59.5	MATTAPOISETT HARBOR, INNER	72.6	QUISSETT HARBOR, OUTER	90.3
CUTTYHUNK, WEST END POND	46.9	NASKETUCKET BAY	61.1	CUTTYHUNK HARBOR	72.9	AUCOOT COVE, OUTER	92.5
WAREHAM RIVER, OUTER	47.1	EEL POND, BOURNE	62.1	PHINNEY'S HARBOR	73.0	PENIKESE ISLAND	96.0
		LITTLE BUTTERMILK BAY	62.8	ONSET BAY, INNER	73.9	Excellent	

Impact of Nitrogen Pollution

Buzzards Bay bottom habitat associated with various levels of water quality.



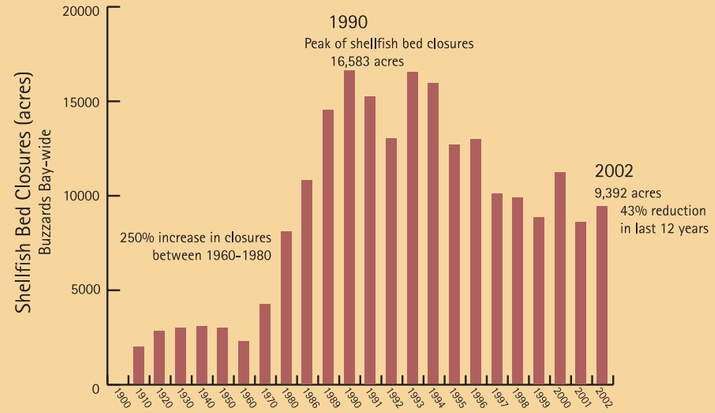
Degraded → Healthy

Bacterial Pollution: 59

Bacterial contamination is caused from improper disposal of human sewage and animal waste. The presence of certain bacteria in the water is measured as an indicator of pathogens and viruses. When the bacteria levels in the water exceed human health standards, shellfish bed and swimming beach closures can occur. Bacterial contamination represents a serious human health risk and economic loss in many parts of Buzzards Bay. Sources include failing septic systems and the more than 2,500 pipes that discharge untreated road runoff into the Bay.

Shellfish bed closures due to pollution are a clear indicator of bacterial contamination. Buzzards Bay experienced its first shellfish bed closure in the greater New Bedford Harbor area in 1904, and throughout the 1900s all towns in the watershed began suffering from bacterial contamination from cesspools, sewers, and animal wastes. Mattapoisett saw its first closure in 1926, followed by Wareham in 1936, Gosnold, Westport and Bourne in the 1970s, and finally Marion and Falmouth in the 1980s. Shellfish bed closures reached their peak in 1990, when over 16,500 acres were closed to harvest due to bacterial contamination.

A Success in Progress

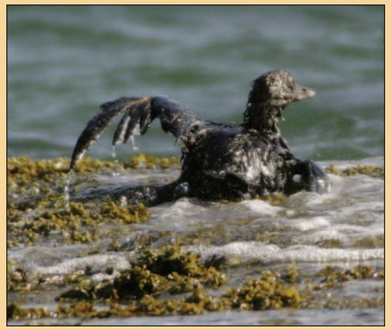


Shellfish beds closed due to bacterial contamination in Buzzards Bay have decreased by 43% in the past 12 years.

Today, of the 23,000 acres of Buzzards Bay's most productive nearshore shellfishing areas, 9,300 acres (41% of the most productive shellfishing areas) remain closed to harvest due to bacterial contamination. A perfect score would represent a Bay with no shellfish bed closures, and therefore no swimming beach closures, due to pollution.

Toxic Pollution: 45

Among all threats to the Bay, toxic chemicals are the most difficult to measure. Sources of toxic pollution to Buzzards Bay include oil spills, chemical discharges from industry and wastewater treatment plants, household hazardous wastes, agricultural pesticides and stormwater. The sources are many and varied and the effects are not completely understood.



(Photo: The Standard Times)

Oil Spills: With nearly 2 billion gallons of oil passing through the Cape Cod Canal and Bay each year, Buzzards Bay is in constant danger of a major oil spill. The environment and economy of Buzzards Bay were devastated in 2003 by a spill of an estimated 98,000 gallons of heavy #6 fuel oil by the Bouchard Transportation Company. The April 27th spill - the second largest in the bay's history - took the lives of more than 450 loons and other sea birds, fouled miles of beaches, and contaminated shellfish beds. Much of the Bay's shellfishery remains closed to harvest - now six months after the spill - and the full extent of ecological damage is unknown.

Also of significant danger are the unquantified, unreported, everyday minor oil spills, road runoff, illegally dumped boat bilges, and the contribution from two-stroke marine engines. A 2003 study by the National Research Council reports that the everyday dribs and drabs are just as detrimental to the health of our waters as major oil spills.

New Bedford: New Bedford Harbor is the only harbor in Buzzards Bay that has been seriously damaged by persistent toxic pollution. Between 1940-1975, electronic and other industries polluted the harbor with PCBs and heavy metals. The area remains closed to the taking of finfish and lobsters to this day. Within the past 10 years, some heavily contaminated sediments have been removed, but the removal and containment of less contaminated sediments has been delayed. Still, the ongoing cleanup represents one of the Bay's most promising restoration efforts.

Other Toxics: In 2000, the U.S. EPA reported that over 400,000 lbs. of toxics were released from industries in the Buzzards Bay watershed either through the air, into sewer plants, or through direct discharge. Contaminated groundwater emanating from the Massachusetts Military Reservation in Bourne flows into the Bay only partially treated. Wastewater treatment plants still use toxic chlorine for disinfection (although many are eliminating this practice). And, the quantities and impacts of toxic household cleaners and other materials flushed down the drain are unmeasured.

The toxics score is our best estimate of the state of toxic contamination across all of Buzzards Bay and was heavily influenced this year by the damage caused by the April 27th Oil Spill.

Watershed Health

Forests: 76

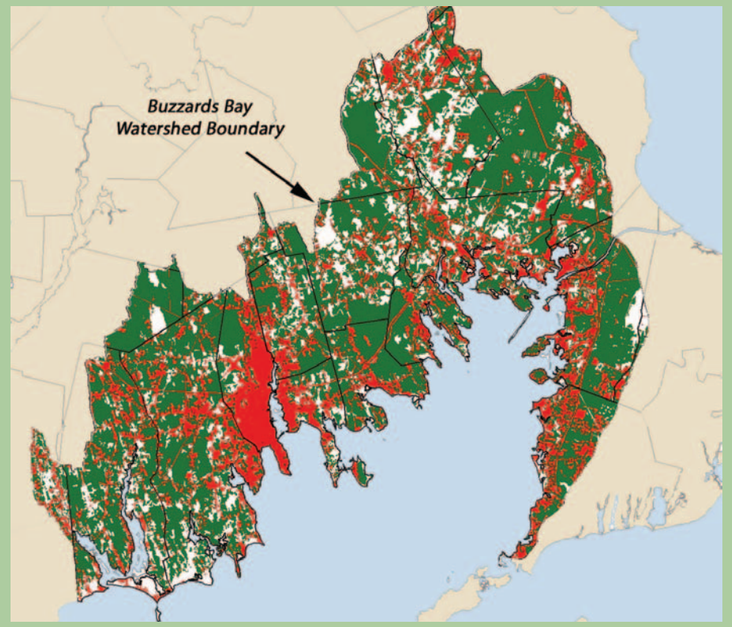
Acre for acre, forests are the most beneficial land use to support a healthy Bay ecosystem. Forests contribute to the Bay's health in a variety of ways. They filter nitrogen pollution and sediment, capture rainfall and regulate streamflow, moderate stream and air temperatures, stabilize erodible soils, and support fish and wildlife habitat.

In 1602, approximately 75% of the watershed was upland forest (the remaining lands being wetlands and small areas cleared for farming by the native Wampanoag). In 1999, according to land use data provided by the Woods Hole Research Center, 153,000 acres, or 76%, of the watershed's original forest coverage remain.

Throughout much of the 20th century, forest cover in the Bay watershed had been increasing as pastures and farm fields cleared at the height of the region's agriculture economy (c.1850) were abandoned. Today, however, forest cover is again on a decline as land is cleared for new development. These losses differ from past forest declines because they represent permanent conversions. It is unknown exactly how much forest land must be preserved in the Buzzards Bay watershed to maintain ecological balance, although scientific findings point to 70% forest cover as an important threshold in similar coastal watersheds. Forest along streambanks and large contiguous blocks are particularly critical in maintaining Bay and freshwater quality.

Today, more than half of the Buzzards Bay watershed remains covered by forests (coverage shown in green), 24% of the land has been developed (shown in red). The white represents lands that are not developed or forested, such as cranberry bogs, open farmlands, and ponds.

Data analysis and map provided by The Woods Hole Research Center.



In the past 30 years, 13% (or 23,000 acres) of our remaining forests have been lost, primarily due to sprawl development.

Streams buffered by trees and other natural vegetation are crucial for filtering harmful pollution before it reaches our waters (Photo by Ed Hebert, www.edhebert.com)

Stream Buffers: 68

Twelve percent of the Bay watershed lies within 200 feet of one of the more than 700 miles of streams that flow into Buzzards Bay. These stream and riverfront lands play the most important role in protecting the region's fresh and coastal water quality.

A stream buffer is an area of natural vegetation (trees, shrubs, and grasses) bordering a freshwater stream or river that protects water quality by filtering pollutants carried by stormwater and groundwater.

In pre-colonial times, when no land had been disturbed along the watershed's streams and rivers it is estimated that 31,000 acres of stream buffer were present. Today, however, 32% of that land has been impacted by human uses, such as development and agriculture. Only 12% of our remaining intact stream buffers have been permanently protected from land development.

Not only are buffers adjacent to streams and rivers important in preventing nitrogen pollution from entering Buzzards Bay, the small streams themselves remove nitrogen. In fact, the smaller the stream, the more quickly nitrogen is removed and the less likely it is to be transported downstream and into Buzzards Bay. Taking greater care to insure that small streams are protected will reduce the overall amount of nitrogen that makes its way to the Bay.

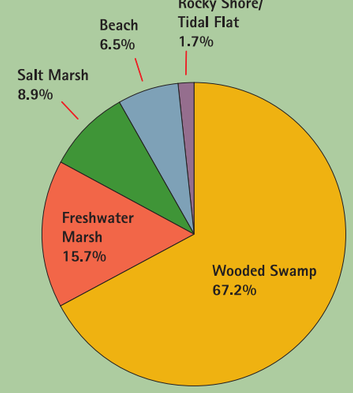
A 200-foot buffer zone was chosen for this report because it represents present scientific consensus on the distance needed for vegetation to remove a significant amount of nitrogen, sediment, and other pollution from water before it reaches a stream or river.

Wetlands: 60

Since pre-colonial times 40% of the wetland coverage in the Buzzards Bay watershed has been filled, drained, or built upon. This figure exceeds the statewide average which has been estimated by the U.S. Fish and Wildlife Service to be a loss of 28% of Massachusetts' wetlands in the past 200 years. The loss of 40% of the watershed's natural wetlands has seriously impaired the Bay's ability to function as a healthy ecosystem. It is vital that all of the Bay's remaining wetlands be protected and that restoration efforts begin to replace lost wetlands.

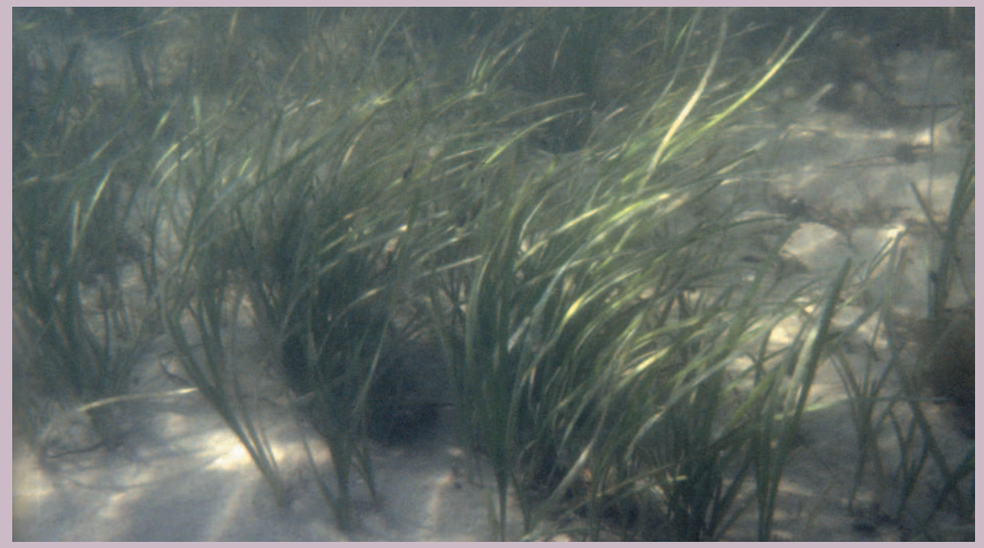
Wetlands is the collective term for salt marshes, wooded swamps, bogs, and freshwater marshes. They are some of the world's most valuable and naturally productive areas, providing water quality improvement, flood control, fish and wildlife habitat, and control of shoreline erosion.

One of the most important values of wetlands is their ability to help maintain and improve the water quality of Buzzards Bay. They are excellent filters, able to absorb as much as 90% of the nitrogen and other pollution generated by human activities and land development before it reaches the Bay.



The distribution of remaining wetlands in Buzzards Bay.

40% of Buzzards Bay's original wetlands have been filled, drained, or built upon.



Healthy eelgrass beds signify clean and healthy water. (Photo by Joseph Costa)

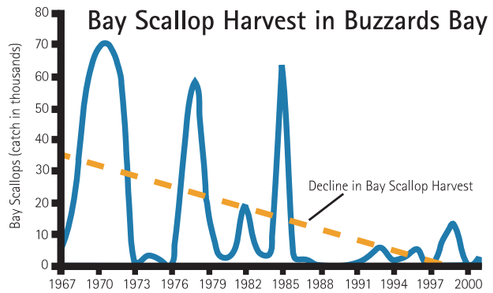
Eelgrass: 34

In 1602 it is estimated that nearly 25,000 acres of eelgrass were growing in Buzzards Bay. The Bay was free from nitrogen pollution and shoreline development. Today, only an estimated 8,000 acres remain. Restoration of eelgrass depends directly on efforts to reduce nitrogen pollution from all sources.

Eelgrass is a rooted underwater plant that forms meadows in areas of excellent water clarity and sunlight penetration. It serves as vital habitat for a broad range of marine life such as bay scallops. In Buzzards Bay, a major cause of eelgrass decline is a result of murky waters created by the excessive growth of algae, which occurs from nitrogen pollution. Due to its close relationship to water clarity, eelgrass serves as an excellent indicator of water quality.

In 1930 eelgrass meadows in the Bay were nearly wiped out due to a "wasting disease." By 1960, much of the eelgrass habitat had recovered from the debilitating disease. However, simultaneously, a new threat began degrading eelgrass habitat – nitrogen pollution. Over 65% of historical eelgrass meadows are gone. However, with improved water quality and restoration, eelgrass can recover.

Bay scallops populations are naturally cyclical. However, the peak abundance of bay scallops over the past 30 years has significantly decreased. Nitrogen pollution and loss of eelgrass meadows are two reasons for this decline.



Bay Scallops: 12

The bay scallop is a highly valuable shellfish that historically has been an important commercial fishery throughout Buzzards Bay. While there is no definitive way to estimate bay scallop populations either in pre-colonial times or today, the MA Division of Marine Fisheries has been documenting the bay scallop harvest in the Bay since 1967. During the past 30 years, there has been a severe decline (almost collapse) in the bay scallop fishery.

Strong bay scallop populations are indicative of clear, pristine waters. Bay scallops are very sensitive to environmental conditions, from water quality to water temperature. Waters polluted by nitrogen choke out eelgrass beds, destroying crucial habitat for settling scallop larvae and thereby hindering the normal development of the bay scallop colonization. Pollution not only destroys the bay scallop's nursery habitat, but also results in the closure of many shellfish beds. The severe decrease in harvest in the past 30 years is indicative of the degradation of the Bay ecosystem as a whole.

As we eliminate pollution and restore eelgrass meadows, bay scallop populations can begin to return to their once abundant levels.

Degradation of the Buzzards Bay ecosystem has caused a severe decline (almost collapse) in the bay scallop fishery.

River Herring: 5

River herring and other anadromous fish species (which are born and spawn in freshwater and live in the ocean) in Buzzards Bay have declined dramatically from their pre-colonial abundance. Fish such as alewives and blueback herring exist at a small fraction of their historic populations and other species once present in Bay rivers such as Shad, Sturgeon, and Atlantic Salmon - have been eliminated.

Throughout Buzzards Bay's history, river herring have been an important food source for people, fish and wildlife. The fate of the Bay's Pollock, Bluefish, Striped Bass, and Squeteague populations are very closely connected to river herring, as are the region's nesting Roseate Terns – a federally endangered species.

The decline of Buzzards Bay's anadromous fish can be traced to the damming of the Bay's rivers, filling of spawning ponds, degradation of water quality, and alterations to pond and river flows. Without a clear freshwater-to-saltwater pathway, population declines today are the result of physical obstacles, more than overfishing.

The Mattapoisett River - consistently one of Buzzards Bay's strongest herring runs – has the best maintained historic record of herring populations. In 1921, state biologists estimated the river's herring run at 1.85 million fish – referring then to this figure as 'depleted' over historic levels. In contrast, between 1998 and 2002, an average of only 93,687 fish per year were counted in the Mattapoisett River and reached Snipatuit Pond for spawning.

Dam construction, stream diversion, and declines in water quality have degraded herring populations to one-twentieth of their historic abundance.

In 1921, there were 1.85 million herring in the Mattapoisett River. The average for the past 3 years is less than 100,000 fish per year.

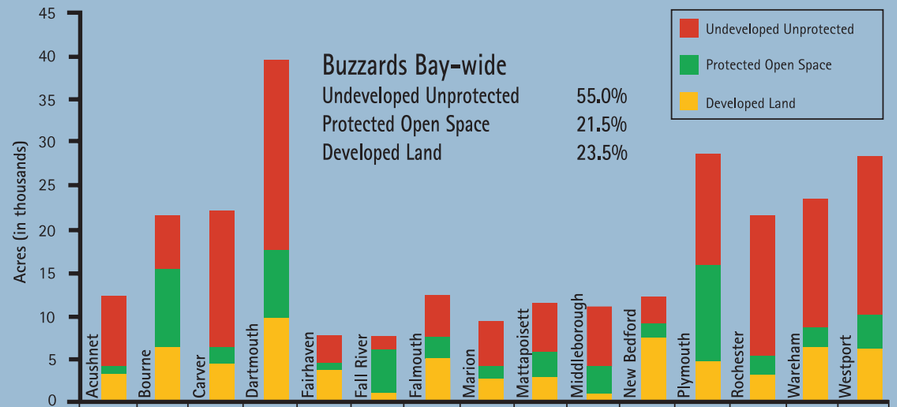
Development Trends Drive Bay Decline

Sprawl development is resulting in the destruction of the Bay's natural filters - our forests and wetlands – and increasing the distribution and volume of pollution throughout the watershed. Prior to the 1950s, most development took place in the region's cities (New Bedford and Fall River), small town centers, and seasonal beach communities, leaving the surrounding rural lands open for agriculture and forest.

By the mid 1950s, a national change in population growth and how we developed land had begun. People began moving out of the Bay's urban and town centers and into residential subdivisions spread out across the watershed's rural landscape. Increasingly, summer cottages were converted into year-round homes. Consequently, today, land is being developed three times faster than the watershed's population is actually increasing. This form of development is known as sprawl.

Walkable, mixed-use neighborhoods have been replaced by low-density, single-use, auto-dependent sprawl developments. Increased septic systems and stormwater run-off from new roads and fertilized lawns in these subdivisions are increasing nitrogen and other pollution in Buzzards Bay.

Large portions of Bay watershed towns still remain undeveloped. How these lands are developed and protected will decide the future of the Bay.



	Acushnet	Bourne	Carver	Dartmouth	Fairhaven	Fall River	Falmouth	Marion	Mattapoisett	Middleborough	New Bedford	Plymouth	Rochester	Wareham	Westport
Undeveloped Unprotected	68.2%	27.9%	73.3%	55.6%	46.4%	23.0%	39.4%	57.9%	51.1%	62.3%	22.9%	45.3%	76.5%	64.1%	69.8%
Protected Open Space	7.3%	44.0%	9.4%	20.4%	13.7%	73.4%	19.1%	17.4%	27.4%	28.7%	13.0%	39.7%	11.2%	10.4%	10.4%
Developed	24.5%	28.1%	17.3%	24.0%	39.9%	3.6%	41.5%	24.7%	21.5%	9.0%	64.1%	15.0%	12.3%	25.5%	19.8%

This represents the distribution of developed land (yellow), protected open space (green), and undeveloped unprotected land (red) for each town in the Buzzards Bay watershed. Only the portion of each town that lies within the Buzzards Bay watershed was included. Data was supplied by The Woods Hole Research Center's analysis of 1999 McConnell Land-use data set and the Buzzards Bay Project National Estuary Program's 2003 Open Space Database.

"More land was developed in southeastern Massachusetts since 1960 than was developed in the previous 350 years. A doubling of land consumption in one generation."

"Southeastern Massachusetts is the fastest-growing region in the state, adding population at three times the state's rate. The nature of the growth is sprawl, consuming open space and farms, demanding new infrastructure investment, and diverting needed resources away from our urbanized areas. It is a change the region is unprepared for."

– Southeastern Regional Planning & Economic Development District

Improving the State of the Bay

Actions Watershed Communities and Citizens Can Take to Restore Bay Health

Growth & Development

Watershed Communities:
- Accelerate open space acquisitions by creating new sources of municipal funds for purchases and through partnerships with land trusts and state agencies.
- Update town Open Space and land use Master Plans. Revise zoning bylaws to implement their recommendations.
- Encourage use of open space or cluster zoning to protect open space in new subdivisions.
- Support statewide efforts to revise the state Zoning Act and Subdivision Control Laws to give towns greater control over new development.

Everyone:
- Get involved in town government, learn about development plans, and support growth management efforts and open space acquisitions.

Nitrogen Pollution

Watershed Communities:
- Create Nitrogen Management Zoning Districts to restore areas already damaged by nitrogen and plan for new growth.
- Designate under Title 5, the state septic system code, nitrogen sensitive areas to require nitrogen-removal technologies.
- Expand use of decentralized community wastewater systems to remediate sewer issues in older neighborhoods and reduce nitrogen pollution in new development.
- Upgrade sewer plants in Fairhaven, Marion, Wareham, and Falmouth to provide nitrogen removal.

Everyone:
- Reduce your use of lawn fertilizers and only use organic products.
- Get involved with volunteer water quality monitoring near you.

Bacterial Contamination

Watershed Communities:
- Remediate existing stormwater discharges to coastal waters and rivers.
- Accelerate efforts to eliminate all Combined Sewer Overflows (CSOs) in New Bedford.
- Investigate and correct illegal sewage connections to stormdrains.
- Encourage use and availability of boat pump-out facilities.

Everyone:
- Replace your old cesspool or any septic system that shows signs of failure.
- Reduce stormwater runoff at home by redirecting downspouts to grassy areas, gardens or dry wells.
- Pick up after your dog and don't feed the geese. Animal wastes on streets and lawns end up in the Bay when it rains.

Toxics

Watershed Communities:
- Reduce industrial toxic sources to Wastewater Treatment Plants and remediate stormwater discharges.
- Participate in regional oil spill prevention and response programs.
- Maintain commitment to cleanup of PCB contamination in New Bedford Harbor.
- Increase public accessibility to household hazardous waste recycle centers.

Everyone:
- Never dump paint, oil, cleaners and other hazardous waste down sinks and storm drains. Take them to hazardous waste recycle centers.

Forests

Watershed Communities:
- Support the acquisition of conservation restrictions on working forests and the creation of large forest bioreserves in southeastern Massachusetts. There is currently no regulatory protection for upland forests in Massachusetts.
- Minimize forest clearing in new developments by limiting building footprints and lawn area.

Everyone:
- Support land trust and town open space acquisition projects in your town.

Wetlands

Watershed Communities:
- Adopt 100-foot no-build setbacks to all wetlands to prevent encroachment and degradation over time. Despite state/local laws, wetlands are still being lost to development in the Bay watershed.
- Participate in opportunities to restore degraded and filled wetlands to their natural state.
- Include protection for isolated wetlands through local wetlands bylaws.

Everyone:
- Respect wetlands on or near your property. Never dump yard wastes in wetlands.

Stream Buffers

Watershed Communities:
- Increase protection for smaller stream buffers under local wetlands bylaws to 200 feet (exceeding the 100 foot minimum provided by the Massachusetts Rivers Act.)
- Focus open space acquisitions to protect streamside areas.

Everyone:
- In you live near a stream, create a buffer by planting native vegetation along the stream's edge.

River Herring

Watershed Communities:
- Accelerate dam removal and fish ladder improvements on herring rivers.
- Closely monitor water withdrawals by municipal drinking water wells and cranberry bogs to prevent low-flow conditions from harming herring runs.
- Expand monitoring of herring runs. Today, only the Mattapoisett & Sippican Rivers are consistently monitored.

Everyone:
- Observe local herring regulations and support town and state efforts to improve fish passage.

Eelgrass & Bay Scallops

Watershed Communities:
- Reduce nitrogen pollution, maintain forested buffers and remediate stormwater discharges to improve water quality needed to support eelgrass beds and healthy bay scallop populations.
- Support physical restoration efforts to jump-start eelgrass and scallop recovery in areas of good water clarity.

Everyone:
- Avoid eelgrass and respect No Wake zones when boating to prevent destruction of sensitive beds and suspension of sediments.
- Get involved with natural resource restoration efforts near you.