

BUZZARDS BAY PROJECT

FACT SHEET

#1

BACTERIAL CONTAMINATION OF SHELLFISH

Buzzards Bay has always been a fertile growing area for shellfish such as quahogs, clams, scallops and oysters. These species are harvested commercially and recreationally and contribute an estimated \$6.6 million in landed value annually for the region's economy¹.

In the last decade, however, shellfishing in much of Massachusetts and Buzzards Bay has suffered because of water pollution problems. Since 1980, the total number of closed shellfish beds in Massachusetts has increased 30%. This translates as a total economic loss of about \$94.5 million annually for the state². In New Bedford alone, shellfish closures account for an estimated \$22 million economic loss each year³.

Coastal Development

Increased closures correlate with increased development of coastal property. The 1970s marked the beginning of a housing boom along the coast of Massachusetts. As demonstrated by the table below, there has been a dramatic increase in the number of building permits issued in the towns bordering Buzzards Bay during the last eight years. Over 95% of these permits resulted in either new home construction or additions to already existing ones. Although the acreage varies in each housing permit issued, these figures show how rapidly new

developments are dotting the coastline of Buzzards Bay.

Coastal development exacerbates or causes water pollution problems because development increases the amount of pathogens and fecal coliform in surface water runoff entering the Bay either through point or non-point sources, and these inputs result in shellfish bed closures. Fecal coliform bacteria is the indicator used to determine whether or not shellfish are safe to harvest. Examples of these coliform sources are:

Point-Source Pollution

industrial drain pipes
municipal treatment plants
storm drains

Non-Point Source Pollution

stormwater runoff
septic systems
discharges from boats
agricultural runoff
waterfowl and animal wastes

Number of Building Permits Issued in the Past Eight Years

Town	Number of Housing Unit Permits Issued*		
	1980	1987	1980-87
Acushnet	33	66	323
Dartmouth	311	193	1306
Fairhaven	11	30	392
Marion	13	40	241
Mattapoisett	20	73	338
New Bedford	19	702	1751
Rochester	19	28	305
Wareham	26	258	905
Westport	44	88	405
TOTAL	496	1478	5966

*Figures supplied by SRPEDD

A 1986 study of closed shellfish areas in 5 regions south of Boston showed that point sources of pollution were responsible for 51% of shellfish bed closures on the west shore of Buzzards Bay while non-point sources were responsible for 87% of closures on Cape Cod and the Islands⁴.

Fecal Coliform Bacteria

Because of the scores of pathogens associated with human sewage and the difficulties and expense involved in testing for these disease-causing agents, indicator organisms have been used since the 1920s to assess the public health risk. The current indicators are fecal coliform bacteria, a group of microorganisms that live in the intestines of warm-blooded animals. Although some forms of fecal coliform can cause disease, most are not pathogenic; in fact, they are abundant in our intestines. Because fecal coliform are so abundant in human waste, their presence in water can serve as a warning that harmful bacteria or viruses from wastes of humans or other animals may also be present in the water.

Acceptable Number of Fecal Coliform Colonies per 100 Milliliters of Water

For swimming areas --
less than 200

For shellfishing areas --
less than 14

The reason the acceptable number of fecal coliform is so much smaller for shellfishing is because shellfish are capable of bioaccumulating the bacteria in their tissues (up to 10 times what is found in the water!), hence the standard is very stringent for shellfishing. State agencies concerned about public health account for this concentration factor in setting bacteriological standards.

How Shellfish Become Contaminated

Shellfish feed by filtering seawater with their gills. The cilia on the surface of the gills catch food particles such as plankton and pass them to their stomach and intestines. Bacteria attached to these particles are also ingested and accumulate in the organism's tissues. If the shellfish are transferred to clean waters, they will purge themselves of the contaminants (depurate), taking advantage of their built-in pumping device. The transfer of contaminated shellfish to clean water is called relaying and the Massachusetts Division of Marine Fisheries authorizes and monitors this practice.

Contaminated shellfish must depurate for at least three months and through a spawning season before they are allowed to be transferred back to open beds. This system is only in place for depurating shellfish tainted with bacteria; metals and organics persist for a long time and shellfish exposed to these contaminants are treated differently by regulatory agencies.

From the Oyster, Quahog and Clam Bed to the Consumer

Shellfish beds are classified according to the level of contaminants in growing areas. In Massachusetts waters, there are 365 shellfish harvesting areas. Currently, 111 are closed, or prohibited, 254 are approved on a restricted basis and 1 is conditionally approved. Once the state classifies an area as approved, control then reverts to the town which in turn opens an area to shellfishing. The following is a list of the state-mandated criteria on which shellfish beds are classified⁵.

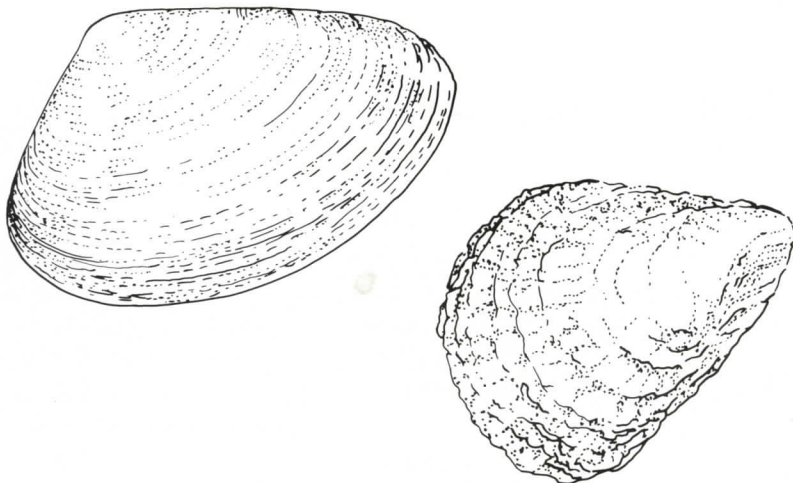
Shellfish Bed Classifications

Approved

Any growing area that does not contain pathogenic bacteria, fecal material or poisonous substances in dangerous concentrations. Shellfish can be harvested recreationally and commercially.

Conditionally Approved

Any growing area that is subject to intermittent microbiological pollution. Shellfish can be harvested only under certain specific conditions.



Restricted

Any growing area that indicates a limited degree of pollution. Shellfish are moderately contaminated and can be harvested by specially-licensed diggers for purification at the state-operated depuration plant.

Conditionally Restricted

Any growing area that is subject to intermittent microbiological pollution. Shellfish may be harvested in times when bacterial contamination is predictably low.

Prohibited

Any growing area that is closed to the harvesting of shellfish at all times. Shellfish cannot be harvested under any circumstance.

Coliform levels in water are checked routinely so that shellfish are harvested only from clean waters or are sent to clean waters to depurate before they are sold to the public. A system for tracing shellfish from the point of harvest to the marketplace has been implemented by state agencies to ensure public health safety. Typically, it works like this:

The Digger Harvests Shellfish

Sells to Retailer

Retailer makes records of place harvested, the fisherman's name, the dealer's name and location. Retailer tags the purchase by attaching an identifying transaction seal. This seal is used in any subsequent transactions so it can be traced to the original owner.

Sells to Wholesaler

Wholesaler keeps records of the fisherman's name and location as well as his/her own on any subpackaging that is done.

Spotchecks, a form of market sampling, are done routinely by State and Federal authorities to ensure that the shellfish tissues for sale do not have coliform levels exceeding U.S. FDA standards (230 fecal coliform per gram of tissue). If they do, the transaction seal number is used to trace the shellfish back to the originating bed or harvest area. Investigations ensue to find out if the shellfish were harvested from illegal areas.



Facts and Figures

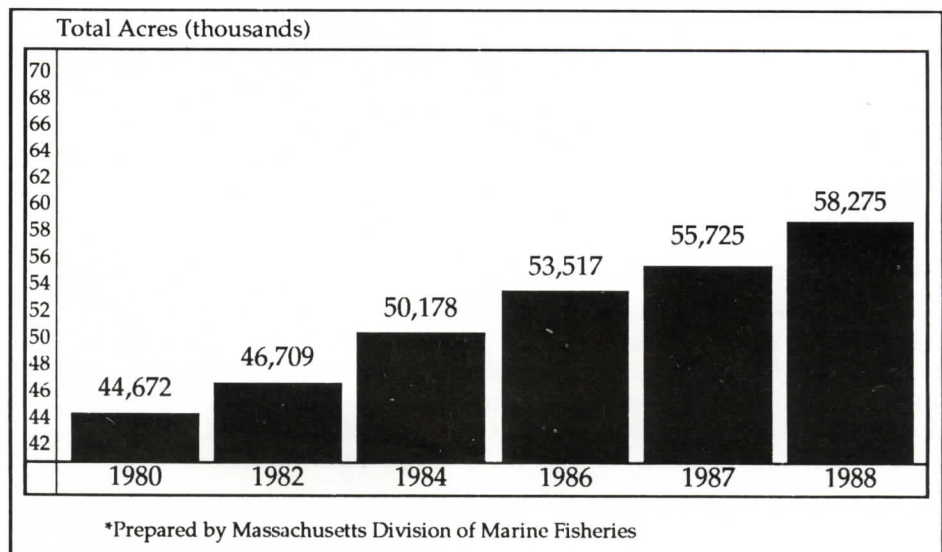
Total Available Acreage under Commonwealth Jurisdiction
(3 miles inshore) - 800,000 acres

Total Acreage of Shellfish Beds
Currently Closed

- In Massachusetts:
60,000 acres (91 square miles)

Acreage Closed to Shellfishing*

Total for Massachusetts' Waters

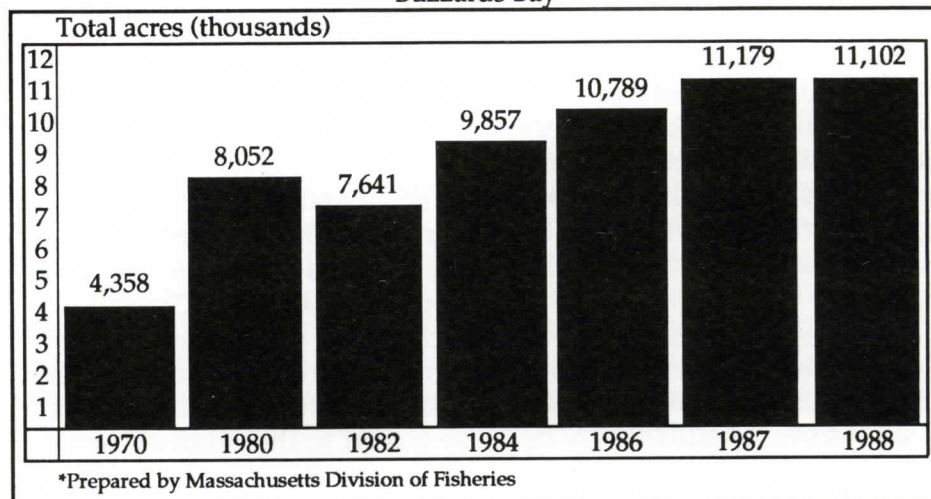


Total Acreage of Shellfish Beds Currently Closed

- In Buzzards Bay: 12,297 acres
- In Acushnet: 59;
- In Bourne: 665;
- In Dartmouth: 1701;
- In Fairhaven: 4480;
- In Falmouth: 180.1;
- In Gosnold: 113.4
- In Marion: 42;
- In Mattapoisett: 165;
- In New Bedford: 4168;
- In Wareham: 325;
- In Westport: 670;

Acreage Closed to Shellfishing*

Buzzards Bay



References Cited

1. Boston University Marine Program. *Shellfish in Buzzards Bay: A Resource Assessment*, Woods Hole, Massachusetts, June 1987.
2. Hickey, Michael. *Comments to the Subcommittee on Fisheries and Wildlife Conservation and the Environment, Concerning Shellfish Contamination*, Division of Marine Fisheries, September 26, 1988. AND personal communication.
3. Conservation Law Foundation of New England. *Lost Harvest: Sewage, Shellfish and Economic Losses in the New Bedford Area*, Boston Massachusetts, January 1988.
4. Hickey, Michael. *Comments to the Subcommittee on Fisheries and Wildlife Conservation and the Environment, Concerning Shellfish Contamination*, Division of Marine Fisheries, September 26, 1988.
5. U.S. Dept. of Health and Human Services, Food and Drug Administration, and Dept. of Public Health. *National Shellfish Sanitation Program Manual of Operations*, Part 1, Sanitation of Shellfish Growing Areas, Washington, D.C. 1988.



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