



Has the acreage of open shellfish beds in Casco Bay changed over time?

CBEP Goal: Open and protect shellfish areas impacted by water quality.

Why Is Open Shellfish Bed Acreage Important?

For many residents and commercial diggers around Casco Bay, shellfish harvesting is both an important tradition and livelihood. Soft-shell clams (*Mya arenaria*), blue mussels (*Mytilus edulis*), quahogs (*Mercenaria mercenaria*), and other species provide significant economic benefits to the region. Some sheltered coves also present optimal conditions for shellfish aquaculture. In most parts of the Bay, determination of whether mudflats and other shellfish areas are open to harvest depends on the degree and extent of fecal pollution, which is assessed by monitoring representative fecal coliform bacteria levels. Tracking changes to shellfish management area classifications leads to knowledge of the levels of fecal bacteria in the Bay, which adds to an understanding about the Bay's current water quality.

Status and Trends

The National Shellfish Sanitation Program (NSSP), directed by the U.S. Food and Drug Administration and administered locally by the Public Health Division of the Maine Department of Marine Resources (DMR), determines the water quality standards that shellfish areas must meet to ensure that shellfish product falls within public health thresholds for human consumption. Under the NSSP, DMR classifies shellfish areas as prohibited, restricted, conditionally restricted, conditionally approved, or approved based on an assessment of the risks of illness. Each management area's status is determined by several criterion such as proximity to private or municipal wastewater treatment facilities; recent heavy rains (which can wash pathogens and other pollutants into the Bay); the presence of high levels of fecal bacteria; dangerous red tide levels; toxic substances in sediments; or a



Mike Timberlake

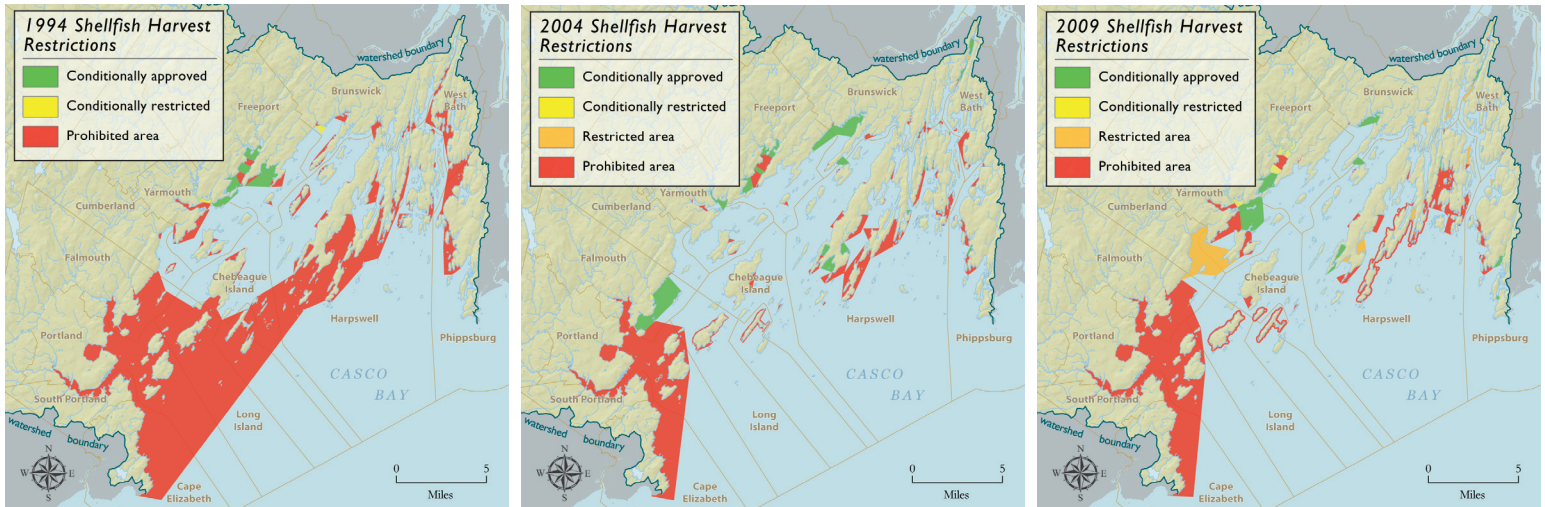
combination of the above. In Casco Bay, most shellfish bed closures occur due to the presence of anthropogenic sources of fecal bacteria carried in stormwater runoff, and fecal bacteria associated with human waste from malfunctioning septic systems, release of treated and untreated sewage from boats, combined sewer overflows, and overboard discharges.

Local, state, and federal agencies have taken important steps to reduce fecal pollution inputs to Casco Bay by removing overboard discharges, eliminating combined sewer overflows, and designating Casco Bay as a No

Discharge Zone. Nonetheless, fecal bacteria counts persist at elevated levels in many areas, resulting in widespread restrictions on harvesting shellfish. In 2009, shellfish harvesting remained prohibited throughout much of southern Casco Bay, including but not limited to, the Fore River/Portland Harbor, Back Cove, the Presumpscot Estuary, Peaks Island, Great Diamond Island, Mussel Cove, and the Royal River estuary. Much of Broad Cove, along with most of the



Brad Lauster

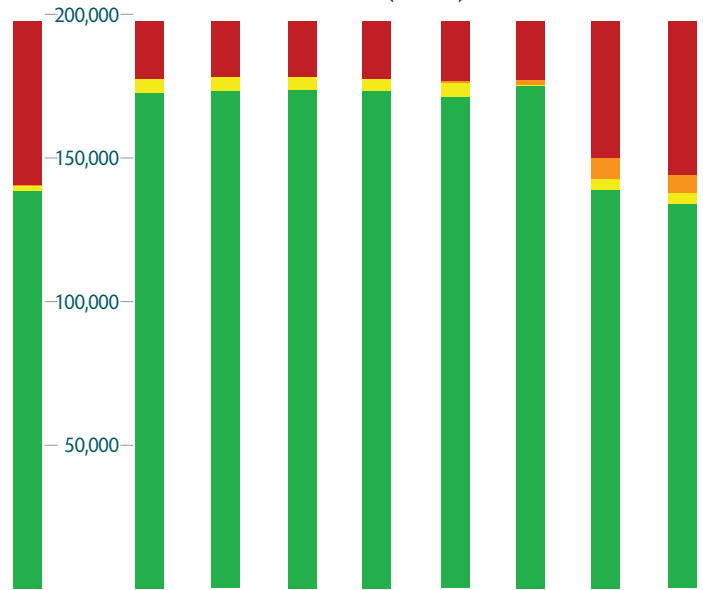


Shellfish Management Area classification status in 1994, 2004, and 2009. The 1994 and 2004 data were presented in the 2005 *State of the Bay* report. Although the maps show a dramatic reduction in prohibited area from 1994 to 2004, much of the change is attributed to closure lines being re-drawn to fit the shoreline of affected islands. Note: DMR did not use 'restricted' as a classification until 2000–2002. Data: Maine DMR

waters around Cousins Island, was classified as either restricted or prohibited in 2009. In eastern Casco Bay, Quahog Bay and Ridley Cove were classified as prohibited, along with sections of Sebasco Harbor and Small Point Harbor. Notable classification improvements between 2004 and 2009 occurred in the upper and lower New Meadows, and in sections of Maquoit Bay.

From 2007 to 2008, a shift in the proportion of open to closed shellfishing areas took place. The total area classified as prohibited more than doubled from 20,441 acres to 47,421 acres, while the total area classified as approved or conditionally approved area fell from 174,761 acres to 138,575 acres. Between 2004 and 2009, the total area classified as restricted increased sharply from 57 acres to 6,416 acres. Those shifts represent administrative changes in NSSP guidance, as well as in actual water quality changes. The increase in prohibited area can be attributed to a number of factors including: expanded closures around sewage treatment plant outfalls to ensure adequate dilution of effluent; the expiration of required sanitary surveys along the shoreline; and prioritization of commercial digging sites. The increase in restricted area reflects changes to NSSP standards. Areas that are affected by nonpoint source pollution, and which do not meet approved standards, are now classified as restricted, reflecting the fact that nonpoint source pollution is having a bigger impact on shellfish areas than in past years. Although the increase can be partially attributed to high rainfalls in

Change in Casco Bay Shellfish Management Area Status 1994–2009 (Acres)



Status of Shellfish Flats	1994	2002	2003	2004	2005	2006	2007	2008	2009
Prohibited	57,020	20,014	19,260	19,174	19,908	20,845	20,441	47,421	53,356
Restricted	224	57	57	57	170	489	1,619	7,272	6,416
Conditionally Restricted	1,865	4,893	4,796	4,732	4,236	5,202	538	4,091	3,668
Approved or Conditionally Approved	138,250	172,395	173,245	173,395	173,045	170,823	174,761	138,575	133,919

Data: Maine DMR

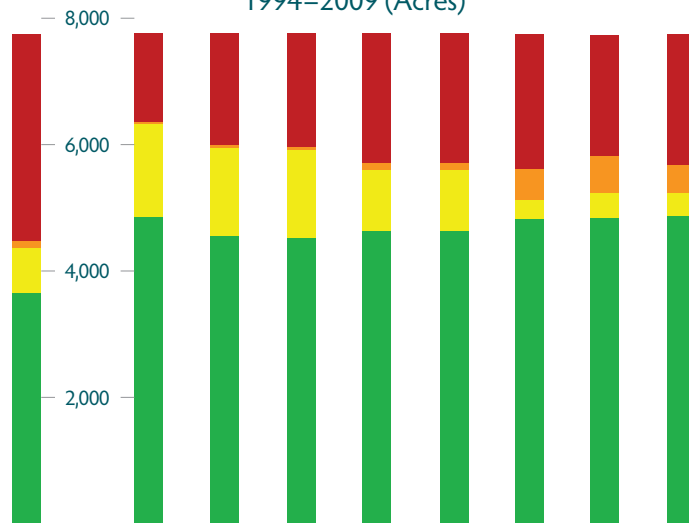
2008 and 2009, intensive development of coastlines and subwatersheds is a contributing factor.

Shellfish management areas are much larger than actual harvestable digging sites. Although tracking changes in the classification of entire management areas is a useful way to illustrate the extent of fecal pollution in Casco Bay, the scale does not accurately convey the specific impact that



classification changes have on where harvesters can dig for shellfish. To understand how classification has affected Casco Bay’s most important shellfish industry, it is useful to review classification changes as they pertain specifically to mapped softshell clam digging areas. At that scale, classification trends are less pronounced. Although clam flats classified as prohibited increased from 1,774 acres in 2004 to 2,040 acres in 2009, an increase of 15 percent, there was a simultaneous increase in combined open (approved) and conditionally approved acreage from 4,504 acres in 2004 to 4,843 acres in 2009, a 7.5 percent increase. The area of clam flats classified as restricted increased from 49 acres in 2004 to 442 acres in 2009. Again, the impact of increased nonpoint source pollution on shellfish harvesting is evident. Consequently, nonpoint source pollution adjacent to shellfish harvesting areas is a topic of growing concern among state and local shellfish managers.

Change in Casco Bay Softshell Clam Bed Status 1994–2009 (Acres)



Status of Softshell Clam Beds	1994	2002	2003	2004	2005	2006	2007	2008	2009
Prohibited	3,233	1,376	1,749	1,774	2,033	2,301	2,107	1,897	2,040
Restricted	105	49	49	49	103	218	480	581	442
Conditionally Restricted	704	1,450	1,368	1,382	965	1,005	298	392	364
Approved or Conditionally Approved	3,644	4,832	4,542	4,504	4,607	4,186	4,805	4,819	4,843

Data: Maine DMR

Solution and Actions

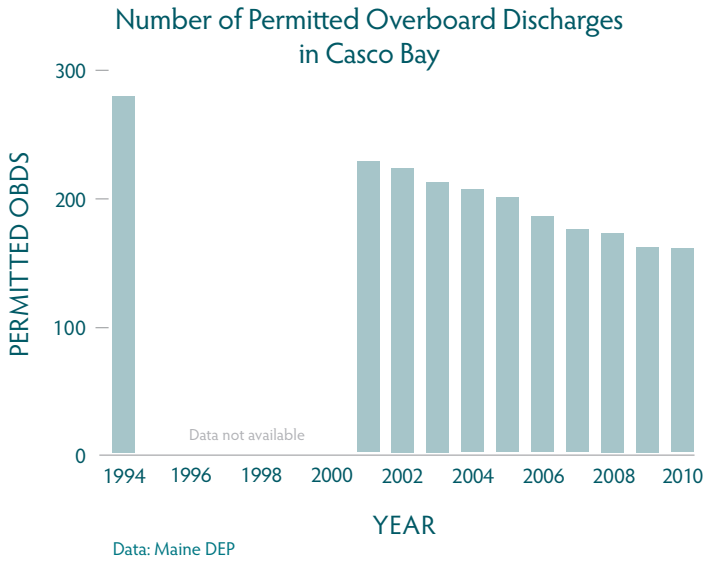
Overboard Discharge System Elimination

Between 1974 and 1987, Maine DEP regulations allowed treated, chlorinated overboard discharge systems (OBDs) to be built as a replacement for “straight pipes” or as an alternative to conventional inground septic systems. By 1987, nearly 400 OBDs had been installed in towns surrounding Casco Bay. Coastal buildings without access to publicly owned treatment facilities, or the ability to install septic systems due to poor soil conditions or small lot sizes, often had no other choice, because underlying ledge leaves little room for proper function and operation of leach fields. Since OBDs require consistent maintenance, they are considered by state and federal regulators to be a source of fecal bacteria, leading to mandatory prohibition of shellfish harvesting in adjacent areas. OBDs constitute a major cause of Casco Bay’s shellfish management area closures.

To address that ongoing cause of shellfish closures, towns are working closely with DEP and DMR and continue to seek ways to remove and replace OBDs, particularly those located near productive shellfish resource areas. As a result, the number of permitted OBDs has declined by about half since 1995. Since 2004, despite a shortage of low-interest state loans to assist with removal and replacement costs, the



Data: Maine DEP



Harvesting clams in Harpswell.

Peter Taylor

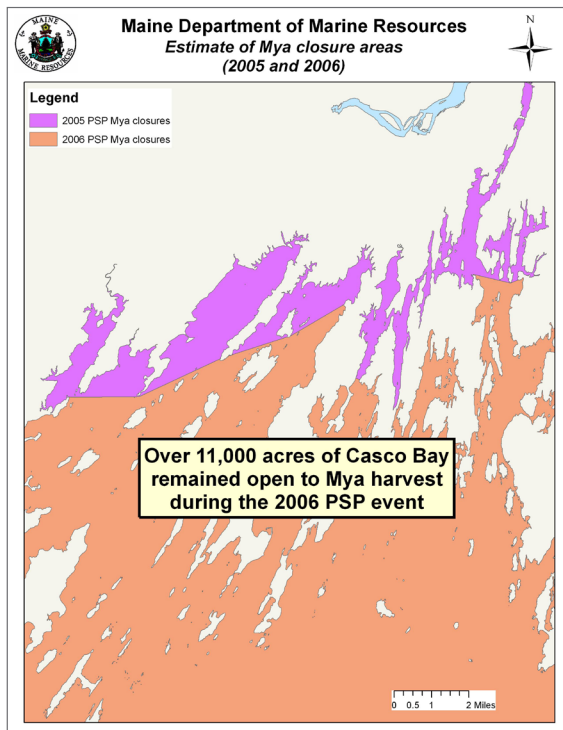
Town of Harpswell has been successful in securing and utilizing Community Development Block Grant funds to replace OBDs by making a strong case for the economic development benefits of opening shellfish areas that have long been closed to harvest. Between 2001 and 2009, Harpswell eliminated 37 OBDs along its 150 mile coastline.

Red Tide

Harmful algal blooms of *Alexandrium fundyense*, also known as red tide, produce a biotoxin that accumulates in clams and other shellfish, and can lead to paralytic shellfish poisoning (PSP) if consumed. PSP-related closings have had a severe impact on Casco Bay’s shellfish harvest since

2005, when an intense and prolonged red tide closed shellfish areas to harvest for weeks at a time, producing record levels of toxicity, and resulting in a disaster declaration for affected areas.

Since red tide was expected to continue for several years following the 2005 event, the Casco Bay Clam Team worked closely with Maine DMR to better understand red tide, and to enable finer-scale management of shellfish areas during red tide events. The 2006 pilot program created 43 new sampling stations which – along with the three DMR already had in place – provided comprehensive information about the extent and severity of red tide in Casco Bay. The additional data enabled continuation of shellfish harvesting in some near-shore flats, despite ongoing red tide blooms off shore. As a result of the pilot program, more than 11,000 acres of shellfish management area that had been ordered closed in 2005 remained open during the entire red tide event in 2006. Based on the success of the pilot program, DMR has maintained the new monitoring protocol in Casco Bay, and applied the approach to other areas of the state. (For additional information about red tide, see Section 3: Water Quality.)



References

Casco Bay Estuary Partnership. 2005. *State of the Bay*. <http://www.cascobay.usm.maine.edu/sotb05.html>

Maine Department of Environmental Protection. 2004. *DEP Fact Sheet – Summary of Laws Pertaining to Overboard Discharges*. <http://www.maine.gov/dep/blwq/docstand/OBD/obdlaw.pdf>

Maine Department of Environmental Protection. 2010. *DEP Google Earth Interactive Maps - Overboard Discharges*. http://www.maine.gov/dep/gis/datamaps/LAWB_OBD/LAWB_OBD.kmz (June 2010)

Maine Department of Environmental Protection. 2010. Unpublished data.

Maine Department of Marine Resources. 2010. Unpublished data.

U.S. Food and Drug Administration. 2007. *Guide for the Control of Molluscan Shellfish*. <http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FederalStatePrograms/NationalShellfishSanitationProgram/ucm046353.htm>