2015 State of the Bay Summary Flyer

Casco Bay Estuary Partnership

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Casco Bay encompasses more than 200 square miles bordering Maine’s largest metropolitan area. While only 3 percent of the state’s total land mass, the Bay’s watershed holds roughly 18 percent of its population and includes portions of 48 municipalities.

The Casco Bay Estuary Partnership (CBEP) mobilizes collective action to strengthen the Bay’s ecological and economic vitality, fostering a shared commitment to Casco Bay. It focuses scientific expertise and financial resources on helping watershed communities address regional challenges such as water pollution, habitat degradation and climate adaptation.

Since Casco Bay was named an “estuary of national significance” in 1990, CBEP has served as a convener and information hub—engaging individuals, organizations and government agencies in shared actions to sustain Casco Bay. CBEP is one of 28 community-based partnerships that participate in the National Estuary Program of the US Environmental Protection Agency.

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State of the Bay 2015

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State of the Bay 2015, summarized here and detailed online at www.cascobayestuary.org/state-of-the-bay-2015, reveals a complex array of factors shaping the ecology and economy of the Casco Bay region. There’s a mix of encouraging news, interspersed with unsettling trends. The warming climate represents a vast and unpredictable driver of regional change—with hotter oceans and air temperatures, more frequent and extreme precipitation and rising seas (already evident in flooding at extreme high tides).

Indicators used in the past (and included in the 2015 report) do not fully account for the dynamic interplay of forces currently at work on Casco Bay. Future reports will include new indicators to help gauge the pace and impacts of far-reaching change.

State of the Bay 2015

Cover map of Casco Bay created by MollyMaps for the Envisioning Change Project (esealevelchange.org)
This document has been funded by the US Environmental Protection Agency under Cooperative Agreements #CE96185501 and #CE96190301 with the University of Southern Maine.
Researchers Anticipate Increased Climate Stressors
Regional air temperatures have increased for decades, and could rise between 2° and 6°F by mid-century. Since the mid-1800s, Casco Bay’s average water temperatures have increased about 3°F and the latest data (2015) of the Maine Climate Change Response Program indicate that the Gulf of Maine is experiencing higher annual precipitation and more frequent extreme precipitation events. The Maine Geographic Survey currently estimates that Casco Bay will experience a 2°-4°F rise in sea level by 2100. According to a Maine Legislative Commission report, ocean acidification is taking place at a rate at least 100 times faster than natural rates. Oceanic acidification, in which the impact of atmospheric CO2 is aggravated by degraded water quality, is also increasing. Casco Bay’s first comprehensive acidification monitoring station was established in May 2015.

Spreading Invasive Species Disrupt Ecosystems and Fisheries
Non-native marine organisms are well established in Casco Bay, with some now among its most widespread species. The common periwinkle was introduced from Europe more than a century ago, and is now one of the most abundant invertebrates in the Bay. European oysters are abundant, and non-native colonial tunicates (like the bright orange chain tunicate) grow throughout the Bay and foul fishing gear. While Casco Bay’s salt marshes remain relatively pristine, on the open water the Bright Shrimp, Hairy Crab, and European rock shrimp that were not seen in surveys a decade ago. Species introductions are spread among 20 introduced species between the two sites. An additional 11 species were of uncertain origin, and may be introduced. Since 2000, scientists have conducted regional rapid assessment surveys throughout the Northeast roughly every three years. Data gathered at ten Casco Bay sites in 2013 found 20 introduced species at seven of the sites. An several specific species were of uncertain origin, and may be introduced. Recent surveys revealed the presence of several new invaders such as the Asian snail crab and the Chinese mitten crab, which are not seen in surveys a decade ago. Recognizing the need for a rapid and coordinated response, CREP convened a series of meetings in 2013 and 2014 that generated the first effort to systematically test the ability to move within this network, nearly eliminating barriers that exist to life stages of aquatic species. A 2013 pilot study was launched to identify suitable sites for large-scale eelgrass restoration, gauge the impact of atmospheric CO2 is aggravated by degraded water quality, and possibly test long-term decline in water clarity. As tidal conditions and stream flow conditions change, more invasive species could be introduced. The watershed’s network of rivers, streams and lakes historically supported large populations of migratory fish, including sockeye salmon, Atlantic salmon, Atlantic halibut, and Atlantic cod. The region’s population grew over the past decade at a slow but steady pace. Between 1996 and 2010, the watershed’s forested land area increased by 2,500 acres (18,960 acres) in 2015. Regional air temperatures have increased for decades, and could rise between 2° and 6°F by mid-century. Since the mid-1800s, Casco Bay’s average water temperatures have increased about 3°F and the latest data (2015) of the Maine Climate Change Response Program indicate that the Gulf of Maine is experiencing higher annual precipitation and more frequent extreme precipitation events. The Maine Geographic Survey currently estimates that Casco Bay will experience a 2°-4°F rise in sea level by 2100. According to a Maine Legislative Commission report, ocean acidification is taking place at a rate at least 100 times faster than natural rates. Oceanic acidification, in which the impact of atmospheric CO2 is aggravated by degraded water quality, is also increasing. Casco Bay’s first comprehensive acidification monitoring station was established in May 2015.

Eelgrass Beds Decline as Green Crab Numbers Explode
A seagrass that forms extensive intertidal and subtidal beds, eelgrass provides food for migratory winter waterfowl and nursery habitat for fish and shellfish. Casco Bay has traditionally had abundant eelgrass beds, but a 2013 aerial survey verified that the Bay had lost more than half of the eelgrass beds evident a decade earlier (due, in part, to clipping and uprooting of vegetation by the invasive Green Crab). Recognizing the need for a rapid and coordinated response, CREP convened a series of meetings in 2013 and 2014 that generated the first effort to systematically test the ability to move within this network, nearly eliminating barriers that exist to life stages of aquatic species. A 2013 pilot study was launched to identify suitable sites for large-scale eelgrass restoration, gauge the impact of atmospheric CO2 is aggravated by degraded water quality, and possibly test long-term decline in water clarity. As tidal conditions and stream flow conditions change, more invasive species could be introduced. The watershed’s network of rivers, streams and lakes historically supported large populations of migratory fish, including sockeye salmon, Atlantic salmon, Atlantic halibut, and Atlantic cod. The region’s population grew over the past decade at a slow but steady pace. Between 1996 and 2010, the watershed’s forested land area increased by 2,500 acres (18,960 acres) in 2015. Regional air temperatures have increased for decades, and could rise between 2° and 6°F by mid-century. Since the mid-1800s, Casco Bay’s average water temperatures have increased about 3°F and the latest data (2015) of the Maine Climate Change Response Program indicate that the Gulf of Maine is experiencing higher annual precipitation and more frequent extreme precipitation events. The Maine Geographic Survey currently estimates that Casco Bay will experience a 2°-4°F rise in sea level by 2100. According to a Maine Legislative Commission report, ocean acidification is taking place at a rate at least 100 times faster than natural rates. Oceanic acidification, in which the impact of atmospheric CO2 is aggravated by degraded water quality, is also increasing. Casco Bay’s first comprehensive acidification monitoring station was established in May 2015.

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Bob Travis

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Survey currently estimates that Casco Bay will experience a 2- to 4-foot rise in sea level by 2100. Researchers Anticipate Increased Climate Stressors

Researchers have been tracking water quality in Casco Bay for more than 60 years. Elevated Lead and PAHs Found in Some Shellfish Samples

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Regional air temperatures have increased gradually for decades, and could rise between 2° and 6°F by mid-century. Since the mid-1990s, Casco Bay's average water temperatures have increased about 3°F. The 2013 update of the Maine Climate Change Action Plan predicted that the main Bay is experiencing higher annual precipitation and more frequent extreme precipitation events. The Maine Geologic Survey currently estimates that Casco Bay will experience a 3- to 4-foot rise in sea level by 2100. According to a Maine Legislative Commission report, ocean acidification is taking place at a rate at least 10 times faster than at any time in the last 5 million years. Ocean acidification, in which the impact of atmospheric CO2 is aggravated by degraded water quality, is also increasing. Casco Bay's first comprehensive acidification monitoring station was established in May 2015.

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The Casco Bay watershed's network of rivers, streams and lakes historically supported large populations of migratory fish, including shad, blueback herring and alewife. Roads, dams and other structures that eliminate populations of several species.

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Spreading Invasive Species Disrupt Ecosystems and Fisheries
Non-native marine organisms are well established in Casco Bay, with some now among its most widespread species. The common periwinkle was introduced from Europe more than a century ago, and common periwinkles (like the bright orange chain tunicate) grow throughout the Bay and foul fishing gear. European green crabs, introduced from Europe near the end of the 19th century, are now abundant in Casco Bay, and are consuming local population of the native European rock shrimp that were not seen in surveys a decade ago. Since 2000, scientists have conducted regional rapid assessment surveys throughout the Northeast roughly every three years. Data gathered at ten Casco Bay sites in 2013 found 20 introduced species at the two sites. An average of eight species were of uncertain origin, and many introductions are ongoing. Recent surveys revealed the presence of several new invaders such as the Asian shore crab and the Chinese mitten crab, both of which are considered invasives in Casco Bay. The Chinese mitten crab’s population continues to grow as it invades Casco Bay.

Eelgrass Beds Decline as Green Crab Numbers Explode
A decade-long study found that Casco Bay’s eelgrass beds, but a 2013 aerial survey confirmed that the Bay had lost more than half of the eelgrass beds evident a decade earlier (due, in part, to clipping and uprooting of vegetation by the invasive European green crab). In 2013 and 2014 that sparked formation of a broad partnership focused on eelgrass conservation. In 2013, Casco Bay’s eelgrass biomass remained generally good, but acidification is a concern, along with moderately high winds, increasing water temperatures, and a possible long-term decline in water clarity. Casco Bay’s eelgrass beds declined roughly every three years. Data gathered at two Casco Bay sites in 2013 found 20 introduced species at the two sites. An average of eight species were of uncertain origin, and many introductions are ongoing. Recent surveys revealed the presence of several new invaders such as the Asian shore crab and the Chinese mitten crab, both of which are considered invasives in Casco Bay. The Chinese mitten crab’s population continues to grow as it invades Casco Bay.

Work to Remove Barriers Progresses Slowly
The watershed’s network of rivers, streams and lakes historically supported large populations of migratory fish. Chickens, blueback herring and alewives. Roads, dams and other structures that disrupt natural stream processes have long required their ability to move within this network, nearly eliminating many species that were able to disperse (in the past relatively easier to do). As stated in 2013, a joint study was launched to identify suitable sites for large-scale eelgrass restoration, gauge effective eelgrass transplant methods, and determine which environmental factors contribute to restoration success.

Conserved Lands More Than Triple over Two Decades
The total acreage of permanently protected lands in the Casco Bay watershed increased from 18,960 acres in 2000 to 33,550 acres (18,960 acres) in 2015. Conservation District confirms that winter salt degrades the health of urban waters, increasing water temperatures, and a possible long-term decline in water clarity. Casco Bay’s eelgrass beds declined roughly every three years. Data gathered at two Casco Bay sites in 2013 found 20 introduced species at the two sites. An average of eight species were of uncertain origin, and many introductions are ongoing. Recent surveys revealed the presence of several new invaders such as the Asian shore crab and the Chinese mitten crab, both of which are considered invasives in Casco Bay. The Chinese mitten crab’s population continues to grow as it invades Casco Bay.

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