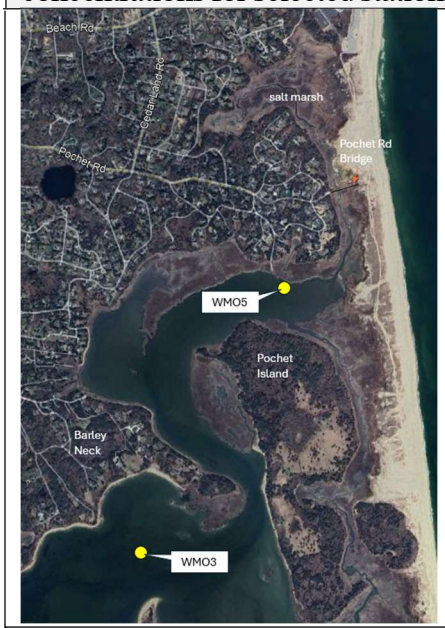
Pochet/Pleasant Bay

Orleans, MA

2001-2023 Water Quality Summary

Estuary Setting

The Pochet portion of Pleasant Bay is located between Pochet Island and Barley Neck and includes a salt marsh located north of Pochet Neck Road. Pleasant Bay is shared between Orleans, Brewster, Harwich, and Chatham and is connected through a dynamic inlet along a barrier beach to the Atlantic Ocean. The location and size of the inlet(s) have a large impact on water quality. During the 2006 Pleasant Bay Massachusetts Estuaries Project (MEP) ecosystem assessment, the system inlet was in Chatham Harbor, but in 2007 a new northern inlet formed east of Strong Island. Historical reviews showed that inlets in the current location gradually move back to the southern location. The 2007 inlet location increased the impact of tides and improved water quality conditions throughout the system, but did not alter the target MEP nitrogen concentrations for restoring acceptable conditions. The MEP noted significant impairments in the terminal basins and established a number of nitrogen threshold concentrations for selected stations, including inner Pochet (WMO5).



Water Column Sampling History

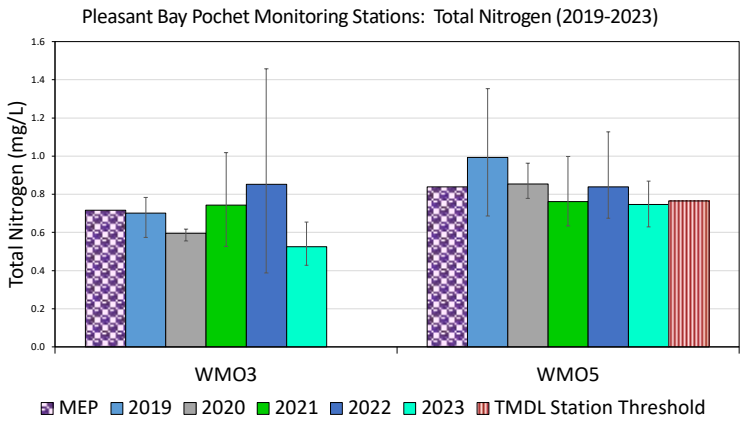
Water column sampling in Pleasant Bay began in 1995 and 2000-2005 data from 35 stations was used in the MEP assessment. 2015-2019 data from 27 stations was used in a 2021 MEP update. The MEP and the 2021 update were refined ecosystem assessments, but with different levels of data collection. The MEP included review of sediment habitat and species, macroalgal accumulation and continuous dissolved oxygen (DO), while the 2021 repeated tidal and sediment N measurements. Current and recent summer sampling occurs 4-5 times each year throughout the system Sampling includes DO and temperature readings and lab assays for chlorophyll-a (CHL), ortho-phosphorus, and particulate and dissolved species of nitrogen.

2023 Water Quality Status

Water quality conditions have varied with changes in the system inlet while more refined assessment within the system has helped refine management strategies. 2019-2023 total nitrogen (TN) levels the inner Pochet station (WMO5) average was the same as the impaired level at the time of the MEP (0.84 mg/L). 2019-2023 TN levels at WMO3 were slightly lower than the MEP level. Average 2019-2023 TN levels were higher than 2013-2017 TN levels. 2022 measurements at the Pochet Road bridge showed the upstream salt marsh is removing nitrogen, so most of the high TN levels are due to loads south of the bridge. Since all water column sampling has been completed using the same protocols, data throughout the historical record can be compared. In addition, since all protocols were approved by MassDEP, all sampling data may be used in regulatory decisions. MassDEP approved system-specific nitrogen limits (or TMDLs) for various portions of Pleasant Bay, including Pochet, in 2007.

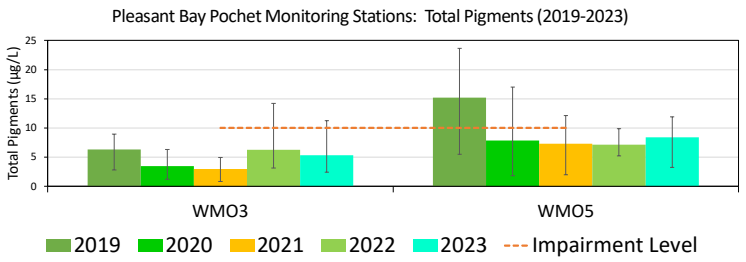
ECOSYSTEM STATUS: Moderately Impaired

Pleasant Bay Massachusetts Estuaries Project report is available on the MassDEP website:
https://www.mass.gov/doc/pleasant-bay-system-orleans-chatham-brewster-harwich-ma-2006/download



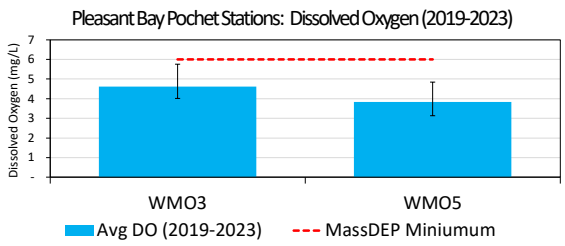
Total Nitrogen

Nitrogen is a limiting nutrient in salt marsh and estuary ecosystems and is necessary for plant, phytoplankton, and algae growth, but excessive N can be harmful. Based on the 2007 MEP ecosystem assessment of Pleasant Bay, a total nitrogen (TN) concentration of 0.72 mg/L at station PBA12 was recommended as a maximum level in order to maintain a healthy Bay ecosystem with other levels in key terminal ponds, including 0.765 mg/L at WMO5. A 2021 review of available water column data showed TN levels tend to fluctuate over multi-year periods. The average 2019-2023 TN level at inner Pochet station (WMO5) was the same as during the MEP (0.84 mg/L), while the average at WMO3 was slightly lower (0.68 mg/L).



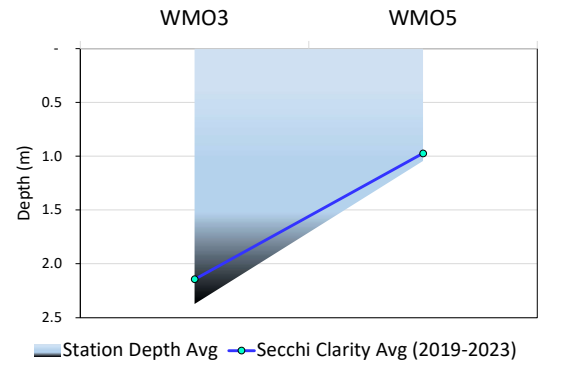
Total Pigments

The primary pigments used for photosynthesis by microscopic plants floating in water are summed for the total pigment concentration, which can be used as a measure of the amount of phytoplankton. Excessive levels generally correspond to higher nutrient levels, but these relationships can get complex when other plants in the community are altered. 2019-2023 average pigment levels at both WMO3 and WMO5 increased from the 2013-2017 averages.



Dissolved Oxygen

DO concentrations in Pochet stations have generally been less than the MassDEP regulatory minimum of 6 mg/L. 2019-2023 averages at the Pochet stations were 4.6 mg/L at WMO3 and 3.8 mg/L at WMO5. In 2013-2017, almost all of the readings at the two stations were less than 6 mg/L. These low levels are likely be due to the influence of surrounding salt marshes.



Water Clarity

Water clarity measured with a Secchi disk is an easy way to measure how deep light can penetrate into an estuary water column. Clarity is an indirect measure of phytoplankton density and where plants can grow well on the bottom of an estuary. Because the depth in an estuary will vary with the tide, measuring the total depth is also an important monitoring task when measuring clarity. 2019-2023 clarity at the Pochet stations tended to be excellent with clarity averages ≥90% of the total depth. These readings were a slight improvement from 2013-2017 averages.

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