

Little Namskaket Marsh

Orleans, MA

2001-2023 Water Quality Summary

2023 WATER QUALITY STATUS

Recent monitoring results (2019-2023) show that Little Namskaket Marsh continues to be a healthy salt marsh. The recent average TN level at WMO-19 was 0.61 mg/L, which is approximately the same as the average MEP level of 0.60 mg/L. Only 3% of all WMO-19 TN readings over the last 22 years (n=118) have been greater than the recommended MEP limit. Review of other sampling factors show that the Little Namskaket Marsh system has had a significant increase in temperature and higher pigment levels since the MEP, but the marsh still has capacity to accept additional nitrogen. Since all sampling has been completed using the same MEP protocols, data throughout the historical record can be compared. In addition, since MEP protocols were approved by the state Department of Environmental Protection (MassDEP), all data may be used in regulatory decisions. MassDEP has not established a system-specific nitrogen limit (or TMDL) for Little Namskaket Marsh.

ECOSYSTEM STATUS:
Healthy Salt Marsh

ESTUARY SETTING

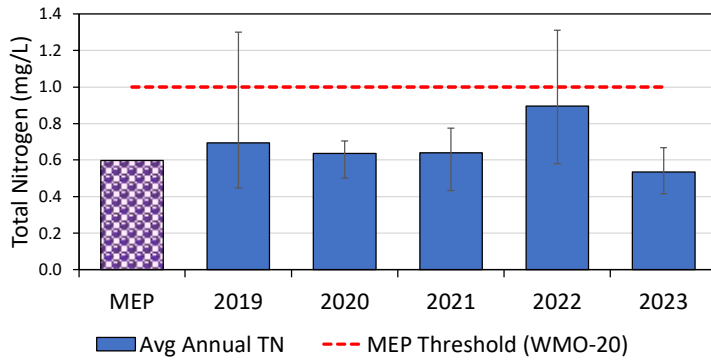
Little Namskaket Marsh is a 124 acre salt marsh west of Route 6 and north of Skaket Beach Road receiving tidal flood waters from Cape Cod Bay. The marsh watershed receives groundwater and nitrogen inputs mostly from the Town of Orleans. The 2008 Massachusetts Estuaries Project (MEP) ecosystem assessment noted that the system was a healthy salt marsh capable of assimilating additional nitrogen inputs (>65% higher than current levels) without causing any impairments. MEP staff concluded that total nitrogen (TN) concentrations should be limited to 1 mg/L at the border of the upper and lower reaches (*i.e.*, sentinel station WMO-20).



WATER COLUMN SAMPLING HISTORY

Marsh water column sampling began in 2001 at three stations shown in the map above, but has been limited to WMO-19 since 2006. Summer sampling occurs 5-6 times each year. Sampling results from 2001-2006 were used in the MEP assessment, which was a refined ecosystem assessment including review of sediment habitat and species, macroalgal accumulation and continuous dissolved oxygen (DO) and tidal measurements. Sampling includes DO and temperature readings and lab assays for chlorophyll-a (CHL), ortho-phosphorus, and particulate and dissolved species of nitrogen.

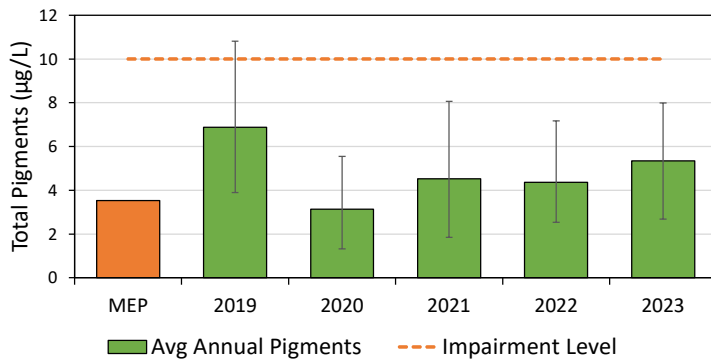
Little Namskaket Marsh: Total Nitrogen (WMO-19)



TOTAL NITROGEN

Nitrogen is a limiting nutrient in salt marsh estuary ecosystems and is necessary for plant, phytoplankton, and algae growth, but excessive N can be harmful. Based on the 2008 MEP ecosystem assessment of Little Namskaket Marsh, a total nitrogen concentration of 1 mg/L at the WMO-20 sampling station was recommended as a maximum level in order to maintain a healthy Little Namskaket Marsh system. Average annual concentrations at WMO-19, which is closer to the inlet, have been well below this level in all recent years.

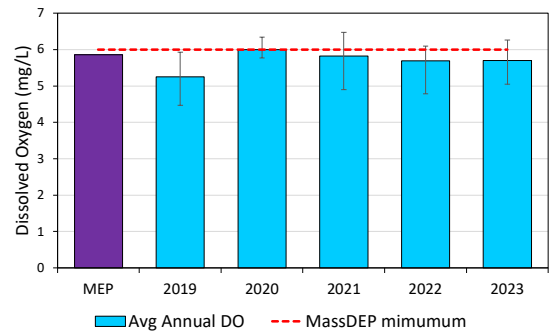
Little Namskaket Marsh: Total Pigments (WMO-19)



TOTAL PIGMENT

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 in salt marshes. Pigment levels in Little Namskaket Marsh have been consistent with healthy salt marsh conditions throughout its whole monitoring history, but the 2019-2023 average concentration was higher than the MEP average (2001-2006).

Little Namskaket Marsh: Dissolved Oxygen (WMO-19)



Dissolved Oxygen

Salt marsh DO concentrations often vary by location and time of day because of their enriched features and tidal impacts. DO levels may be higher in the upper portion of the water column, during flood tide, and later in the day and low near the sediments, during ebb tides, and early in the morning. MassDEP has a regulatory minimum DO level of 6 mg/L for SA waters like Little Namskaket Marsh, but provides flexibility for natural variability. Recent individual mid-depth DO levels at WMO-19 have ranged from 4.5 to 6.5 mg/L, but average summer levels have been relatively consistent throughout its monitoring history (generally 5-6 mg/L).

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. All recent readings of clarity at WMO-19 have shown light penetrating through the whole water column to the bottom (*i.e.*, the Secchi disk was clearly seen on the bottom).