

Bay Health Index

The Bay Health Index measures the nutrient-related health or level of nitrogen fertilization (eutrophication) of each of the Bay's major harbors and coves and provides an "at a glance" picture of conditions throughout Buzzards Bay. The index is the sum of five individual health scores: oxygen, nitrogen, chlorophyll a pigments, water clarity, and salinity. It does not include bacteria monitoring and is not an index of swimmability or shellfish bed status. The results of these criteria are combined and reported as a color-coded chart that indicates the overall health of the sampling location.

Dissolved Oxygen

Dissolved oxygen (DO) is one of the most important parameters for determining the health of an embayment and is required for the survival of plants and animals. DO concentration represents the balance between inputs from photosynthesis and the atmosphere and outputs due to plant and animal respiration and decaying organic matter. Low oxygen levels clearly indicate a disruption of the balance due to an overabundance of respiration and decay relative to the amount of oxygen input that the system receives.

Nitrogen

Nitrogen is the primary nutrient controlling plant production in Buzzards Bay embayments. Some nitrogen input is essential for growth of phytoplankton (microscopic plants) and the animals they support. But too much nitrogen creates an overabundance of plant matter causing reduced water clarity and low oxygen conditions. For our calculations, total nitrogen is divided into inorganic (DIN - Dissolved Inorganic Nitrogen) and organic forms (DON - Dissolved Organic Nitrogen or PON - Particulate Organic Nitrogen). Knowing the amount and form of nitrogen helps to identify its source, its potential impact to an embayment, and where management decisions are needed.

Chlorophyll

Chlorophyll a is the primary photosynthetic green plant pigment found in algae and most phytoplankton. Measuring the abundance of chlorophyll a and its immediate breakdown product, pheophytin a, indicates the amount of living algae in a body of water and is used to determine if a bloom has occurred. High levels often indicate nutrient enriched conditions, and result in reduced water clarity, greenish coloration and the potential for low dissolved oxygen levels.

Water Clarity

Water clarity is affected by the amount of suspended particles in the water column. Typically, the higher the level of eutrophication, the less light penetrates into the water column. Light penetration is important for photosynthesis and plant growth. Reduced water clarity can shade bottom dwelling plants, clog fish gills and shellfish, and hinder prey fish from finding food. Baywatchers measure water clarity using a device known as a Secchi Disk, a black and white circle that is lowered into the water. The depth that the disk disappears to the eye is known as the Secchi depth.

Salinity

Salinity is the measurement of the amount of dissolved salts in a volume of water and is expressed in parts per thousand (ppt). Salinity levels can range from 35 ppt in offshore waters to 0 ppt for freshwater from groundwater or stream inputs. Buzzards Bay and its sub-embayments contain a mixture of seawater and freshwater. Water column stratification can occur when dense, higher salinity water forms a wedge under lighter freshwater. Since plants and animals are adapted to a specific range of salinity, data can be used to delimit the range and habitat of various organisms within an embayment.