Water quality data available for Frenchman Bay
Developed following the Frenchman Bay Partners Water Quality Meeting, Sept. 2019

There are plenty of datasets accessible to the general public that concern water quality along the coast of Maine in general and in Frenchman Bay in particular. Each dataset focuses on a different aspect of water quality, such as suitability for shellfish harvesting, human health or environmental variables.

- **Shellfish harvesting**. Since molluscan shellfish (for example oysters, clams, mussels, quahogs etc.) are filter feeders, the quality of the water they grow in directly affects their safety for human consumption. In particular, the presence of certain bacteria and biotoxins can affect the safety of shellfish for human consumption. The Maine Department of Marine Resources (DMR) monitors the relevant bacterial and biotoxin levels to prevent public health risks, and issues closures and advisories wherever necessary.
    - Fecal coliform bacteria such as *E.coli* are the focus of the bacterial closures program. The DMR work follows the National Shellfish Sanitation Program (NSSP) framework to establish which areas are safe for shellfish farming and harvesting through the NSSP Classifications scheme. Each area's classification status is assigned following a three-part survey that evaluates the real and potential levels of fecal coliform bacteria in the water.
        - The Shellfish Water Quality Classifications page hosts an online map, updated on the 1st of every month, that displays information relative to bacterial levels. The following layers can be selected from the layer list:
            - *Current NSSP Classifications*. The National Shellfish Sanitation Program (NSSP) Classifications layer shows areas where shellfish harvesting is prohibited due to low water quality levels. Specifically, bacterial levels in these areas are or could be above safe levels for human consumption. Areas that satisfy water quality level requirements for safe human consumption are not displayed. For more information on the classifications and on the survey, click here and here.
            - *P90_Scores_2018* (most recent data available). The P90 Scores layer is related to the NSSP Classification layer. "P90" stands for 90th percentile, and it's one of the statistical values yielded by the fecal coliform tests. These points are part of the three-part survey that determines an area's NSSP Classification; for an area to be Approved for shellfish harvesting activities, P90 scores must be 31 or less. Any area with P90 scores of 31 or above will receive a Restricted or Prohibited classification. For more information on the contents of the P90 layer, click here.
        - The Shellfish Water Quality Classifications page also includes an Aquaculture Leases map. This layer can be activated from the layer list and will display the location of coastal aquaculture lease sites.

    - Information pertaining biotoxin closures is accessible through the Maine Biotoxin Closures: Shellfish Biotoxin Area Inventory page. Biotoxins are produced by three different species of phytoplankton (marine algae). These species of phytoplankton occur naturally and pose no threat in low concentrations, but during events called Harmful Algal Blooms (HABs) they can produce high concentrations of biotoxins. These can make shellfish unsafe for human consumption. The DMR conducts weekly tests all along the coast of Maine to monitor concentration of the three species of phytoplankton, and implements temporary closures to shellfish harvesting in the affected areas. For more information about biotoxins and the testing methodology, read here.

- **Human health**. Physical exposure to contaminated water can directly affect human health, even if no seafood is consumed. Fecal matter is again the cause of concern as it can carry harmful bacteria, parasites and viruses. The Maine Department of Environmental Protection (DEP) collaborates with local municipalities and State parks to reduce the risk of water-borne illnesses through the Maine Healthy Beaches program. Weekly surveys are conducted in the summer season to monitor a number of variables that could cause increases in the levels of fecal matter in the water (for example, potential or actual sources of pollution nearby, water test results, public restroom facilities, presence of dogs or wildlife on the beach, beach usage, etc.). For more information about testing procedures, public outreach and the status of coastal beaches, click here. For more information on accessing raw data, see the Human and environmental health section below.

- **Human and environmental health**. The Community Lab at MDI Biological Laboratory is a leading institution in water quality studies in the Frenchman Bay area. The lab independently conducts numerous studies related to various aspects of water quality and also collaborates with external partners on larger scale projects. Raw data from this varied body of work can be viewed and downloaded from the Anecdata website. Anecdata is a free online platform developed by the Community Lab to collect, manage, and share citizen science data. It also includes projects run by individuals and organizations other than the Community Lab. The following projects investigated various aspects of water quality in Frenchman Bay.
    - Acadia Region Water Quality Monitoring. This dataset is the result of the Community Lab's long-term monitoring of water quality at sites around Mount Desert Island. It includes a number of environmental variables such as water temperature, turbidity and salinity.
    - Mount Desert Island Healthy Beaches. This dataset is a subset, relevant to the Mount Desert Island region, of the state-wide Maine Healthy Beaches program (see previous Human health section).
    - Maine Marine Sediment Monitoring. This project is run by Hancock County Soil and Water Conservation District. It documents the changes in mudflat pH due to ocean acidification and monitors reactions of the clam population to these pH changes.

    - Maine Phytoplankton Monitoring. This project is run by the Community Lab and shares data regarding phytoplankton presence and abundance at sites around Mount Desert Island. Some of the species monitored overlap with those monitored by the DMR for biotoxin closures.

- A focal point in Frenchman Bay's water quality discussions revolves around the presence of visiting cruise ships in Bar Harbor. The town of Bar Harbor has been welcoming an increasing number of cruise ships in the last few years, which has raised concerns over their potential environmental impact in the Bay. A number of local organizations, including the Community Lab, have worked with the town to monitor levels of environmental variables that could signal water quality issues during cruise ship season. This has led to the publication of five reports that are available on the Bar Harbor Town Hall website. The raw data that fed into the reports is available for download on Anecdata on the Bar Harbor Cruise Ship Monitoring project page. A separate project, Exploring the Marine Microbiome was conducted in 2018 to study cruise ship's microbiomes and the presence of microplastics in the harbor.

- **Environmental variables**. The National Oceanic and Atmospheric Administration (NOAA) maintains a station in Bar Harbor to collect year-round data on water temperature and tide levels. General information about the station and current conditions can be found here. Various subsets of historical data can be downloaded here in raw format.

Many of these data are brought together in map format in the Frenchman Bay Atlas. The Atlas can be downloaded as a PDF from the Frenchman Bay Partners website, or viewed as an interactive map on the College of the Atlantic ArcGIS portal.