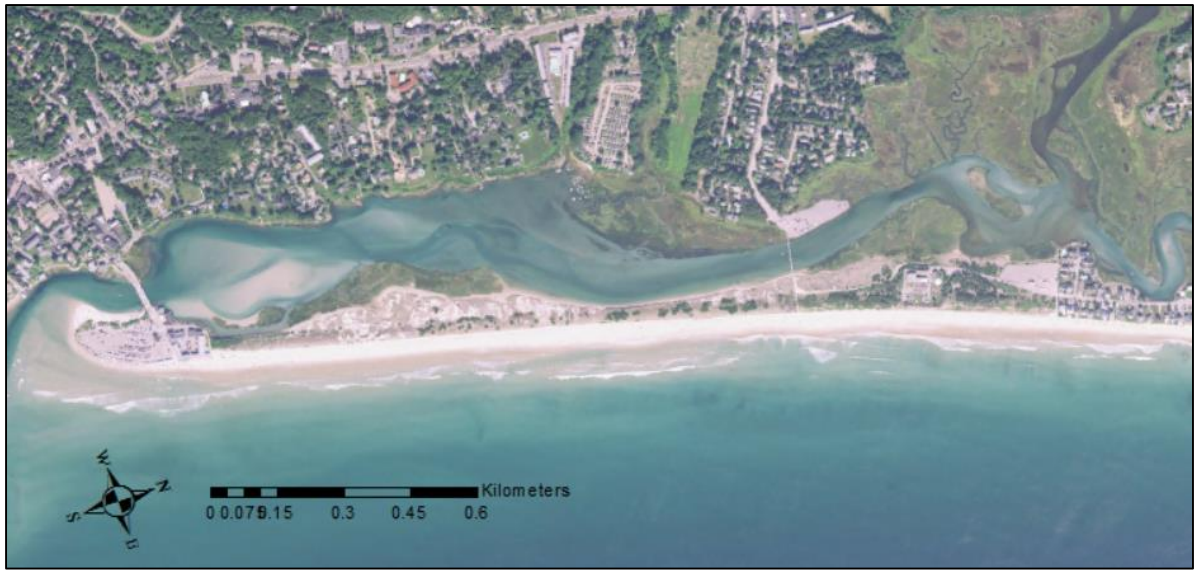
# Maine Geologic Facts and Localities

August, 2019

# *Overview of the Maine Beach Mapping Program*

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## What is the Maine Beach Mapping Program?


The Maine Beach Mapping Program (MBMAP) has monitored annual erosion rates on beaches in southern and mid-coast Maine since 2007. Each summer, MGS scientists use a real time kinematic global positioning system (RTK-GPS) to collect the positions of certain beach features – namely the edge of dune vegetation (or seawall) and the mean high water line (MHW). These features can be used to calculate erosion metrics like dune and beach erosion. Over time, these metrics help describe patterns of erosion. At the end of each summer, data is analyzed and published to an online map, which town planners and coastal residents can reference to help make decisions related to beach management and resiliency. Figure 1 shows all beaches included in the MBMAP program.

**Figure 1**. Beaches included in the MBMAP project shown in dark red.

## How is Data Collected?

Data is collected using a RTK (Real Time Kinematic) GPS System, which has an overall accuracy of about 2cm horizontally and vertically (Figure 2). Two features collected at each beach are the Mean High Water Line (MHW) and the edge of dune vegetation, or wall if there is a seawall (Figures 3 and 4). The MHW is the average vertical height of the high tides. A landward shift in the MHW over time indicates erosion of the beach. Dune vegetation is a natural buffer against storms and flooding. If the monitored edge of vegetation moves landward, that indicates that erosion of the dune is occurring. The distance between the mean high water line and the edge of vegetation (or wall) is the Dry Beach Width (DBW).

**Figure 2**. RTK GPS System.

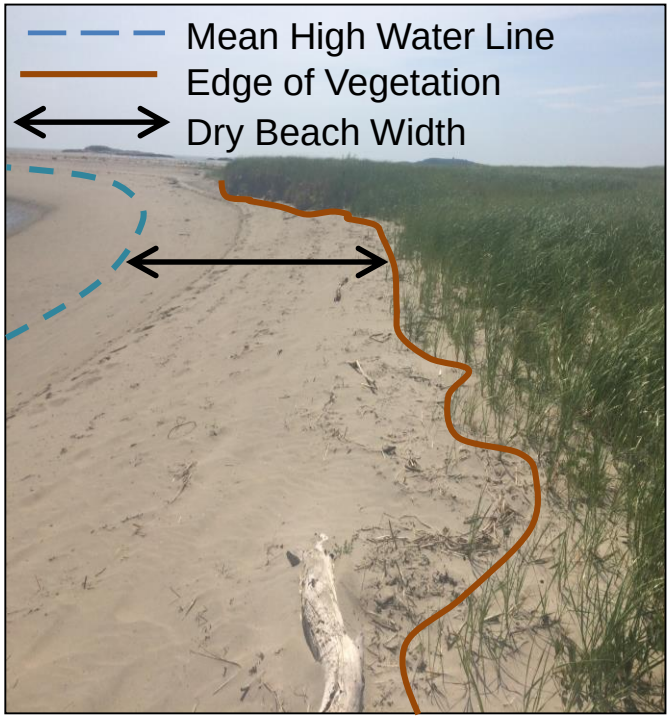


**Figure 3**. Examples of how profiles are collected in the field.

**Figure 4**. Data collection in the field at the base of a seawall.

## How is the Data Analyzed?

The Vegetation and High Water lines are used to calculate metrics which assess different aspects of beach erosion (Figure 5). For example, Beach Change is the annual difference between the High Water Lines, while Dune Change is the annual difference between the Vegetation Lines. The Dry Beach Width is the distance from the Mean High Water Line to the edge of vegetation or seawall. MGS calculates how each of these features change over time and visualizes the data in ArcGIS.

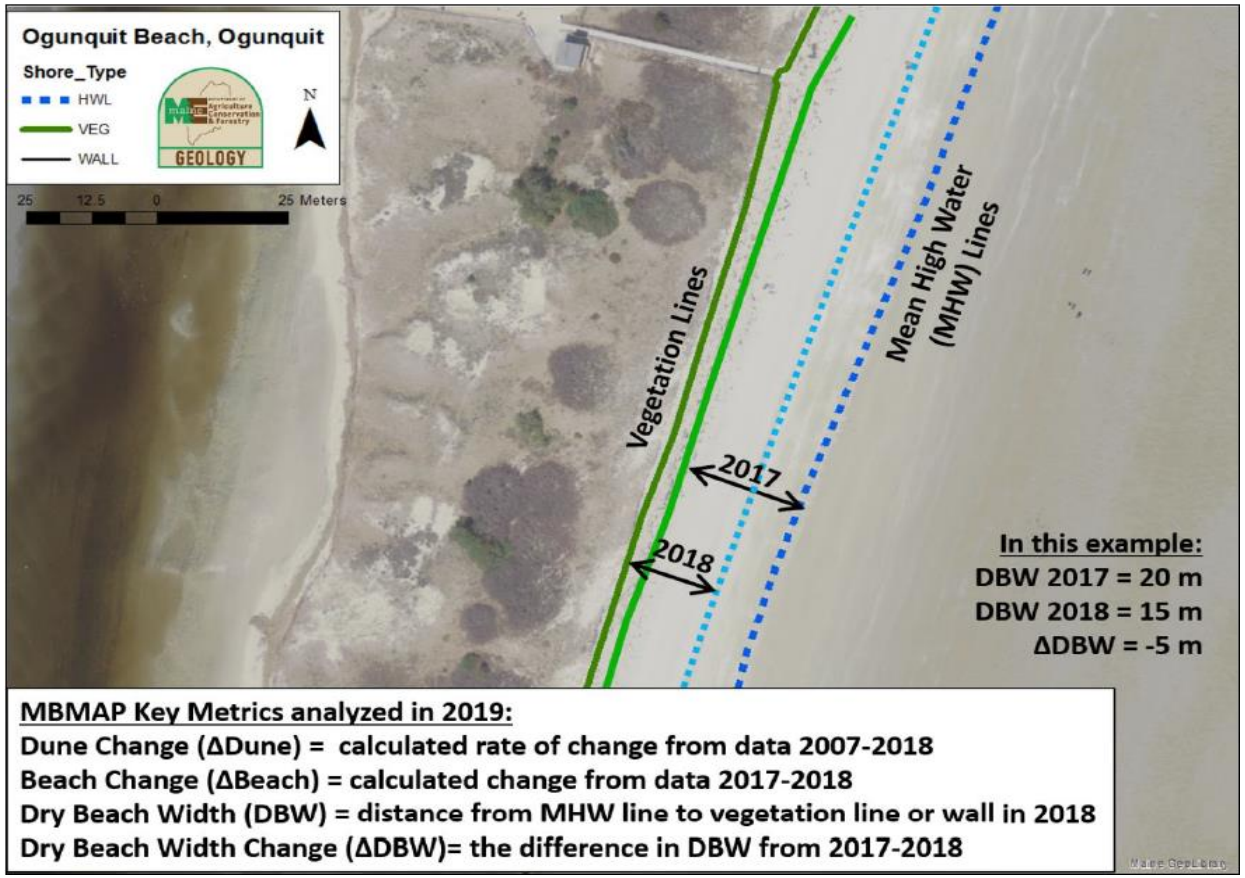


**Figure 5**. Examples of how vegetation and high water lines are used to assess beach erosion.

## Dune and Beach Change at Ogunquit Beach, Ogunquit

At Ogunquit Beach, there is a seawalled section of shoreline at the southern end of the beach near the Norseman Hotel, while the rest of the beach is natural dune. At this beach, MGS has surveyed the edge of the dune since 2007 and the mean high water line since 2017. Figure 6 shows calculated dune change rates from 2007-2018. Data indicates that the south-central portion of the dune has been eroding at about 1 to almost 2 feet per year, while the rest of the beach has been stable or growing. The area of highest dune growth was at the northern end of the beach. Figure 7 shows beach change rates from 2017-2018.

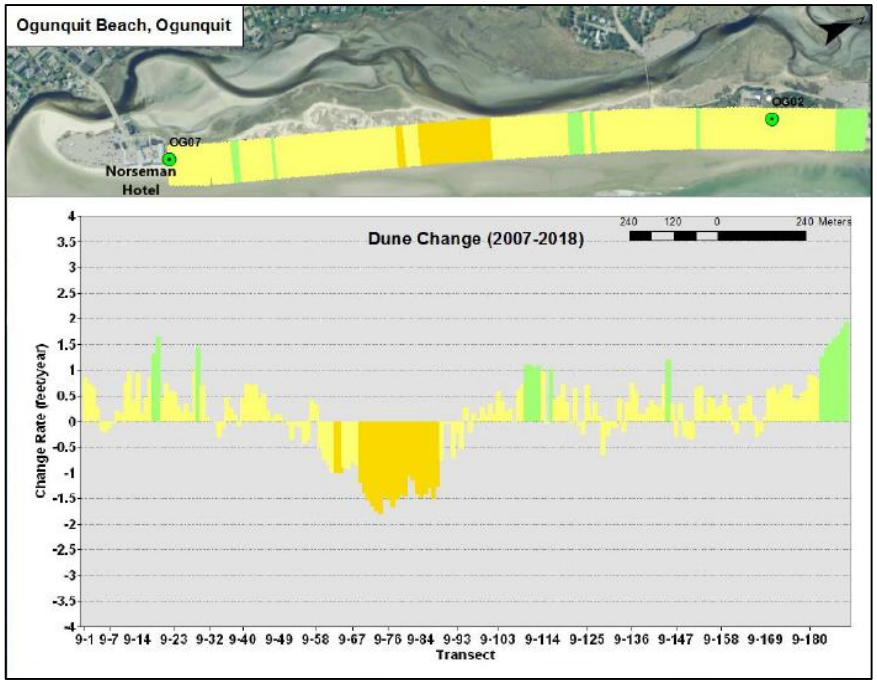


**Figure 6**. Dune Change at Ogunquit beach. Showing slight losses in the middle of the beach, with relative stability or slight growth at other locations.

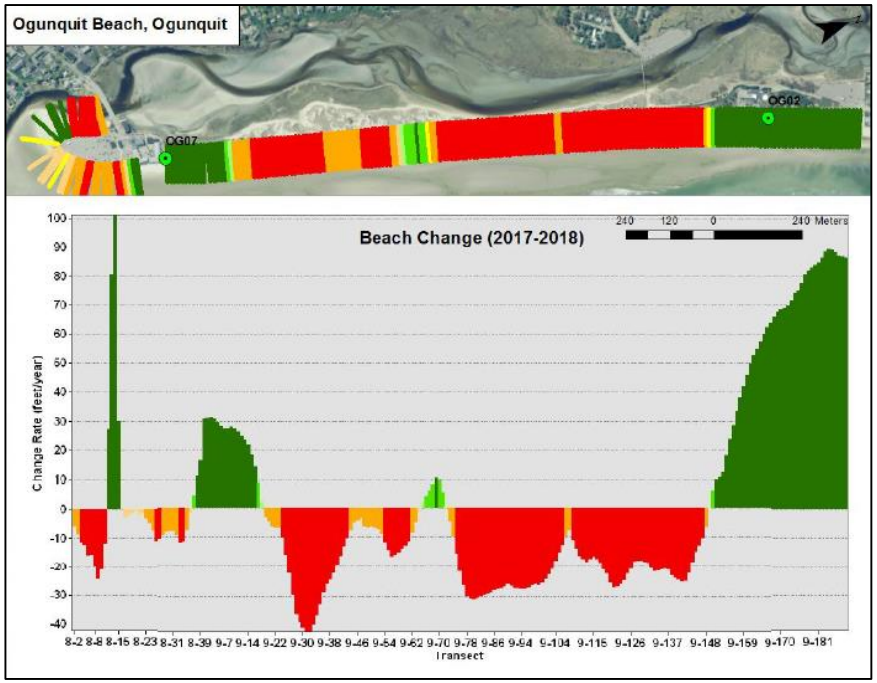


**Figure 7**. Beach Change seen at Ogunquit Beach, showing both large gains and losses.

## Dry Beach Width and Dry Beach Change at Ogunquit Beach, Ogunquit

In 2018, the Dry Beach Width (the distance between the mean high water line and the dune vegetation) was narrowest at the seawalled section of beach near the Norseman Hotel, less than 25 feet (Figure 8). It then widened significantly towards the northern section of the beach, reaching widths of over 100 feet. The average dry beach width for this stretch was 114 feet. Dry Beach Change between 2017 and 2018 indicates an alternating pattern of growth and decline for most of the beach ranging from 20-50ft. However, at the northernmost section of the beach directly prior to Moody beach, there was significant growth of the dry beach from 2017-2018, from 50 to 100 ft for this stretch of beach (Figure 9).

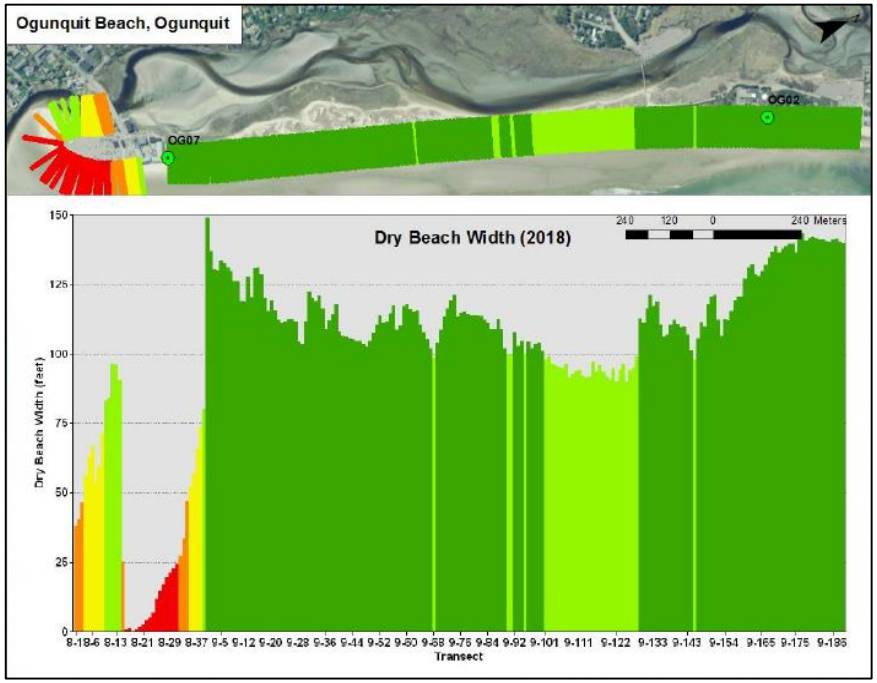


**Figure 8**. Dry Beach Width patterns observed at in 2018 at Ogunquit Beach.

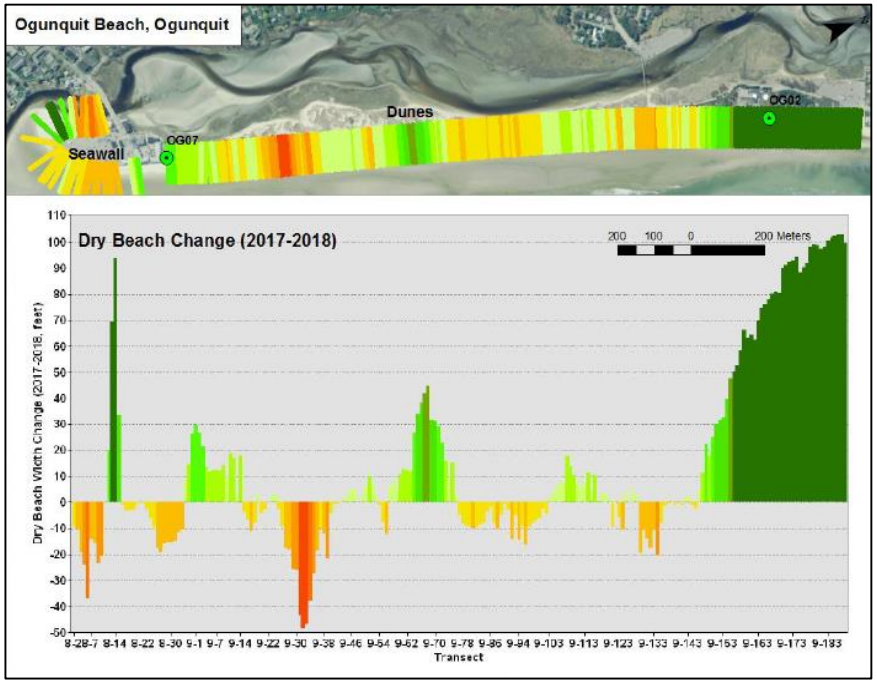


**Figure 9**. Dry Beach Change between 2017 and 2018 at Ogunquit Beach.

## Additional Information

More information on the MBMAP program can be found in both an online map (https://www.maine.gov/dacf/mgs/hazards/beach_mapping/) and an annual State of Maines Beaches Report (https://digitalmaine.com/mgs_publications/570/). In addition to the MBMAP data presented here, these resources include more detailed information such as historical weather patterns and summaries of the overall health of Maine's coast, providing more context to the slides presented here.

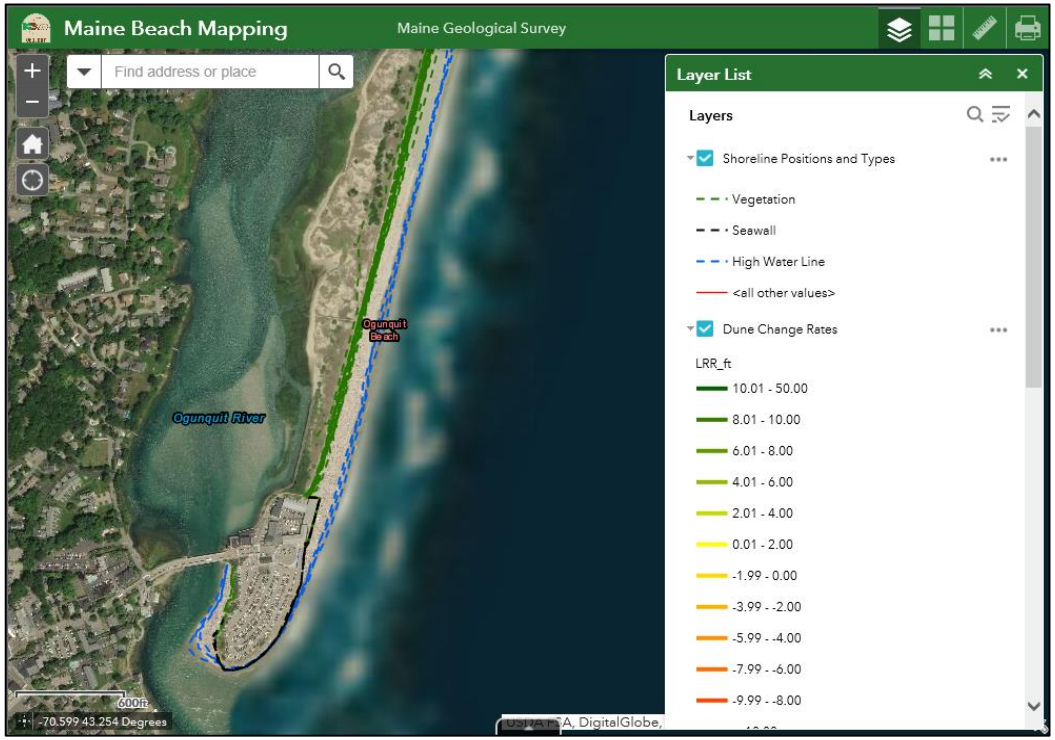


**Figure 10**. Screenshot of the MGS Online MBMAP Viewer

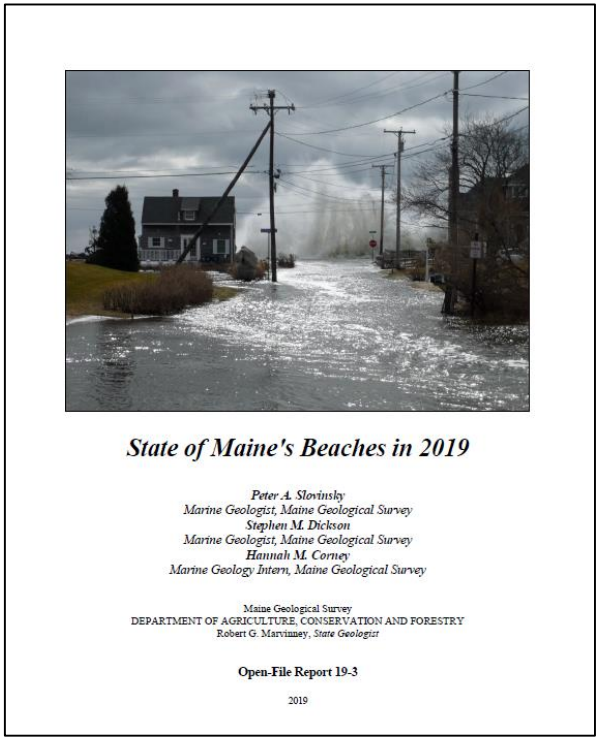


**Figure 11**. Cover of the State of Maine's Beaches 2019 Report.