Wells Beach, Wells

Background geology and characteristics

Wells Beach is a highly developed barrier beach that extends from its northern terminus at the Webhannet River southward to the rocky headland of Moody Point. The beach here has undergone general erosion, aside from an area of accretion adjacent to the jetty at the Webhannet River. Jetties were constructed in the 1960s in order to stabilize the entrance to the river; in so doing, a sediment trap was created that tends to accumulate sediment on either side of the jetty.

Moody Beach is an approximately 1.9 km long stretch of barrier that trends northeast-southwest. It is bound in the north by the bulbous headlands of Moody Point, and its southern end continues into the contiguous stretch of Ogunquit Beach. Together, Moody Beach and Ogunquit Beach comprise one of the longest continuous barrier spits in Maine. Currently, Moody Beach is not part of the SMBPP volunteer monitoring.

Wells Beach has 4 measured beach profiles, WE1-WE4. The overall beach is shown in **Figure 133**. None of the starting marks had been surveyed by MGS at the time of report preparation.

Annual and seasonal beach profile changes

Data at the Wells Beach profiles were available for the years of 2003-2007. The annual mean profiles for the data collection period from WE1 exhibit marked variability. What appears as a significant accretion along the dune and berm between 2003-2004 (**Figure 134**), with dramatic deepening of the profile and sediment loss starting at the 30 m mark (roughly 3 m below the pin) is a result of the lack of a fixed starting pin on the seawall. The 2005 mean profile is quite similar to the 2003 profile shape. The profile starting point moved between 2006 and 2007 so the apparent 1-1.5 m of elevation gained along the entire profile from 2005-2006 is an artifact of different starting points. An additional 0.5 m of elevation occurred in 2007. This much change is possible, due to sand transport in the longshore drift around Casino Point. Seasonal data (**Figure 135**) indicate that DI1 tends to have a much more sediment-rich berm in the summer rather than the winter. Both seasonal profile envelopes indicate large possible variations of over 1 m. Standard deviation data (**Figure 136a**) indicate that the winter profile has slightly more berm fluctuation (up to almost 60 cm) than the summer profile, concentrated at about the 40 m mark.

The beach at WE2 underwent erosion along its entire length from 2003-2004 (**Figure 137**); this continued into 2005, which exhibited the lowest elevations of all profiles collected. The 2006 mean profile indicates that accretion occurred along the majority of the profile, while the 2007 profile exhibited erosion back to the 2005 profile level (out to about 40 m from the pin), then slightly less erosion along the remainder of the profile. Based on available seasonal data (**Figure 138**), WE2 exhibits the typical summer vs. winter profile shape, with more sediment in the upper portions of the profile during the summer rather than the winter. The berm elevation is higher in the summer as well. The profile envelopes and standard deviations indicate greater variability in the entire profile in the summer rather than the winter. Summer berm variability, based on seasonal data, appears to be greatest at about the 40 m mark, with up to about 50 cm of vertical change (**Figure 136b**).

Profile data at WE3 included 2003 and 2005-2007. Again, the 2003 profile had the largest volume of sediment, while the 2005 profile exhibited the leanest, most erosive features (**Figure 139**). Profile recovery occurred in 2006 and 2007, though the profile never came close to reaching its 2003 elevations. Seasonal data (**Figure 140**) show a well developed summer berm that flattens with winter. Profile envelopes show relatively dramatic berm variations are possible during the summer. Standard deviation data (**Figure 136c**) indicate that the largest summer deviations occur around 40 m offshore, likely the position of the berm, which fluctuates on the order of 40 cm. The largest variations in winter data tend to occur offshore (120 m and greater from the pin), fluctuating over 50 cm.

Unlike WE1-WE3, the beach at WE4 was not at its fullest in 2003. Between 2003 and 2005, the beach underwent accretion at the uppermost portion of the profile (within 10 m from the pin), and in the berm area, between 20-30 m from the pin (**Figure 141**). The lower portions of the profile did undergo erosion. From 2005-2006, the areas of accretion that occurred previously were eroded, but accretion occurred along the profile from about 35 m and seaward from the pin. The entire profile appears to have accreted in 2007. Seasonal data (**Figure 142**) indicate a typical summer vs. winter profile relationship, with much greater volumes of sediment in the berm area during the summer, and more sediment offshore in the winter. Standard deviation data show that the berm does not fluctuate significantly during the summer (generally 25 cm or less), though variability of elevation in the winter appears to be much greater (about 50 cm). In fact, the entire profile appears to be much more variable in the winter rather than the summer, indicating seasonal stability (**Figure 136d**).

Generally, the beaches at Wells underwent significant erosion in 2005, with slight recovery in 2006 and 2007. The jetties at the Webhannet River appear to significantly influence the profile shapes that are more proximal to the structures, since they trap any sediment that is migrating in a northern direction, towards the river mouth.

Figure 133. Wells Beach has 4 measured beach profiles, WE1-WE4. The starting marks for the profiles have not been surveyed by MGS as of April 2007. The 4 profiles are approximately located on the figure.

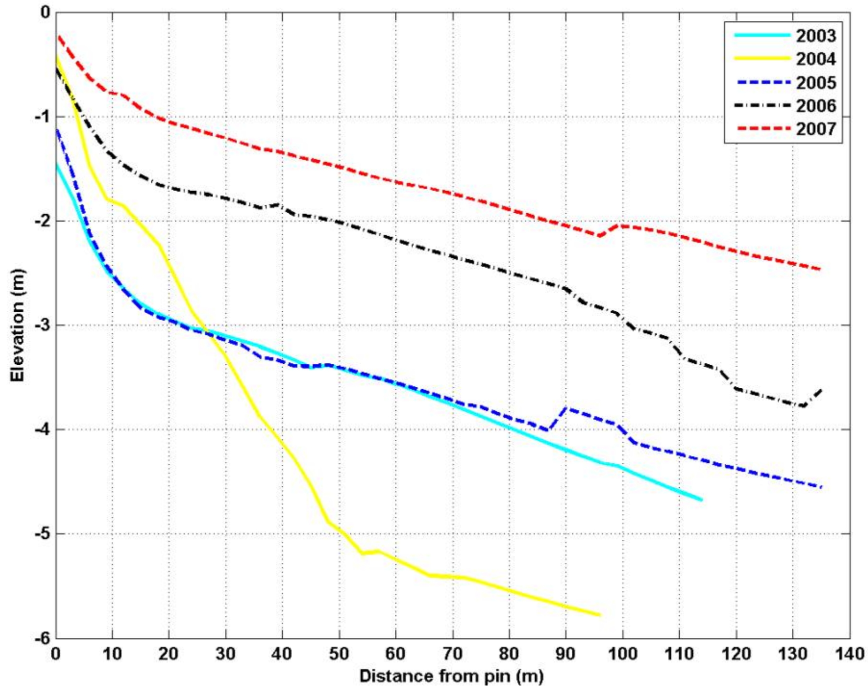

Figure 134. Mean annual profiles for WE1 showed stability between 2003-2005; it is difficult to gauge profile changes since the starting point changed between 2005-2006. Accretion occurred between 2006-2007.

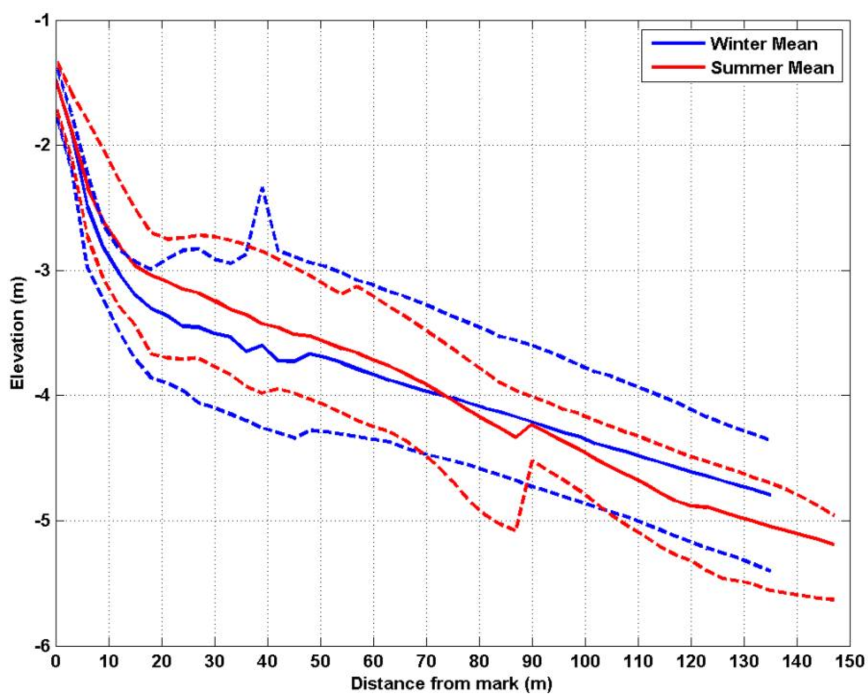

Figure 135. Mean seasonal profiles for WE1 show that the profile has a better developed berm in the summer rather than the winter.

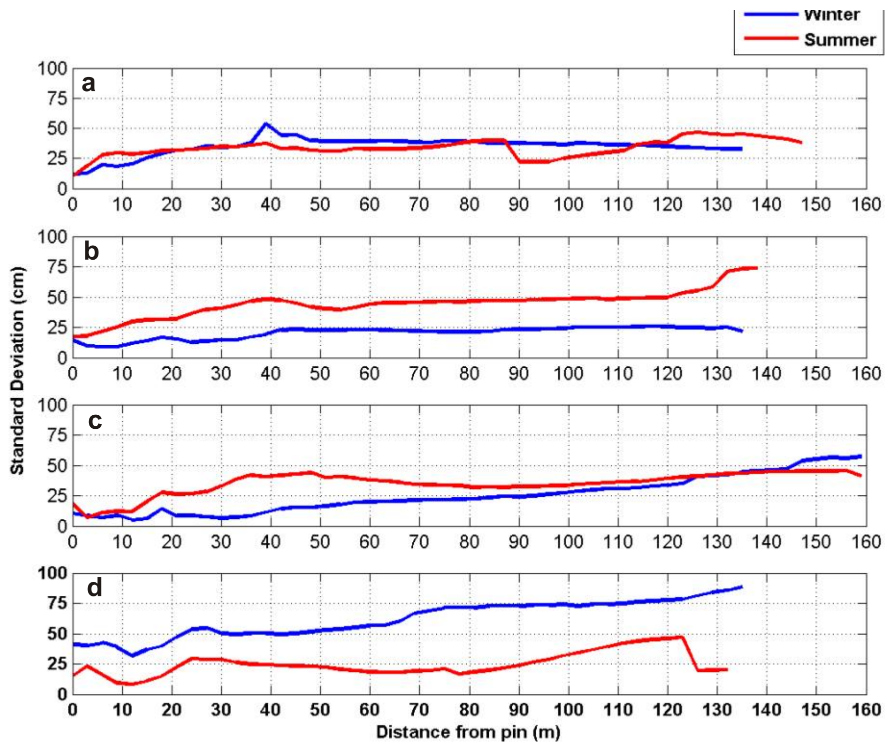

Figure 136. (a) Standard deviation data for WE1 indicate that the winter berm has slightly more variability than the summer shape. (b) Standard deviation data for WE2 show that the summer profile has much more variability than the winter profile, with a well defined berm. (c) Standard deviation data for WE3 indicate that the largest seasonal fluctuations occur in the summer and at the berm position of the profile. (d) Standard deviation data for WE4 show that the winter profile is much more variable than the summer profile.

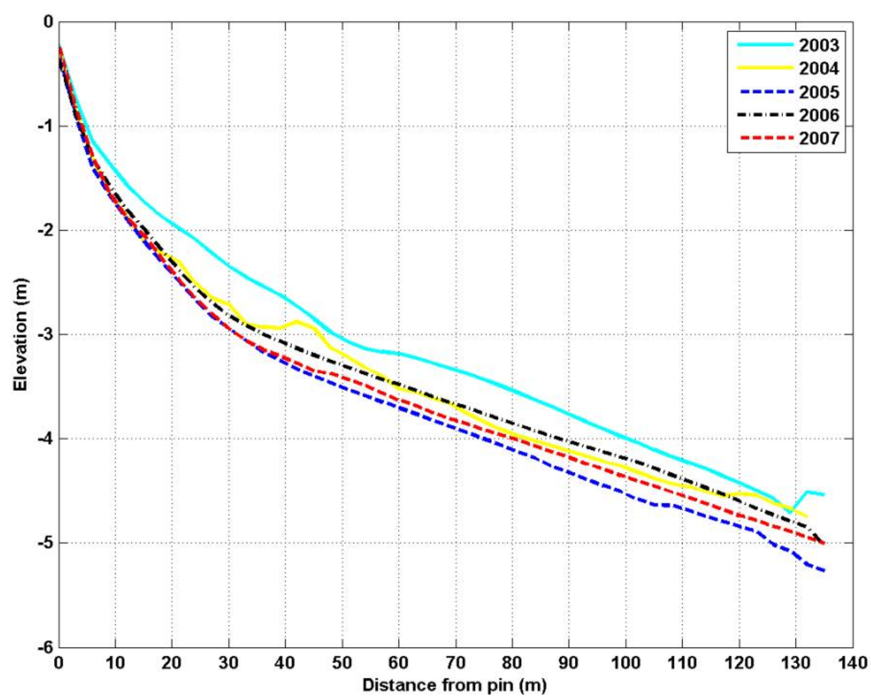

Figure 137. Mean annual profiles from WE2 show that the beach underwent erosion from 2003-2005, then recovery in 2006, and additional erosion in 2007.

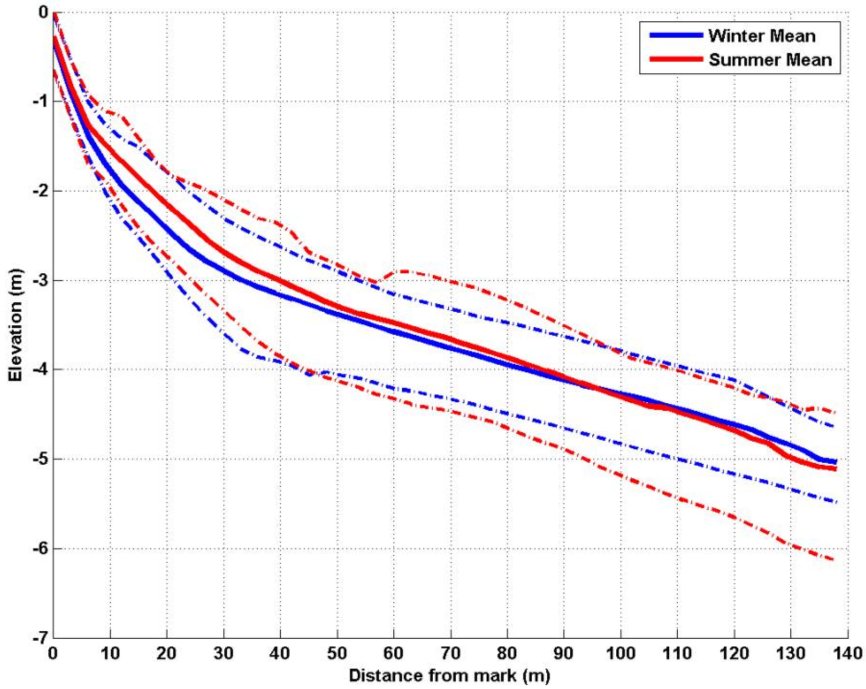

Figure 138. Mean seasonal profiles at WE2 exhibit typical summer vs. winter shapes, with more sediment in the berm area during the summer.

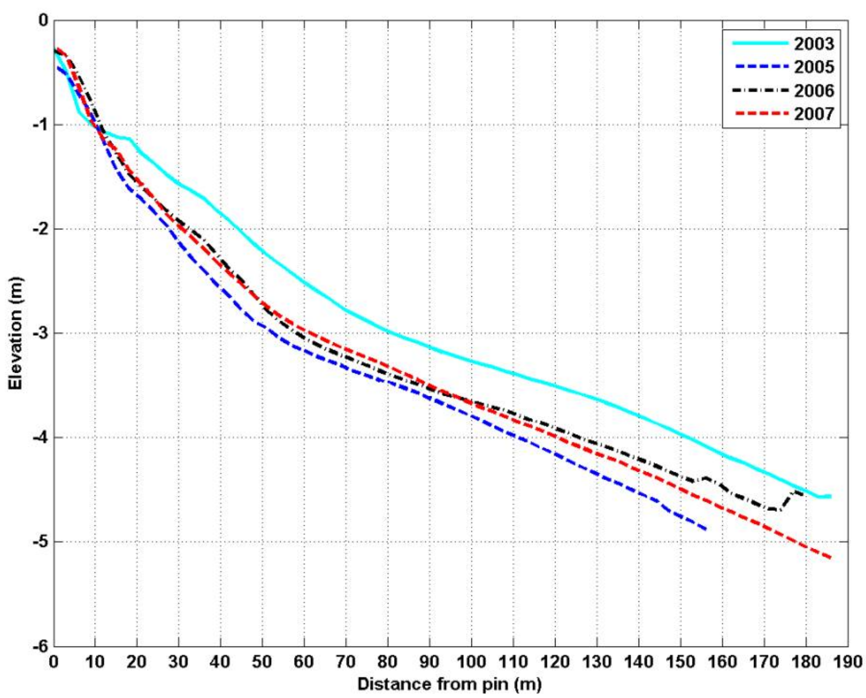

Figure 139. Mean annual profiles for WE3 show that the beach eroded from 2003-2005, and began recovery in 2006-2007.

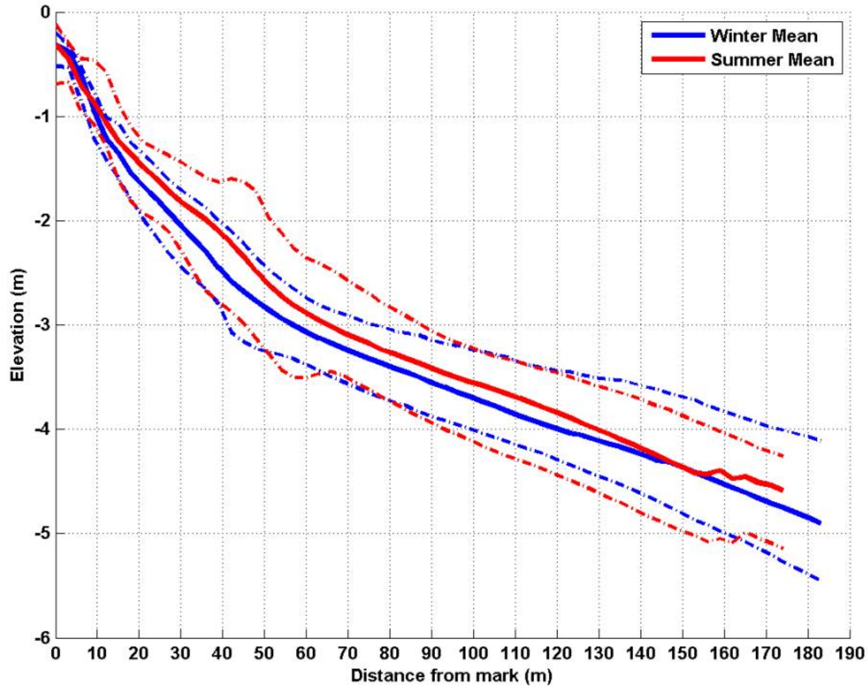

Figure 140. Mean seasonal profiles at WE3 exhibit a typical summer profile shape, with a better developed berm, while the winter profile is flatter.

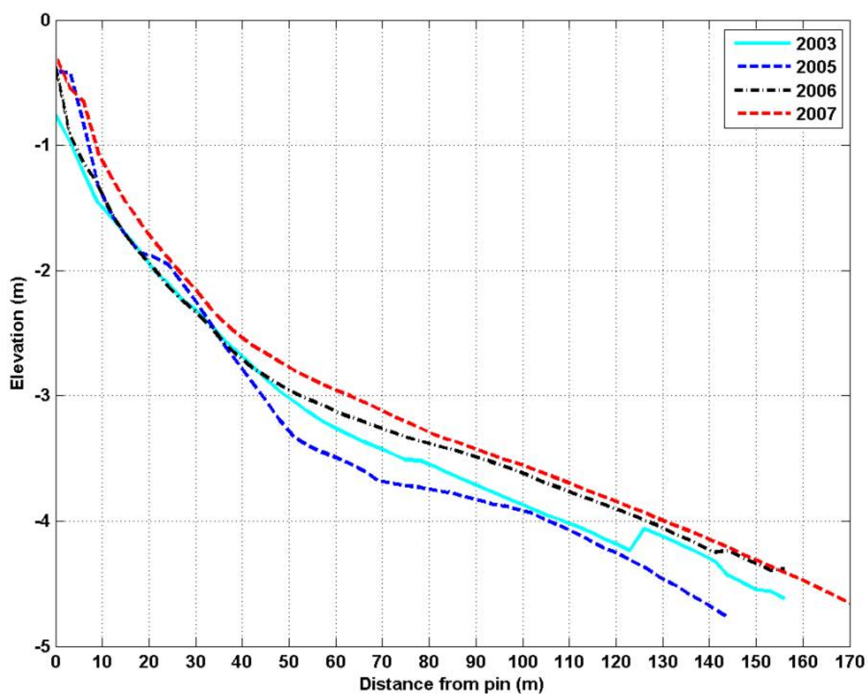

Figure 141. Mean annual profiles for WE4 show erosion from 2003-2005, then accretion in 2006 and 2007.

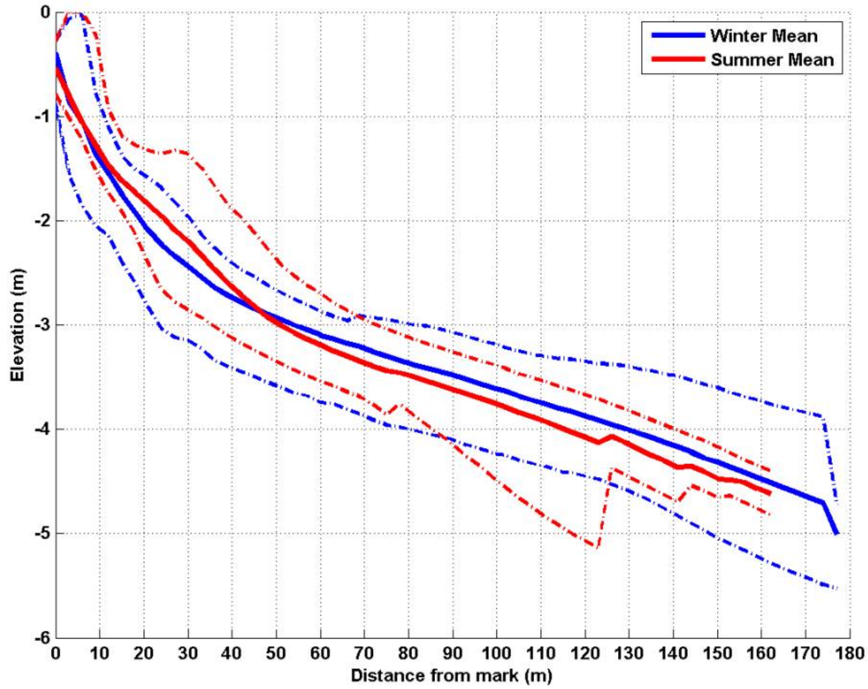

Figure 142. Mean seasonal data at WE4 show a typical summer vs. winter beach shape.