



NH Volunteer Beach Profiling Report 2020

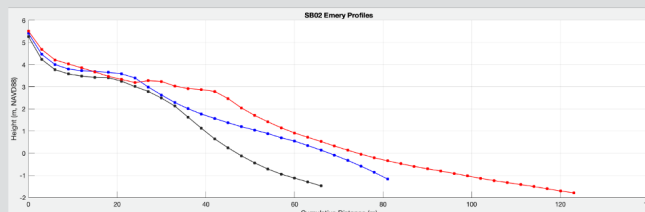
📍 Seabrook Beach, NH

SB02 Seabrook Beach is somewhat unique for NH as it has a higher elevation compared to the beaches north of Great Boar's Head and a large sand dune system that stretches ~1.5km southward to the NH-MA border. Residential homes that are set back from the beach and behind the dunes are more protected from erosion, storm surges, and overwash. Station SB02 is periodically nourished with sand that is removed from Hampton and Seabrook harbors and pumped onto the beach.

Max and min average elevation

The lowest beach elevations measured during this study occurred on May 18, 2018 (black) as a result of severe March nor'easters. The profile recorded

on September 10, 2018 (blue) shows a significant increase in beach elevation due to accretion during summer. The maximum elevation for the study period occurred in August 2019 (red) and shows the differences in shape the beach can have between erosional and accretional conditions.



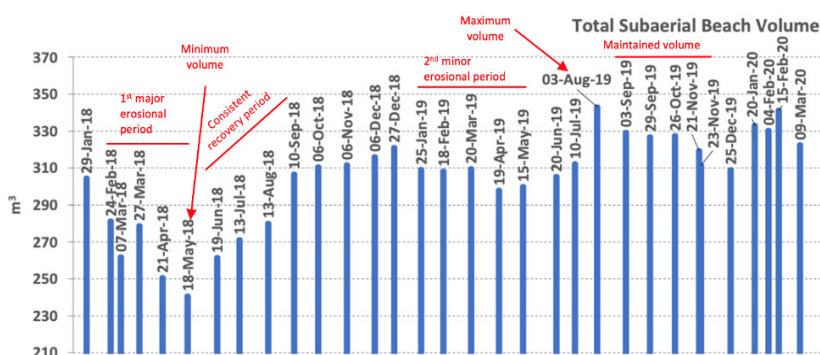
Changes in sand volume at SB02

SB02 underwent two cycles of erosion and accretion (rebuilding) over the study period. The first major erosional period came with the late winter 2018 nor'easters which removed a large volume of sediment. These erosional events were followed by a recovery period from June- September 2018. The second erosional period was less severe than the first occurring in early spring 2019. During this period, the beach lost very little volume and elevation. Consequently, the beach was able to build during the summer and reached the maximum volume recorded during the study period in August 2019. In contrast to the other stations at Seabrook Beach, SB02 maintained volume throughout the fall of 2019. This is likely due to the beach nourishment that occurred at this location in November 2019.



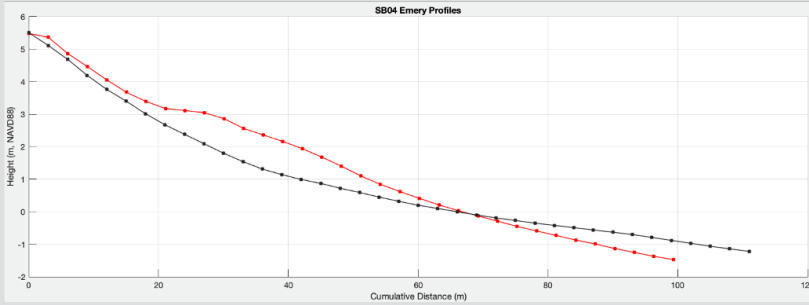
Sand being pumped on the beach north of SB02 on Oct 16, 2019 (left). The sand is immediately spread by bulldozers (right) and over time by natural processes.

The image below was taken on March 28, 2018 and displays damage to the dunes from the March 2018 nor'easters. Note that a scarp (arrow), or steep bank, was created by storm waves eroding into the foredunes.



SB04

SB04 is located ~0.6 km south of SB02. Here, the sand dunes are ~90-100m in width from the residential homes to the beach. As with SB02, the homes that sit landward of the dunes benefit from the higher elevation of the dune field that is stabilized by grasses which provides storm and flooding protection.



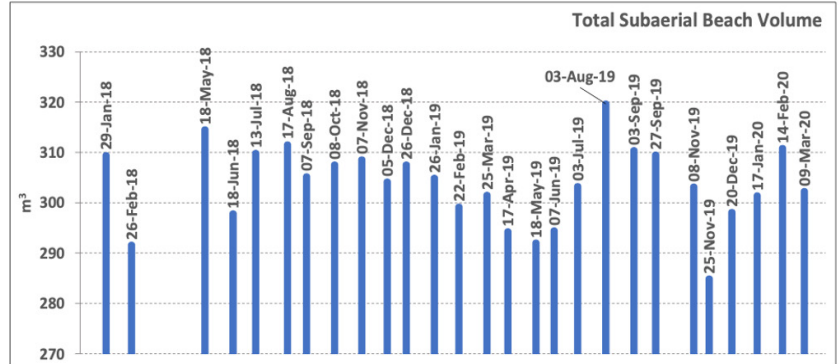
Max and min average elevation

When comparing the maximum (August 3, 2019) and minimum (November 25, 2019) beach elevation profiles for station SB04, there is very little difference in the upper profile (~0.3 m), but the mid beach is ~1.0 m lower. Interestingly, it appears that between August and November, sand was eroded from the upper and mid beach and transported and deposited on the lower beach.

Changes in sand volume at SB04

The beach went through multiple periods of erosion and accretion during the study period. The initial sand volume (January 2018) indicates the beach was in a recovery (accretional) phase. However, the beach was eroded by winter storms and high waves in February 2018. A gap exists in the database during March and April 2018 and the effects of the severe late winter nor'easters were not measured. The beach appears to have recovered from the winter storms by mid summer and maintained sediment volumes for the remainder of 2018.

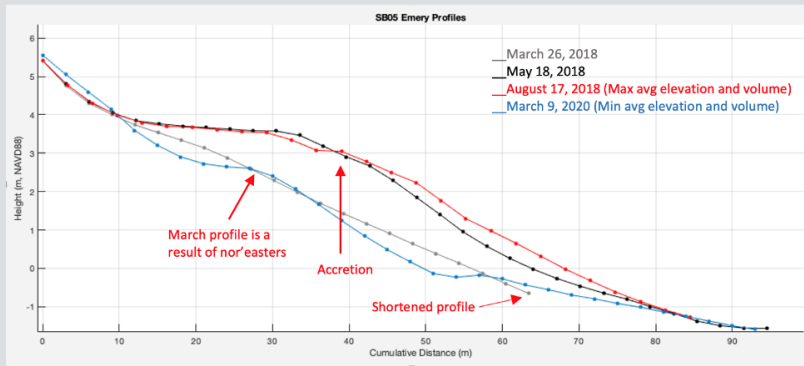
The second period of erosion occurred in winter and spring 2019. The beach recovered from this erosional cycle and reached a maximum volume on August 3, 2019. Fall storms caused a short erosional period, during which the minimum volume was recorded in November 2019. However, the impact of the severe nor'easters in March 2018 were not measured, but likely had a lower volume. The beach steadily increased in volume through February 2020.



Images of Seabrook Beach dune system at SB04. The photograph on the left taken on May 18, 2019 shows the ability of dune grasses to trap sand. Dune grasses provide stability for large volumes of sand with the baffling effect of the above ground vegetation and stabilize the sand with the roots. During storms, waves erode sand from the dunes and intertidal beach system and carry it towards the ocean. The sand is deposited in the nearshore forming a bar which effectively weakens wave energy. Following the storm, waves slowly bring the sand back up to the beach allowing it to recover in calm weather conditions. The dune system also begins to recover by accumulating sand by aeolian processes (wind moving sand and shaping the dunes). Dune systems are coupled with beaches and are integral for the optimal functionality of beach ecosystems. Dunes provide natural storm protection and can help protect our coastal infrastructure. Finally, dunes are valuable habitats and provide protection and homes for several species. The photograph on the right taken on June 6, 2019 shows a piping plover (*Charadrius melodus*) nest with four eggs on Seabrook Beach near SB04.

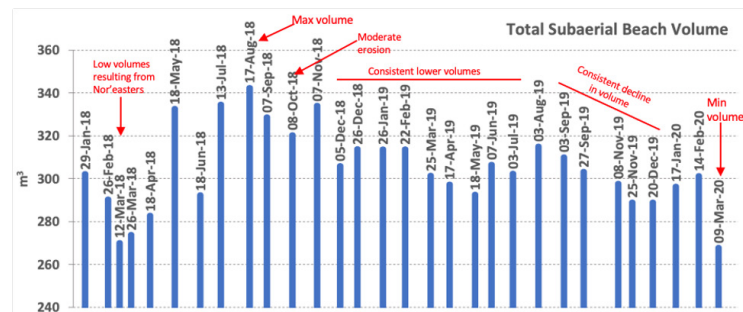
SB05

SB05 is located ~2.1 km south of the Hampton Inlet jetty close to the NH-MA state line. The sand dune system here is slightly narrower than at the northern two monitoring stations. However, the dunes provide significant storm surge and erosion protection for local homes and infrastructure.



Max and min average elevation

The maximum and minimum profiles depict erosional and accretional trends in beach elevation. The beach was severely eroded in March 2018, but by May 2018 it had recovered. However, in Mar 2020 the beach had once again eroded. Subsequently, the beach recovered, repeating the erosion to accretion cycle.



Changes in sand volume

In early 2018, station SB05 was

in an erosional state due to several winter storms. Following the Mar 2018 nor'easters, the profiles were short and some of the lowest volumes were recorded that year. The beach began to recover in Apr and by May 18, 2018 SB05 had gained a large volume of sand back. The beach maintained sand volume from May through summer 2018 apart from the Jun 18 observations. Moderate erosion occurred in September and Oct 2018. Nor'easters and winter storms led to consistently lower sand volumes throughout late 2018 and early 2019. The beach did not recover during the later months of 2019 as more storms in Oct led to more erosional events and decreased sand volumes. Mar 9, 2020 marked severe erosion with the lowest volume recorded in the study. Some erosion occurred at other stations in Mar 2020, but SB05 was the only station that reached its minimum volume and elevation for the study period during this month.



During the severe nor'easters in Mar 2019, sand was eroded from the intertidal beach and transported into the dunes burying the vegetation, which subsequently grew upward stabilizing the dunes (left). The right image displays the lower beach in Jan 2019. Note the sand ridge (arrow) moving onshore as the beach is in the process of recovering from earlier storms.

WHAT'S NEXT?

Seabrook Beach management options

- Restore historic sand dunes for sand storage and storm protection
- Construct raised walkways to allow sand movement and reconnect fragmented dunes
- Allow seaweed deposited by tides to remain to aid in building sand on the beach
- Conduct outreach on the importance of beaches and dunes in protecting the coast
- Explore the ecological history of the area to understand what landforms previously existed

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