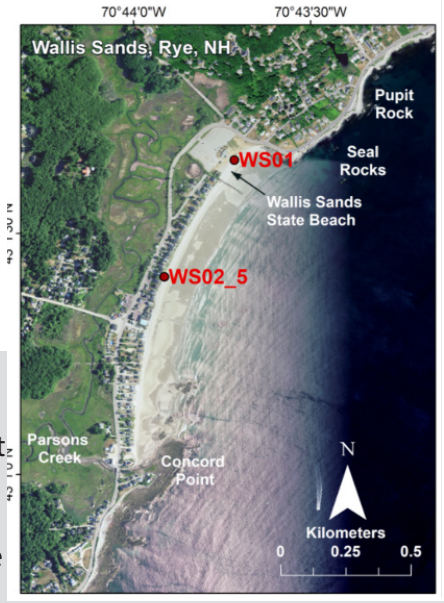
NH Volunteer Beach Profiling Report 2020

Wallis Sands , Rye NH

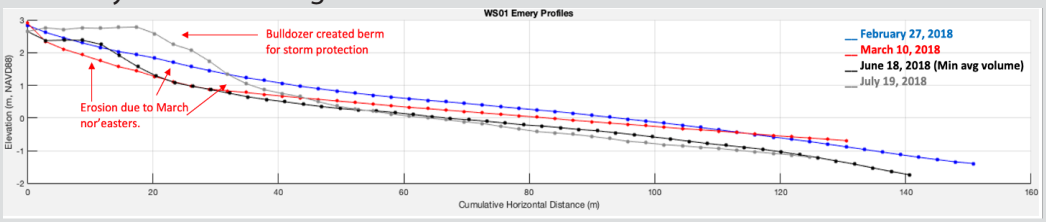
WS01

Over the study period WS01 has changed significantly in response to erosional conditions, accretional conditions, and human-induced changes (e.g., grading, seaweed removal, construction of berms). A concrete seawall separates the intertidal beach from a bathhouse, snack bar and parking lot where dunes were historically located. The seawall has stopped landward migration of the beach, but at the expense of a much-needed source of sand. The beach experienced significant changes in elevation and sand volume throughout the study period. During storms, the loss of elevation results in much of the beach being inundated by the ocean during larger high tides or storm surges.



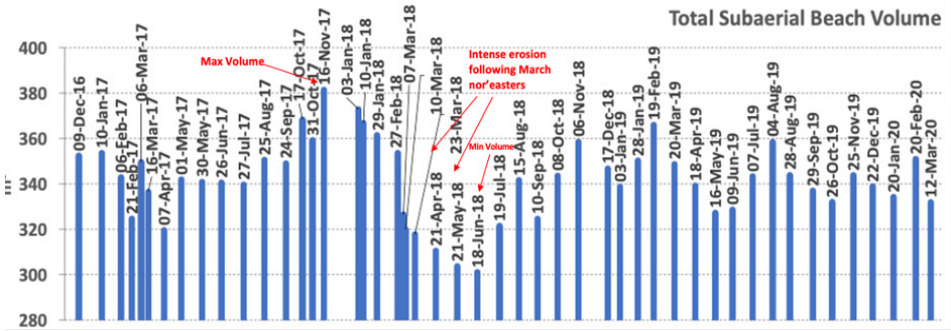
Storm effects and recovery

The figure to the left shows beach elevation profiles that extend from the seawall to the low tide line at profiling station WS01. Each color represents a significant profile date. The Feb 2018 (blue) profile depicts beach conditions before the severe Mar 2018 nor'easters. The Mar 2018 (red) data depicts the large losses in elevation due to the three nor'easters. The June 2018 (black) profile represents the minimum average elevation and volume recorded during the study. Notice the large increase in the upper beach in the Jul 2018 (grey) profile. This was done by the NH Division of Parks and Recreation altering the beach profile for summer use.



Changes in sand volume at WS01

Each blue line represents the estimated volume of sand along a 1-meter-wide swath of the intertidal section of the profile transect for each given date. A minor cycle of erosion and accretion occurred from Feb - April 2017 due to winter storms. The beach was largely accretional during the spring, summer, and fall of 2017 and reached maximum sand volume in Nov 2017 for the study period. The largest cycle of erosion began in Jan 2018 due to winter storms and continued through Jun. The early winter 2018 storms left the beach at a low overall elevation making it more vulnerable to three severe Mar 2018 nor'easters that caused major erosion. The beach was recovering from July - Nov 2018 but did not reach the same overall volumes as measured in the fall 2017. An extended period of erosion occurred during Feb - May 2019, but at a lower magnitude than observed in 2018. Accretion occurred through Aug 2019 and then a seesaw pattern of sand volume gains and losses occurred until Mar 2020.

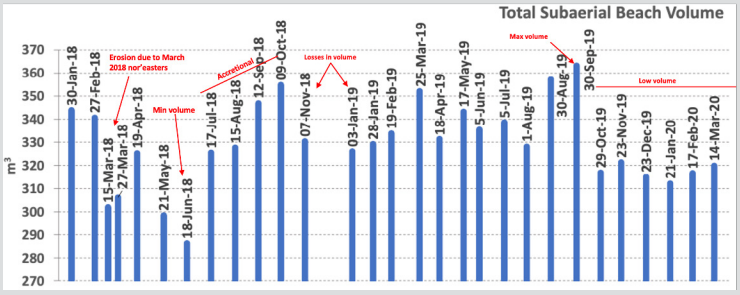


After Winter Storm Riley

Photo A was taken on Mar 4, 2018. It shows the beach by the seawall just south of the WS01 profile station. The mid and lower beach are significantly eroded due to winter storms. Photo B was taken on Mar 7, 2018 after Riley. The intensity of the storm waves further removed sand and concentrated gravel against the seawall.

WS02.5

Beach profiling station WS02.5 is located near the center of Wallis Sands. Residential homes are located adjacent to the beach on elevated parcels of land where sand dunes were previously located. WS02.5 had several periods of erosion—one beginning in March 2018 through June 2018, the second from November 2018 through February 2019, and the third beginning in October 2019.



Changes in sand volume

Each blue line represents the estimated volume of sand along a 1-meter-wide swath of the intertidal section of the transect for each given date. WS02.5 recovered relatively quickly after storms and erosion. The most significant erosion and loss of volume during the study period occurred following the 2018 winter storms. Surprisingly, WS02.5 did not continue to erode and instead, a major ridge and runnel system grew which helped restore the beach. The beach rebuilt by Apr 2018 before eroding again as indicated by the May 21, 2018 and Jun 18, 2018 volume calculations. The beach recovered quickly and continued building during the summer and fall of 2018. Losses in sand volume occurred in Nov 2018 - Jan 2019 due to fall/ winter storms. The volume calculations display variability in summer 2019, but the maximum volume in the study was reached in Sept 2019. During the fall of 2019, the beach lost a significant amount of volume possibly due to coastal flooding on Oct 28th, 2019. Volume remained low through Mar 2020 most likely due to several winter storms in Dec 2019- Mar 2020.

Ridge and runnel system (arrow) at WS02.5 on Mar 27, 2018 formed after the major sequence of storms in late winter 2018.

At the beginning of the study, the seawall at WS02.5 was fronted by a "sand ramp" or sand mound (a general characteristic of many NH beaches) and moderately vegetated with dune grass (photo A taken on Feb 27, 2018). However, the sand ramp and dune vegetation in front of the seawall was eroded and removed during the Mar 2018 nor'easters (photo B taken on Apr 19, 2018). Nevertheless, the additional sand and dune vegetation prior to the 2018 storms afforded the seawall protection, likely reducing the impact of the storms. Protection of seawalls with dune grasses is a valuable strategy.

WHAT'S NEXT?

Wallis Sands Beach management options

- Restore historic sand dunes for sand storage and storm protection
- Construct living shorelines, or nature-based approaches to shoreline stabilization
- Nourish the beach with sand, potentially sourced from dredging projects
- 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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