



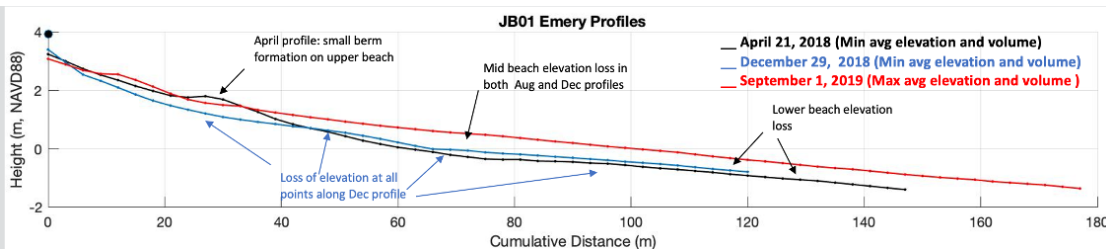
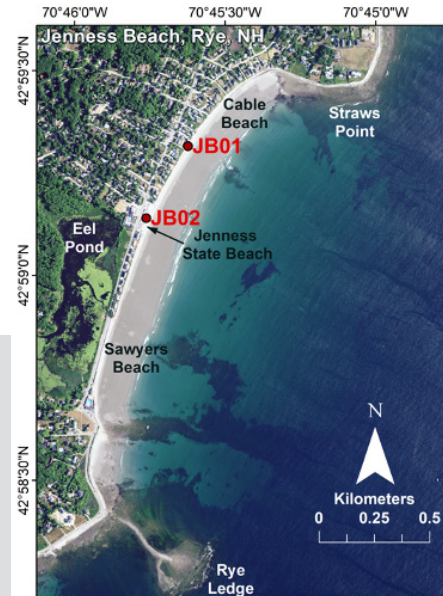
NH Volunteer Beach Profiling Report 2020



Jenness Beach, Rye, NH

Jenness Beach 01

JB01 is composed of fine to medium sand during accretional periods but erosional periods uncover pebble lag deposits, especially on the mid and lower beach. The landward side is mainly private homes fronted by seawalls, replacing large historic dunes. As a result, the sand storage and storm surge protection of a dune system have been lost. The beach has a narrow backshore (landward of the berm or mean high water) and low elevation so much of the beach is inundated during high water. The low tide terrace is wide and relatively flat.



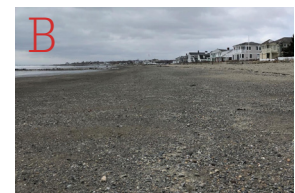
Max and min average elevation

The figure above shows three profiles that extend from the seawall to the low tide line at station JB01. The Sept 1, 2019 profile (red) shows the beach at its maximum mean elevation and sand volume measured during the study period. In contrast, the Apr 2018 profile was measured following severe late winter nor'easters that eroded the beach. The mid beach is ~0.8m lower and the lower beach is ~0.5m lower in elevation in comparison to the Sept 2019 profile. The Dec 29, 2018 profile was also measured after a period of erosion and had a very low mean elevation and volume but showed a different shape; sand was moved from the lower beach and transported to the upper beach, forming a berm. JB01 is among the beaches with the lowest minimum average elevations and volumes recorded during the study period rendering it highly vulnerable to storms.

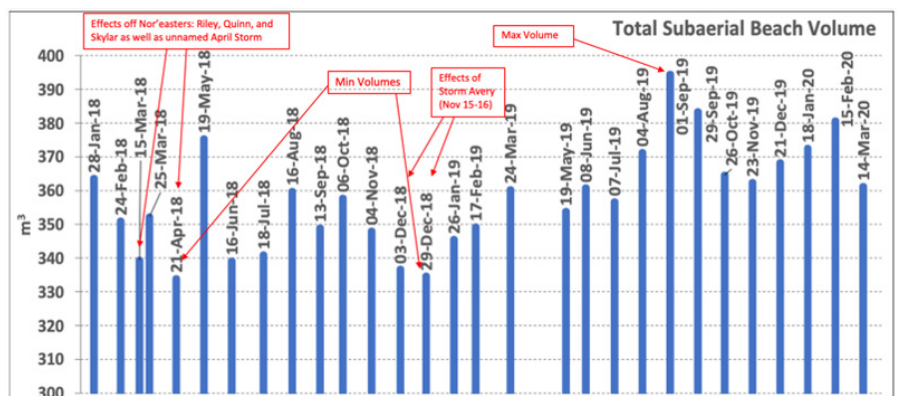
Changes in sand volume at JB01

In the figure at right, each blue line represents the volume of

sand along a 1-meter-wide swath of the intertidal beach profile transect at JB01. Late winter 2018 nor'easters caused major erosion resulting in losses of sand volume from Mar through Apr 2018. Overall, the volume of sediment remained low throughout the spring and summer 2018 with the exception of one anomalous high value in May. Sand volume reached another minimum level in Dec 2018, but gradually increased throughout the spring and summer reaching the maximum sand volume for the study in Sept 2019.

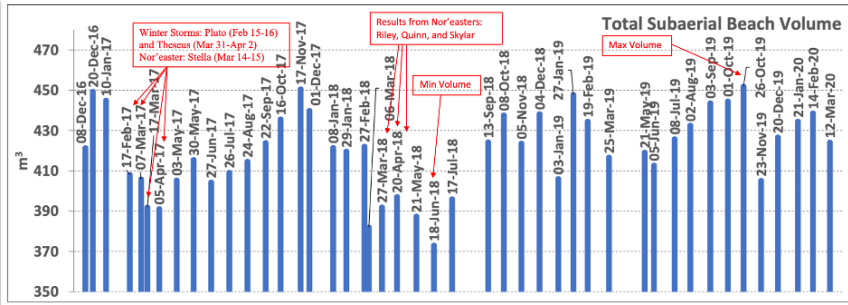


The upper beach just north of station JB01, is largely sandy during accretional periods (A) taken on Aug 4, 2019. However, the mid and lower beach looking south from JB01 (B) shows the beach covered with a pebble lag deposit on Mar 25, 2018 following a stormy period.



Jenness Beach 02

JB02 is composed of fine to medium grained sand during accretional periods and is covered with scattered pebble deposits during erosional periods. The beach was heavily damaged during the late winter 2018 nor'easters. Waves overtopped the seawall, causing severe damage to the bathhouse, parking lot, and general infrastructure resulting in costly repairs. JB02 has experienced both significant accretion and erosion throughout the study period. With a low elevation, no well-developed dunes, and a lack of a significant sand source, JB02 is vulnerable to extreme storm conditions such as those that occurred in 2017 and 2018.



Changes in sand volume at JB02

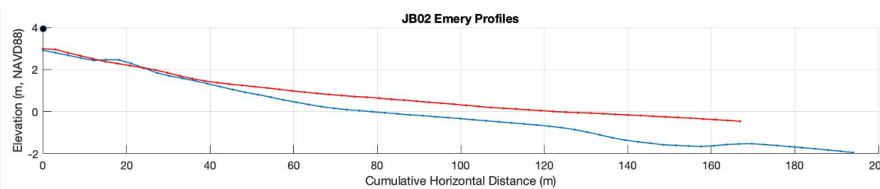
The 2017 winter storms significantly eroded the beach at profiling station JB02 shown by the loss of volume from Feb to Apr. From late spring through fall 2017, JB02 regained sediment volume to pre-winter levels. More severe storm activity in winter 2018 than in 2017 resulted in the worst erosional period of the study. Three nor'easters in March 2018 were particularly hard on Jenness Beach because there was no recovery time between storms. From Mar to Jul 2018, the beach struggled to regain sediment volume. The beach began recovering in Jul 2018 and fluctuated until 2019. In winter 2019, several minor storms impacted JB02 and the sediment volume at JB02 declined, but the impacts were minimal compared to previous winters.



Jenness State Beach's low elevation leaves it susceptible to flooding and storm surge. This photo from Mar 4, 2018 shows waves striking the seawall at high tide following Nor'easter Riley.



Photo at left from March 6th, 2018 at JB02. The upper sand layer was eroded following the Nor'easter Riley, exposing the pebble deposits underneath.



Max and min average elevation

JB02 lacks large morphologic features and has a low elevation and is therefore very vulnerable to storm related erosion and flooding. Despite its lack of major accretional features, JB02 can show large changes in elevation. The maximum average beach elevation occurred on Oct 26, 2019 (red above). The minimum elevation profile occurred in Jun 2018 (blue) after a series of three late winter nor'easters. The lower beach was over one meter lower in elevation and the mid beach was over half a meter lower than in Oct 2019. The observed changes in elevation are very significant given the overall low elevation of Jenness Beach.

WHAT'S NEXT?

Jenness 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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This project was funded by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the New Hampshire Department of Environmental Services Coastal Program.

