Maine Beaches Conference 12 July 2013 Concurrent Session Notes: State of Maine's Beaches

John Cannon

Started with an overview of NWS forecasting tools and weather and storm-related coastal hazards that face beaches and beach communities. We have a very good network of buoys in the Gulf of Maine (one of the best in the country), so that helps us very much with the forecasting.

Wave vs. coastal inundation paradox: which is the greater threat for your location? As wave heights and storm tides increase, the threat of coastal damages increases. Wave growth is a function of wind speed, fetch, and duration. High wind speeds allow for wave growth; as winds increase, wave energy increases dramatically. Fetch is the distance over the water that the wind travels. The longer distance the larger the waves are going to be. We typically have larger storm systems (and therefore longer distances) with Nor'easters. February 2010 Nor'easter had very high storm surge, but it occurred at night, and during a low tide, so people didn't realize what a near miss it was; still, there were heavy impacts in Saco, Wells, and the Popham area.

Slow-moving, long duration storms tend to produce larger waves (by creating a full sea state. The Perfect Storm is a perfect example of this (took place over days, not hours). Fast-moving systems do not have time to produce large waves in Northern New England. High wave set-up, and run-up lead to greater splash-over at sea walls and dunes. Tropical systems (such as Hurricane Bill, Acadia 2009), can lead to long period waves, which are dangerous, because they take people by surprise (ex: folks washed off rocks near Thunder Hole). Very long period waves (tsunami from low pressure system in 2008 in Boothbay Harbor), can cause flooding as well.

Tools for forecasting wave heights and potential damage

- Stockdon (USGS) Equation (empirical model) adds tides, storm surge, wave set-up, and the angle of the beach/dune to forecast wave height, possibility of splash-over, and/or erosion of dune or property inundation.
- Coastal Flood Nomogram plotting water level against wave height (NERACOOS.org) helps to find hotspots along the coast.
- NECOFS Model development focusing on Hampton, NH due to high frequency of coastal inundation and splash-over along the Hampton sea wall. Similar model for Saco hopefully coming out soon.
- New ESTOFS Storm Surge Model gives an areal extent of storm surge predictions.

We are overdue for big storms with large storm surges. Last big one was in 1978. NOAA Coastal Services Center has a team focused on the Social Science of Storm Surges.

Citizen science opportunity for local storm impact verification, there is a website where folks can report their observations, http://reporter.me.stormsmart.me.

Storm-based Beach Profile Monitoring Project (2012-2013)
The beach profile monitoring program can verify storm-erosion links they've only guessed at before. 2012-2013 was a good season to start this work, because of all the big storms. Sandy provided good lead time (well-behaved, slow-moving storm) and allowed us to activate the monitoring network. After the December 27th Nor'easter (25' waves added to storm surge), beach profile shows clear changes in dune structure (dune pushed inland) near camp Ellis. "NEMO" – Blizzard of 2013, February 8th saw record snow in Portland (all time record). Tree stumps 3000-4000 years old (based on radio carbon dates by a professor emeritus at Bowdoin and work by Joe Kelley at UMaine) uncovered on Goochs Beach in Kennebunk, and an archeological ship wreck because of all the erosion. Town managers wanted to spend money to remove the stumps, because they were hazards on the beach, but John and the rest of the BPM team at Goochs showed them their beach profiles showing that the sand would come back in and cover them up again. Sand actually tossed over the barriers at Camp Ellis in this storm. March 8th Storm, 2013 saw splash-over at Goochs even on a sunny day afterwards. Profiles show gains along the top of Goochs and losses down below. Long Sands Beach profiles show gains near dune structure and losses below. First successful storm season monitoring.

Pete Slovinsky

Covering bigger picture of how we created the profiles over the past few years (3-6 years of data, depending on the beach), and then showing data specific to the beaches being monitored.

2013 Beaches Report
- 11 beaches in 7 municipalities
- Total 239 beach profiles analyzed (winter 2010-2013, summer 2010-2012 - does not include summer measurements after harsh winter storms of 2012-2013).
- Qualitative grading system – assigned letter grades
    - Average grades (incorporate both winter and summer grades)

Higgins Beach, Scarborough: General lowering of profile, especially during winter months. 2-2.5 meters/year of erosion in some places over the past 3 years. Last few winters have very negatively affected the profiles, with some decent recovery in some places in summer months. Eroded down to the marsh surface in some places.

Scarborough Beach, Scarborough: Area south of the access path has eroded more than the area north of the access path. Overall, this beach has been showing seaward growth. Assessment grade improved to B-.

East Grand Beach, Scarborough: Had been improving over the past few years, but the past season has reversed that trend (eroded slightly back in 2012).

Kinney Shores, Saco: Last couple years have shown a lot of erosion – area just north of Ferry Beach is much worse (more erosion) than the area farther north. This beach flip-flopped from the last report – overall grade down slightly to a C+.

Ferry Beach, Saco: Continued erosion of the profile in both winter and summer, including loss of dune and profile stake. New trend of extensive erosion in this area – anywhere from 2-3 feet erosion/year on average at this location – very concerning.

Goose Rocks Beach, Kennebunkport: Typically the best scoring beach profiles, especially at the southern end of the beach where dune is growing. At the other end (Little River), it is eroding landward. Overall, a slightly downward trend in score, because of the erosion.

Goochs Beach, Kennebunk: Erosion in some places down to or below the historical erosion surface (emergence of the ancient stumps).

Laudholm Beach, Wells: Showing signs of landward migration – eroded quite a bit over the last couple years, erosion of dune in winter months, all negative trend in shoreline change.

Wells Beach, Wells: Casino Point profile has had a lot of erosion over the past few years – had eroded down to rock/cobble in 2010, recovered a bit, and now back down nearly to the same level in 2013. Different trend up near the jetty – pretty bad erosion in the winter – but a nice berm came back in 2012.

Ogunquit Beach, Ogunquit: Only had one profile to analyze – showed continued seaward growth of the dune and the berm from 2010 to 2013. Summer and winter showed good growth in that period – went up to a score of B+.

Long Sands Beach, York: Southern profile- poor winter profile, but summer profile shows good recovery over each of the past several years. Northern profile– summer profile showed stability with slight landward movement, and winter profile had fairly good stability, too.

Overall, most of the beaches are doing worse in the winter. Big winter storms seem to be driving slight downward trend, with some recovery in the summer, which is keeping the overall downward trend modest.