Maine Beaches Conference: Insights from Beach Profile Monitoring: The State of Maine's Beaches in 2015 and the National Weather Service Wave Run-Up Model

The State of Maine's Beaches in 2015 – Steve Dickson, Maine Geological Survey (DACF)

- **State of the Maine Beaches Report**: published online on the Maine Geological Survey website, look under the "What's New?" link on the right side of the page
- Funding for the profiling project from the Maine coastal program via a grant from the office for coastal management (NOAA)
- State of Maine Beach Profiling Program (SMBPP) collected by volunteers perpendicular to the shore, Maine Beach Mapping program (MBMAP) collected shore parallel by MGS staff
  - Two different metrics of beach health, both included in the report
- Grading system for profiles and shorelines – note that a C indicates stability and is a good grade overall, D and F indicate chronic erosion, A and B indicate growth
- Comparing winter and summer season from each year for each beach
- Looking at overall beach shape and the elevation of the sand to gauge beach health (higher is generally better)
- MBMAP transects show linear regression rates of the vegetation based on GPS-ed dune edge

Long Sands

- SMBPP: Winter stability in upper section of beach (2010-2012), erosion of the berm in 2013, recovery in 2014 and 2015
  - Summer profile showed stability from 2010 to 2013, growth in 2014
- MBMAP: seaward growth of the (small) vegetation indicates good beach health

Ogunquit

- SMBPP: Winter (C-) showed seaward growth from 2010 to 2013 but loss in 2014 and 2015
  - Summer(C) growth until 2013, loss in 2014
- MBMAP: (C) Dune erosion to the south and north, accretion in the middle

Wells

- SMBPP: Winter (D), profile was highest in 2010, losses over time through 2015
  - Summer (D) showed similar trends
- MBMAP: relative stability (C) based on dune

Laudholm

- SMBPP: Winter (F), close to the littler river, heavily influenced by that, steady erosion
  - Summer (D) similar, net result is loss here
- MBMAP: proximity to the tidal inlet is the most unstable, greatest rates of erosion
- One of the biggest problem beaches, but natural causes (not anthropogenic)

Goochs

- SMBPP: Winiter (D) stability or growth into 2012, erosion in 2013, some recovery more recently
  - Summer – similar pattern in the winter
  - Some of the recovery may be due to nourishment project
- MBMAP – not enough dune to really consider it

Goose Rocks

- SMBP: Winter (B-) stable to growing with good recover from the 2012 and 2013 low stands
  - Similar trends in the summer
- MBMAP: Huge erosion on the southern end (due to river), otherwise stable or positive

Saco Beaches, Saco

- Ferry beach areas is struggling from the impact of the jetty to the south – continued steady erosion in both the summer and the winter
- Kinney shores – good recovery in the winter from the low stands
- MBMAP: erosion of a meter per year in the ferry beach section, Kinney shores is relatively stable

West Grand

- One of the highest grades of any beach – received a B for the profile data
- Overall accretion from the dune edge, seaward movement

East Grand

- Frontal dune ridge is accretionary and growing, doing quite well overall
- Slight erosion hot spot at the northeastern end of pine point, but otherwise stable in the MBMAP data

Scarborough

- Very improved from last assessment – beach building up from the previous year's data
- Positive growth in the MBMAP data, with beach getting slightly steeper

Higgins

- Highly dynamic, influenced by the tidal inlet (Spurwink river)
- Huge losses and gains near the river, but in an erosive state more recently (seems to be building out) due to the changes in the river
- MBMAP shows some of the most dramatic changes of any beach in the report

Summary

- See the SMBPP and MBMAP report cards in the report and/or presentation for a more detailed summary of each beach
- Overall scores average out around a C, indicating general stability in Maine's beaches
- 2010 was a very erosive year due to the sea level high stand, but 2013 was often equally if not more erosive due to storms – both sea level and storms are important causes of erosion
- We rarely get a chance to see how beaches respond to *decreasing* sea levels as we have in this report (sea levels have lowered since 2010): seems as though beaches have recovered fairly well

Questions

- How doe dredges affect beach profiles: can significantly aid them (see possible Goochs explanation), but this topic will be covered more explicitly in Steve's next presentation
- How are the vegetation lines measured for MBMAP: only well-established vegetation is mapped
- How does the grain size vary between beaches: Can be significant, needs to be considered with dredging and nourishment
- Has the wave-climate data been incorporated into the consideration for erosion: Yes, though it is not quantitative – look to report for more info

John Cannon: A New Storm Impact Scale Used to Predict Coastal Erosion, Splash-over and Coastal Flooding. National Weather Service

- Many coastal hazards in Maine – hurricanes, tsunamis, rip currents, cold water, ice storms, blizzards, wave action/beach erosion
- Need lots of partners to engage in forecasting and communicating coastal impacts
- Public perception during coastal storms – flooding from rain is *perceived* as being the largest cause of flooding, but it is really due to storm surge – need to adjust how we communicate to public to avoid this type of misinformation
- Large waves are cause by slow moving storms that come at the coast perpendicular to the shore
- One of the biggest periods of wave action in Maine was during a Feb 2010 storm – hit at low tide so there wasn't much of an impact
- Can compare near shore wave measurements (from buoys) and storm tide to attempt to build predictability for when you will see impacts from waves
- Need to move away from benchmark coastal inundation levels – Portland can have lots of damage from water even if the water is below the 12 ft flood stage
- Guidance matrix, compare storm tide and wave height to see what type of warning you need to issue to the public
- Several wave-run up models being run right now – John is involved in the North Atlantic Regional Team funded wave runup
- Modeling wave run-up – need to include wave set up (column of water brought up the beach by the large waves themselves) to try to answer the question of how far the wave bore will go up the beach – can attempt to corroborate the model with dune survey data
- Hindcasting, additional surveys to help constrain model parameters

- Several hot spots in the NE that have problems with wave energy being focused in one area (e.g. Ferry Beach)
- Surveys done before and immediately after big storms to see how much sand was lost as a result of a single event – can have a huge impact
- Hindcasted with a series of blizzards, super storm sandy – model was very accurate
- Wave run-up verification from Sandy
- Communicating the results of the model with other agencies and emergency managers to begin planning for the potential impacts of wave run-up
- Future work: establish more wave run up sites, better outreach with local Ems and first responder, improve Stockdon equation data

Field Observations, Beach Profile Monitoring Volunteers

- Steve Dickson, presentation #2
- Sea level has been slowly increasing in Portland, but increased rapidly in 2009/2010 (due to changes in atmospheric conditions and a slowdown of the gulf stream)
  - Increased by 8 inches in one year
  - Good thing to study how this affects the beach health
- Lots of extreme erosion in 2010 for this reason
- However, there was also a lot of erosion in 2013 because it was a very storm year
- 2010 and 2013 tended to be the most erosive years for these reasons
- Dredging and beach nourishment can have a dramatic effect on the profile
- Frozen beaches (of sand and salt water) formed this winter – very unusual – protected the beaches from erosion during this past winter
- Major factors affecting Maine's beaches:
  - Storm events – wave heights are larger than ever, storm tracks (direction) have a huge impact, king tides can increase risk of erosion if a storm hits at the same time
  - Sea level – 2010 was the highest in the 102 year record – has very dramatic effects but recovery if you can lower sea level
  - Tidal inlets – can lead to huge erosion or growth
  - Deep freeze – holds sand in the beach, protects from waves