Coastal Erosion Mitigation in Southern Maine

Sue Schaller, MS, CPESC
Wetlands & Wildlife Biologist
BarMillsEcologic@aol.com  207.929.5040
3 Examples - Erosion Mitigation & Dune Repair

1) Ferry Beach, Saco  private cottage property
2) Ferry Beach, Saco  Sisters of Mercy site
3) Town of Old Orchard Beach  ongoing work with DPW
Ferry Beach, Saco

Saco: Homes from Bay View to Camp Ellis
10-13 feet of dune loss in 3 winter storms early 2013

Seawall abutters accrue additional damage due to their neighbors structure
Erosion exacerbated by Camp Ellis Jetties

Maine’s pocket beaches –
-- Geologically formed and maintained by river sediments
-- Saco River moves sediments of 19,000–23,000 cu yds/year
-- Sediments blocked from beaches by Camp Ellis jetties
-- circulation usually clockwise
Nor’easter Storms create beach scouring
Wave energy striking jetty deflects shoreward & accumulates
Direction of a storm can accelerate dune loss

Damage to homes & businesses → community stress

Municipal infrastructure: roads, water, sewer, services

Long term impacts to City tax base, budgets, tourism.

Loss of wildlife habitat.
‘SOFT Solutions’ = no hardscape, duration uncertain

Construction of a Sloped Dune via beach-scraping

- **SLOPE**  dissipates wave energy via wave run-up
- **DUNE GRASS**  holds slope, dissipates energy, catches sand
- **SEAWEED**  feeds soil, plant growth hormones, native mulch
Preparation Required

- **PERMITS** – site mapping & write permit (your prep time)
  - MDIFW (4-6 wks)  DEP PBR (2 wks)  City/local (4-6 wks)

- **TIMING** – Season, tides, weather, sub-contractors

- **PROJECT COMPONENTS** –
  - Access ways
  - Temporary road
  - Equipment
  - Seaweed
  - Plant material
Saco Implementation
2013: 19 properties, Beach-scraping and Slope Rebuilt
Saco Implementation
Mulch with Seaweed
Plant Dune Grass *(Ammophila)*
Fencing – open, minimal
Site 1: Mixed Results, K Cottage, Ferry Beach

Storms took ~50% over the 2013-2014 winter
Spring repairs were made

Repaired area had less growth (no seaweed).
Site 2: Optimal Outcome -- Sisters of Mercy

Sand retained, and accreted.

Maine Beaches Conference 2017

© S.Y. Schaller 2017
Dark green = temporary road for seaweed deliveries
Seaweed as Resource restoring natural process

- **EROSION MULCH** -- texture holds surface & traps sand
- **NUTRIENTS** – macro-, micro-, trace & organic material
- **PLANT GROWTH HORMONES** make or break a project
- **SURFACE MULCH** buffers against drought, moisture loss
Case 3: Old Orchard Beach – dune constructed 1996

Fully developed frontal dune – 72 public access paths + private

Abutters – Tourism – sense of ownership – mostly Town owned

Dune constructed mid-1990s

Major erosion – 2007 Patriots Day Storm

Fencing could be enough
Old Orchard dune swath layout on Surf Street

Constructied mid-1990’s → private paths created → foot traffic → cumulative dune loss = lost protection

Result:
Fencing & maintenance are key to protect dune projects.
Storm Damage & User Damage at Old Orchard

Openings funnel storm water & debris into streets & homes

Openings widen with each additional season

Street drains fill w/ sand = added maintenance costs and street flooding
3) Dune Widened after Patriot’s Day Storm

Sloped dune front dissipates wave energy

April 2010

September 2010
Dune Natives for Dune Restoration

American Beach Grass
*Ammophila breviligulata*

Beach Pea
*Lycopus maritima*

Pitch Pine
*Pinus rigida*

Virginia Rose
*Rosa virginiana*

Beach Plum
*Prunus maritima*

Northern Bayberry
*Myrica pensylvanica*

Maine Beaches Conference 2017

© S.Y.Schaller 2017
Additional Tools: Dune Walkovers

Elevated dune walkovers
• do not channel waves,
• prevent dune edge erosion
  ➢ Permits required
  ➢ Specifications vary

Spaces between decking
Open risers
Height allows sand movement
Coastal Erosion Mitigation in Southern Maine

- Soft Solutions can be only option against damage
- Soft Structures buy time – do not last forever
- Vegetation & Seaweed are valuable components
- Fencing usually mandatory for project success

Sue Schaller, MS, CPESC
Wetlands & Wildlife Biologist
BarMillsEcologic@aol.com  207.929.5040
Seaweeds make good fertilizers because they are high in major nutrients -- nitrogen, potash and organic matter—although relatively low in phosphorus. Seaweed also provides growth hormones (auxins, gibberellins, and cytokinens), vitamins, and trace elements (cobalt, iodine, molybdenum, copper, boron, iron, zinc, and manganese) (Senn 1987). Although composted seaweeds contain more salt than barn waste or animal manures, studies have shown it contains less salt than commercial fertilizers (Chapman 1970). Application methods include spreading wet or dry material on top of the soil, digging it into the ground, soaking in water to apply as a spray or extract, and composting. When applied as wet driftweed it was historically spread on the soil during planting at a rate of 10-12 tons per acre, or at the rate of 45-50 tons per acre after harvest. (Chapman 1970) Composted seaweed can break down as quickly as 2-3 months or over 4-12 months (Schaller unpublished data; also in Chapman 1970: Shutt 1914, Little 1948). Studies that compared commercial fertilizers to composted seaweed found that crop yields were similar (Oyieke 1986).