

Adaptation to Sea Level Rise – A Regional Approach in Saco Bay, Maine

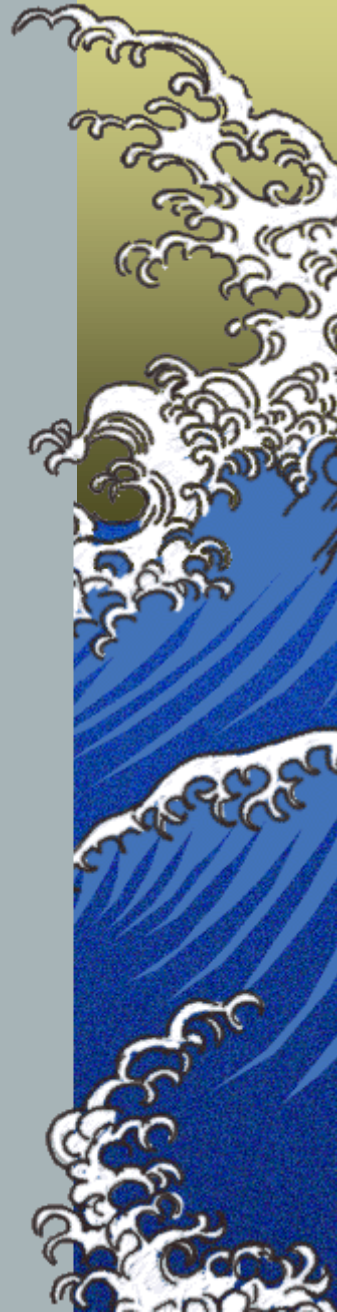
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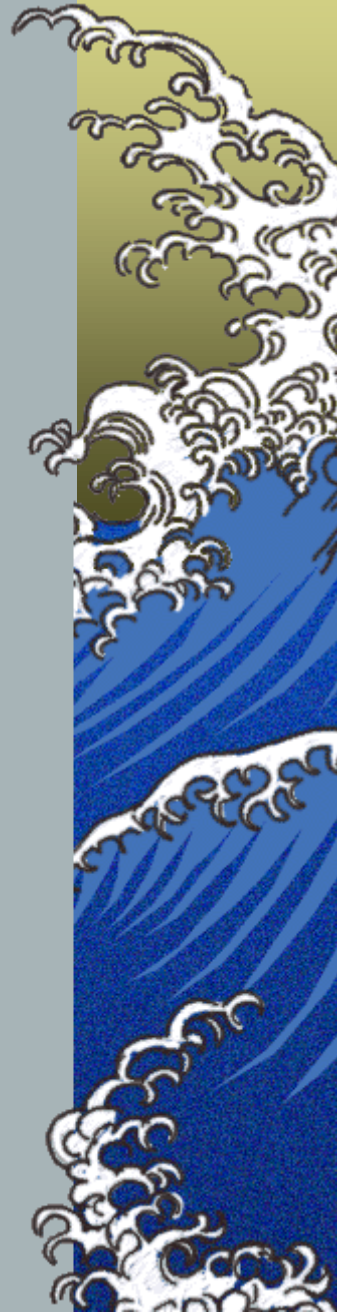
Maine Coastal Program



Sea Level Adaptation

Capital Projects will be needed:

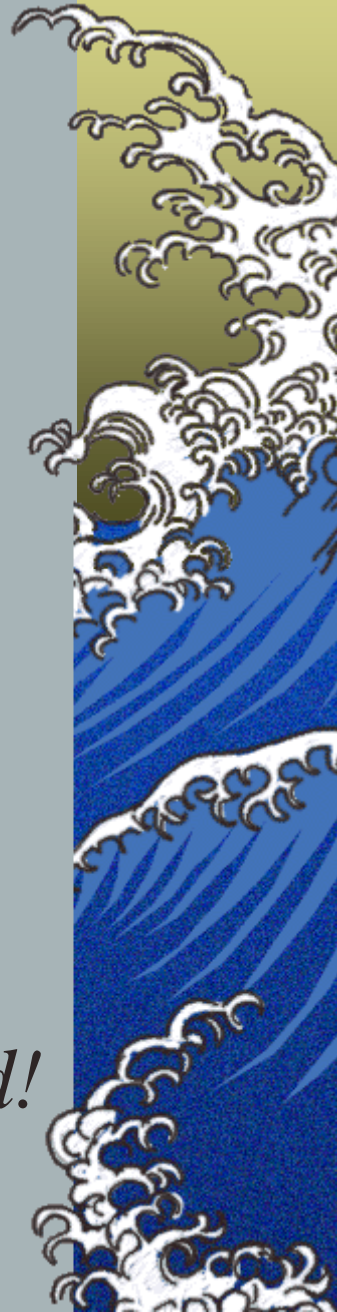
- *Elevation of Roads*
- *Enlargements of Culverts and Other Drainage Systems*
- *Relocation of Municipal Facilities*
- *Purchases of Property in the Path of Migrating Shorelines*



Sea Level Adaptation

Regulatory Changes Will Play a Role:

- *Existing State Programs will be adjusted—
DEP Shoreland Zoning, Sand Dune Act,
NRPA, Site Law*
- *Local Actions will need to be taken to
amend local Zoning Ordinances and
Floodplain Management Ordinances*
- *Maine Municipalities are Already Involved!*



What is this SLAWG Project?

- *A committee has been created, with two members appointed from each community, along with an SMRPC regional planner, to create the Sea Level Adaptation Working Group (SLAWG).*
- *An interlocal agreement has been approved by either three or four of the Councils, as of the date of this presentation.*



What is this SLAWG Project?

- *The agreement contains the purpose, duties, membership, and other by-laws for the working group to function effectively, and can be found at www.smrpc.org .*
- *Upon completion of a regional action plan, the SLAWG will have the following duties:*



Possible Duties of the Sea Level Adaptation Working Group (SLAWG)

- *Commenting on federal or state beach nourishment/erosion control efforts that affect more than one community, including management or deposition of dredged materials.*
- *SLAWG will coordinate with the Saco Bay Implementation Team and other groups working on Bay issues.*



Possible Duties of the Sea Level Adaptation Working Group (SLAWG)

- *Identifying infrastructure vulnerable to storms and sea level rise such as culverts, storm drains, bridges or tide gates.*
- *Using regional approaches to plan for improvements;*
- *Obtaining grants or appropriations for construction projects on a regional basis, or Supporting individual municipal grant or appropriation requests for such projects.*



Possible Duties of the Sea Level Adaptation Working Group (SLAWG)

- *Recommending the standardizing of floodplain management standards and building code interpretations to improve resiliency of individual private structures.*
- *Recommending standardizing of zoning ordinance review standards affecting the shorelands adjacent to Saco Bay, as well as water activities for structures and activities affected by sea level rise or coastal storms.*



Possible Duties of the Sea Level Adaptation Working Group (SLAWG)

- *Such water activities may or may not include land-based development, and could include aquaculture, marina, or green energy production projects.*
- *Providing non-binding comments on various applications for development review affecting Saco Bay that may be vulnerable to sea level rise or coastal storms, to those individual review authorities having jurisdiction.*

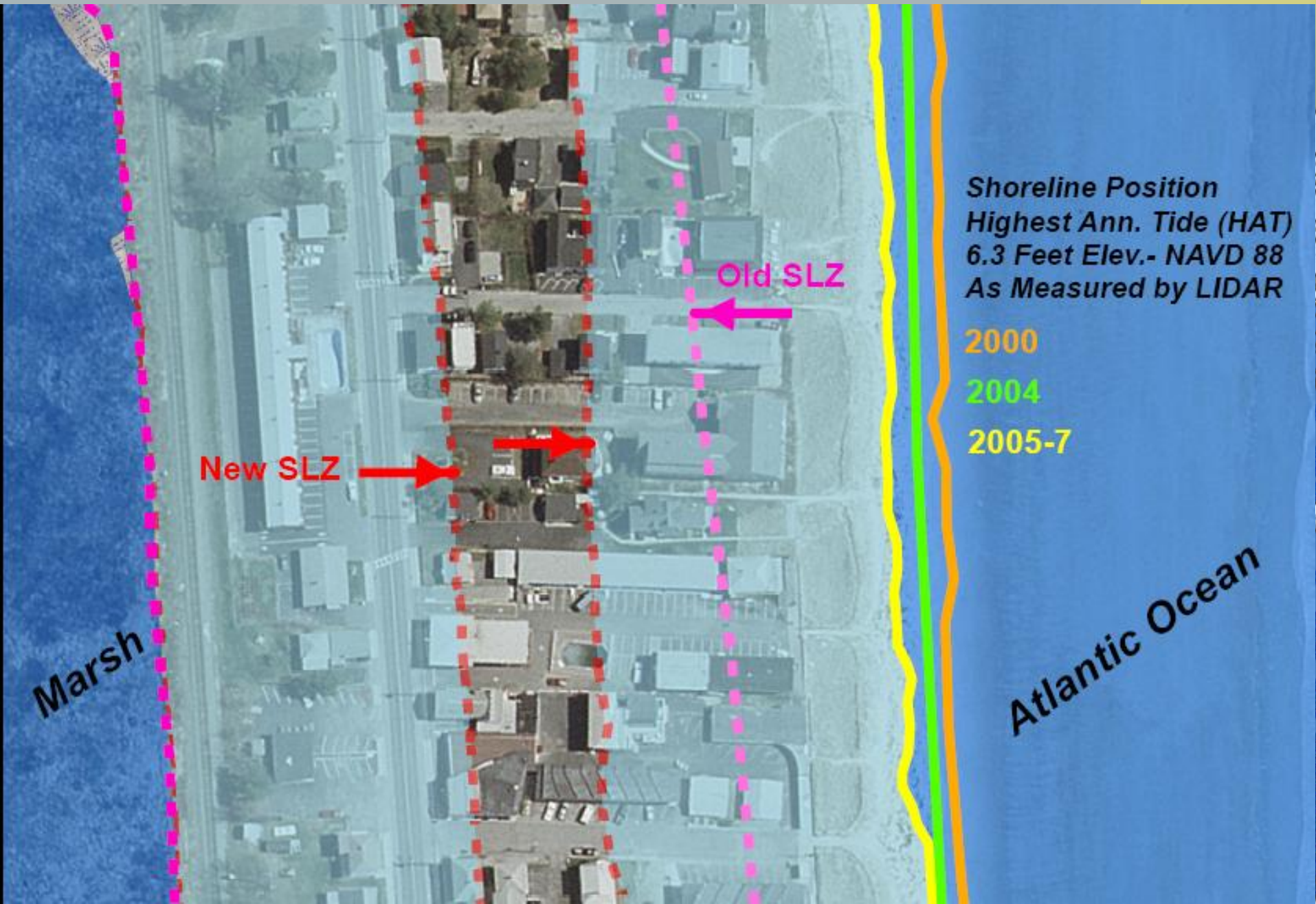


Local Examples of Adaption: For Maine, It's Improving Shoreland Zoning

- *Using LiDAR (Light Detection and Ranging) to set an accurate shoreline position*
- *You can't begin to deal with adaptation unless you know where your shoreline is!*
- *Highest Annual Tide Level – HAT*
- *For this area, it's 6.3 feet above mean sea level..*

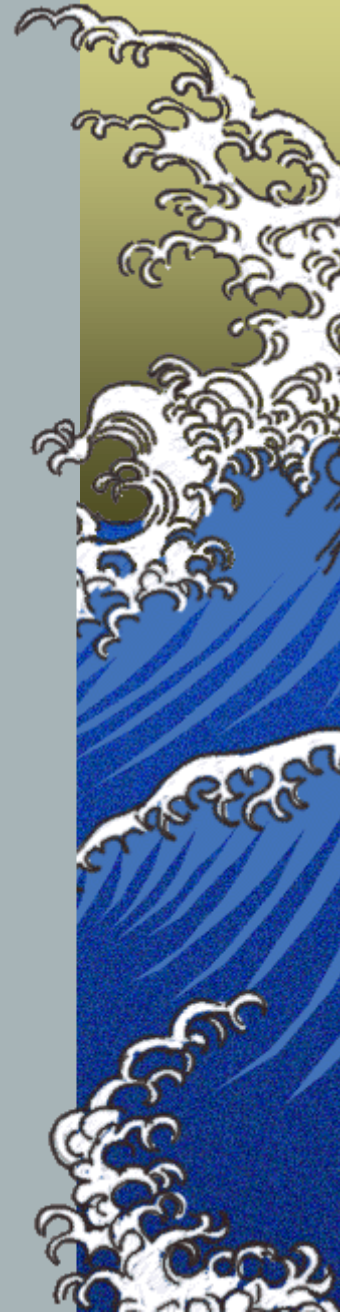


Old Orchard Beach – East Grand Avenue Area



Looking at the Future: Higher than today's "HAT" or today's 100-year Floodplain

- *Ogunquit, Maine – New Definition of “Normal High Water”*
- *Seabrook, New Hampshire – Preliminary Discussions of “Extended Coastal Flood Hazard Overlay”*
- *Adjustments to Maine Shoreland Zoning Guidelines and Model Floodplain Management Ordinances, by SMRPC*



Looking at the Future: Higher than today's "HAT" or today's 100-year Floodplain

*Model Coastal Floodplain Development
Bylaw - Dec. 2009*

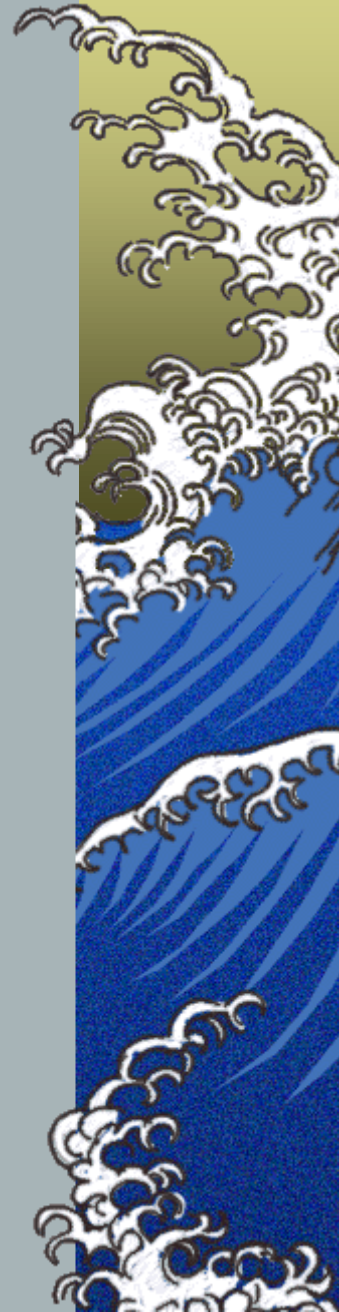
Collaboration of:

- ▶ *Woods Hole Sea Grant*
- ▶ *Cape Cod Commission,*
- ▶ *University of Hawaii Sea Grant*
- ▶ *Cape Cod Cooperative Extension*



Ogunquit Zoning Ordinance – Adopted SLZ Language

“In the case of land adjacent to tidal waters, the normal high water line shall be considered to be the contour line at an elevation 11.0 feet above mean sea level as determined by a land surveyor based on the nearest USGS benchmark.”

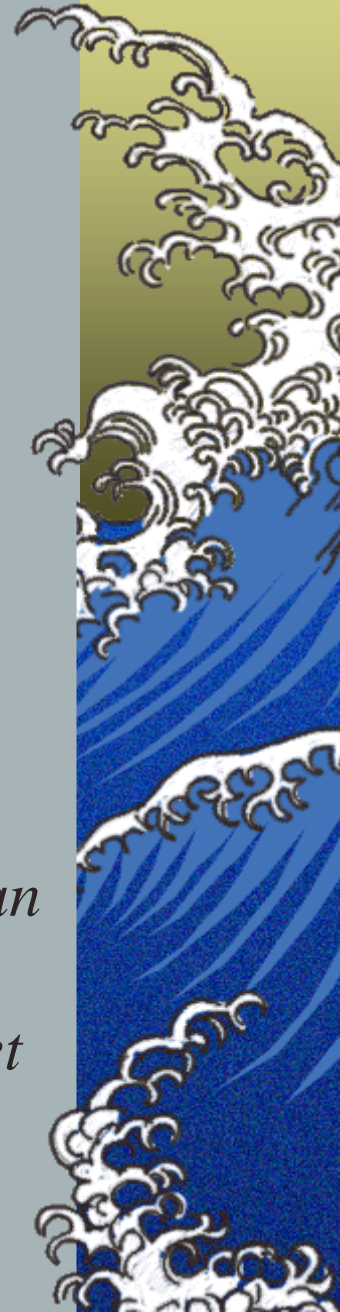


Ogunquit Zoning Ordinance – Adopted Language

DEP Highest Annual Tide – 2008 Predictions.

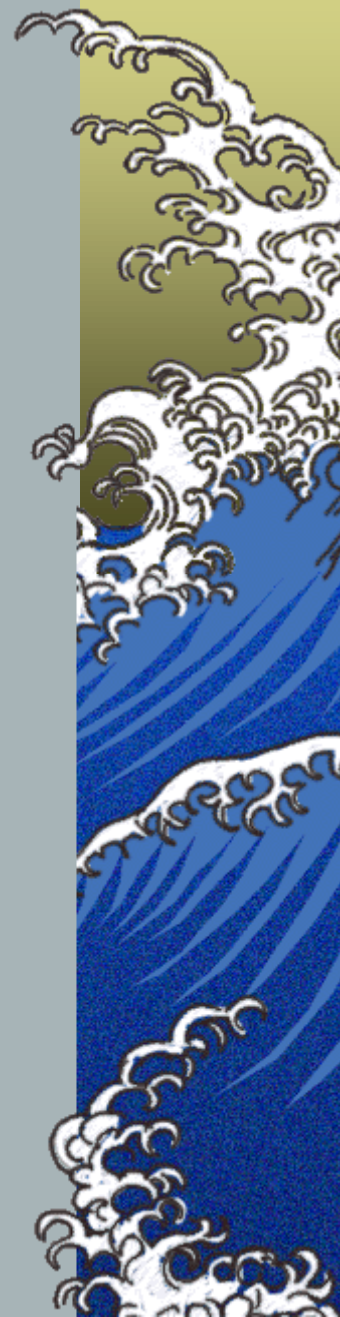
Location	Highest Annual Tide Height (elevation in feet, NGVD29)
Kennebunkport	7.0
Wells, Webhannet River	6.9
Cape Neddick	6.8

- *This means that Ogunquit is using a position four feet higher than the highest annual tide as the start of its setback.*
- *In the area of marsh between Route 1 and the barrier beach, the FEMA 100-year flood is predicted to rise to an elevation of 9 feet.*
- *The contour line set for measuring the setback is two feet higher than the height of the 100-year flood (in the salt marsh area).*



Seabrook, NH – A Proposal at the New Frontier of Floodplain Management

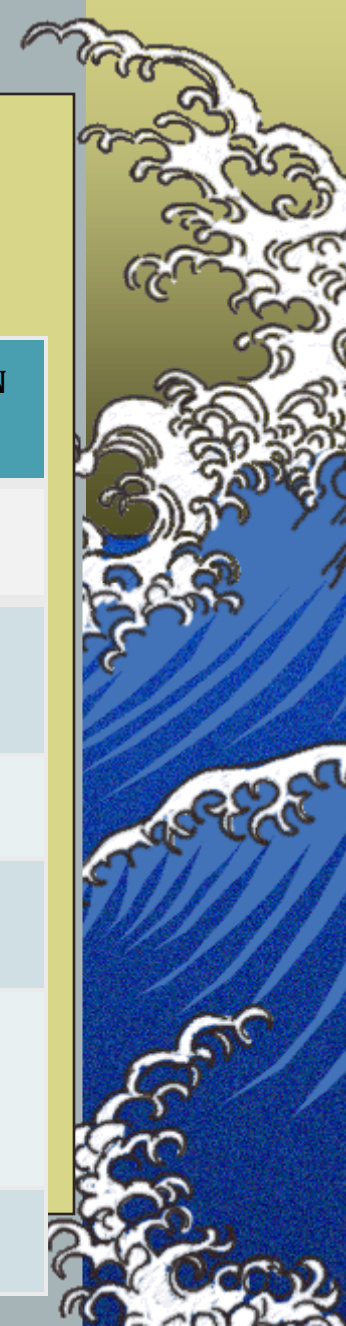
- ▶ *Uses Rhode Island Coastal Policy (2007) of 3-5 foot sea level rise by 2100. (Maine uses 2 feet.)*
- ▶ *Adds 6 feet to current 100-year tidal flood height of 9 feet (NGVD 29) to create an “Extended Coastal Flood Hazard Overlay,” with the upper edge of the zone set at 16 feet.*
- ▶ *Within this zone, the proposal envisions setting “freeboard” heights, way beyond current FEMA Floodplain Management Ordinance requirements.*



Seabrook, NH – A Proposal at the New Frontier of Floodplain Management

Table 2
DESIGN FLOOD ELEVATION STANDARDS
EXTENDED COASTAL FLOOD OVERLAY DISTRICT

STRUCTURE TYPE	DESIGN FLOOD ELEVATION	RECONSTRUCTION THRESHOLD
Accessory Structures	10 ft. (9 ft. BFE + 1 ft.)	NA
Single Fam. Residential & Multi- family <5 Units	11 ft. (9 ft. BFE + 2 ft.)	50%
Multifamily 5+ units	12 ft. (9 ft. BFE + 3 ft.)	40%
Commercial Development	12 ft. (9 ft. BFE + 3 ft.)	40%
Essential Facilities (schools, hospitals, public safety buildings, etc.)	13 ft. (9 ft. BFE + 4 ft.)	33%
Public Infrastructure	14 ft. (9 ft. BFE + 5 ft.)	25%



Cape Cod/Woods Hole Model Bylaw

- ▶ *“Coastal High Hazard Zone” is created by adding 200 foot landward buffer to the FEMA V-zones*
- ▶ *No new structures except water-dependent*
- ▶ *Reconstruction of damaged existing structures without expansion OK.*
- ▶ *Minimum “Freeboard” increased from 1 to 3 feet.*



Cape Cod/Woods Hole Model Bylaw

- ▶ *“Coast Wetland Resource Area” is created by adding 100 foot landward buffer to the FEMA Coastal A-Zone.*
- ▶ *No new residential/human occupancy uses; Water dependent structures OK.*
- ▶ *Reconstruction of damaged existing structures without expansion OK.*
- ▶ *Minimum “Freeboard” increased from 1 to 3 feet.*



Cape Cod/Woods Hole Model Bylaw

- ▶ *Width of Buffer is based upon “LiMWA” or “Limit of Moderate Wave Action.”*
- ▶ *LimWA is the actual landward limit of the hypothetical 1.5 foot wave on top of the predicted 100-year flood elevation.*
- ▶ *Applicant can challenge the width of buffer by conducting an analysis of the topography of the site, and may be able to prove that on his or her subject property, the LimWA extends less than 200 or 100 feet horizontally from the FEMA flood elevation.*



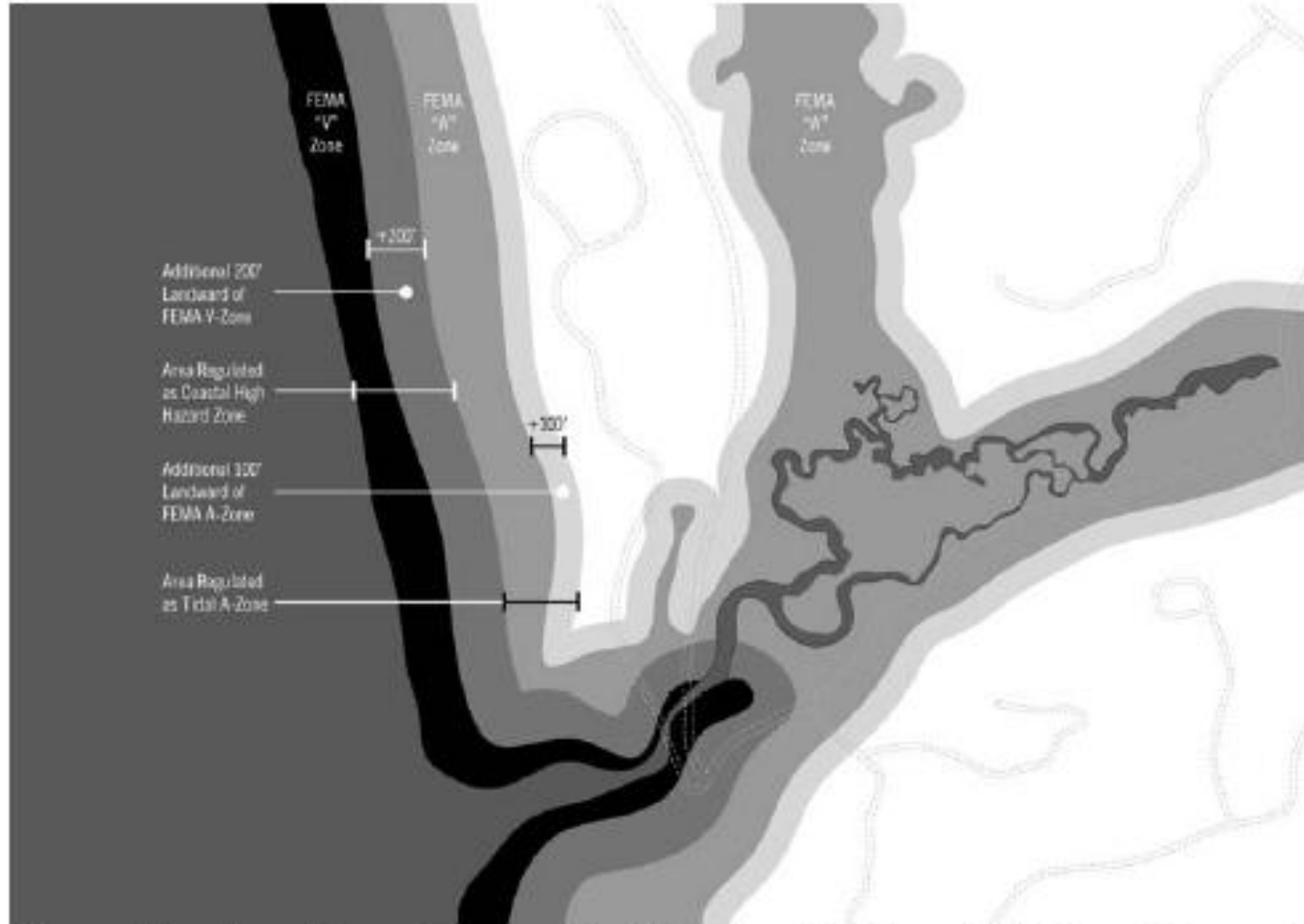


Diagram: The above diagram illustrates the delineation of the Coastal High Hazard Zone and the Tidal A-Zone as defined above in Article 3 (1) and (2). These zones together comprise the Coastal Floodplain District regulated by this bylaw.

Cape Cod/Woods Hole Model Bylaw

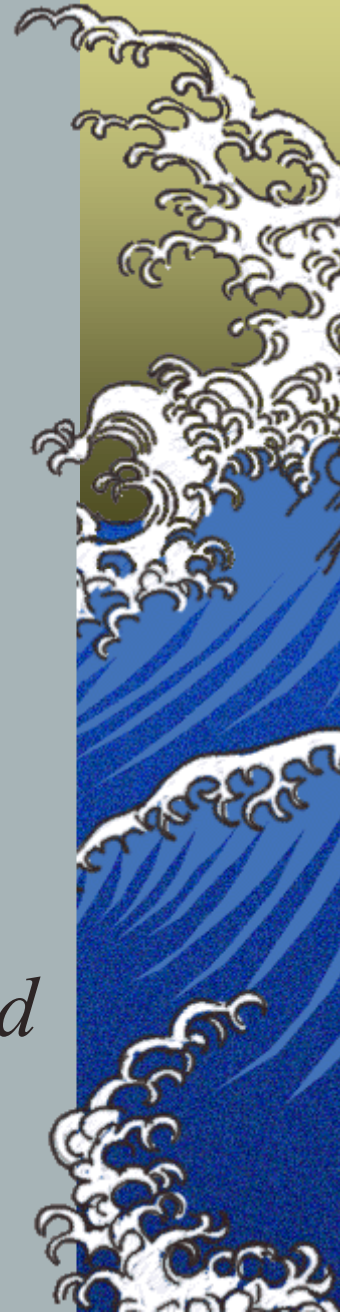
In both Coastal High Hazard and Tidal A-Zones:

- ▶ *Minimum Horizontal Setback from Upland Edge based on 70 times the average annual erosion rate for buildings less than 5,000 square feet.*
- ▶ *Minimum Horizontal Setback from Upland Edge based on 100 times the average annual erosion rate for buildings greater than 5,000 square feet.*



Where can our communities go from here?

- *Actions to adapt to sea level rise and improve resiliency to storms, can be incorporated into each community's comprehensive plan and capital plan.*
- *Municipalities should start discussing modifications to Shoreland Zoning and Floodplain Management Ordinances to adapt to Sea Level Rise...SMRPC has started work on model language. We intend to incorporate elements discussed here.*



Where can our communities go from here?

- *New LiDAR data can be used in coastal tidal areas to set the limits of the coastal wetland to the elevation of the highest annual tide, just like the way Old Orchard Beach has done.*
- *Why not plan for where the shoreline is now, rather than 40 or 50 years ago?*
- *And the big challenge, why not plan for where the shoreline is going to be by 2100?*



Where can our communities go from here?

- *Municipalities can work regionally to create parallel regulations, and obtain funding for capital improvements.*
- *Communities that have identified their needs to adapt to rising sea levels will have an advantage.*
- *Perhaps more SLAWGs will be formed in Maine!*



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