

Maintaining Coastal Infrastructure in Massachusetts: Approaches for Shoreline Management

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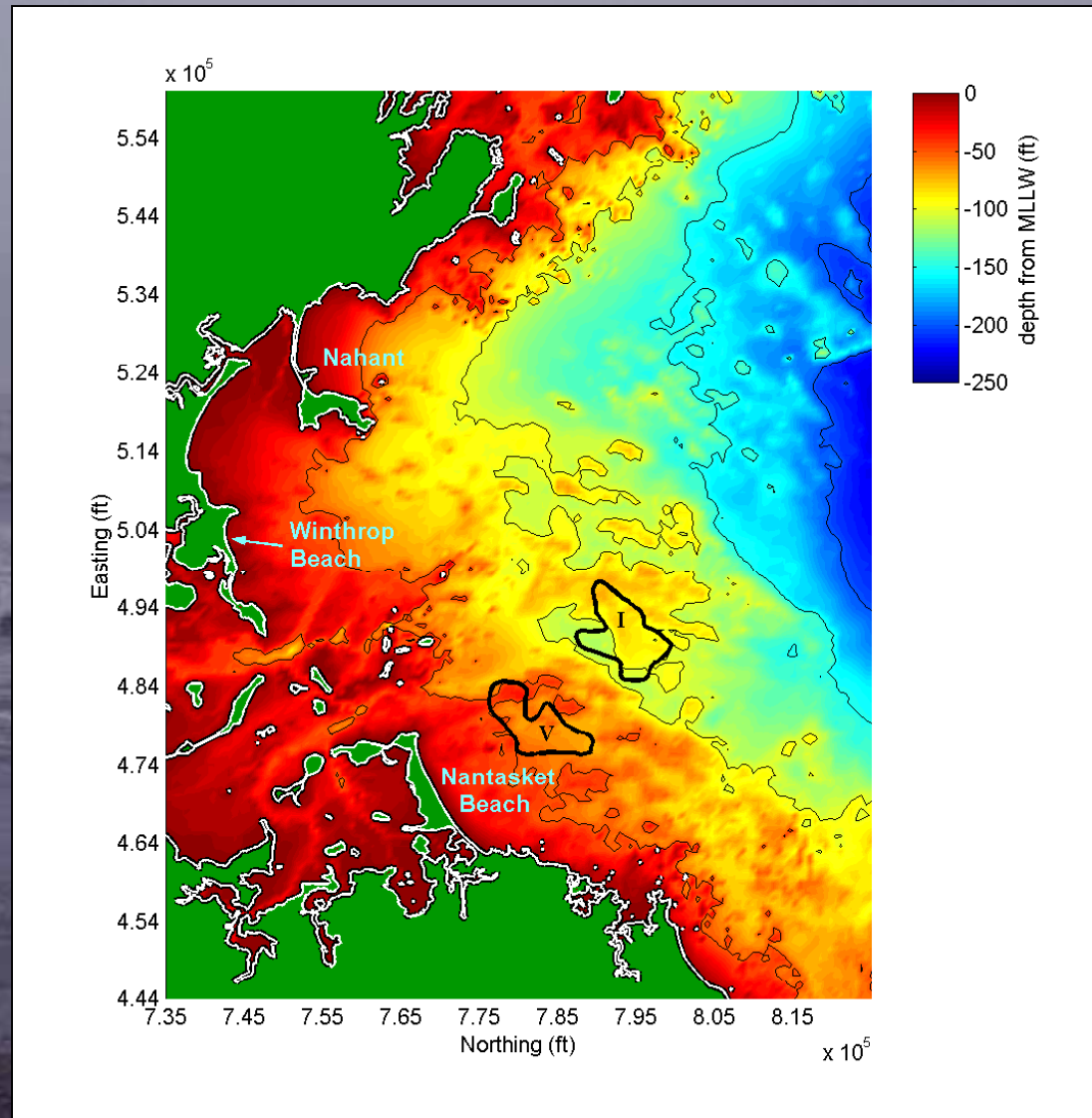


How do manage our coastline?

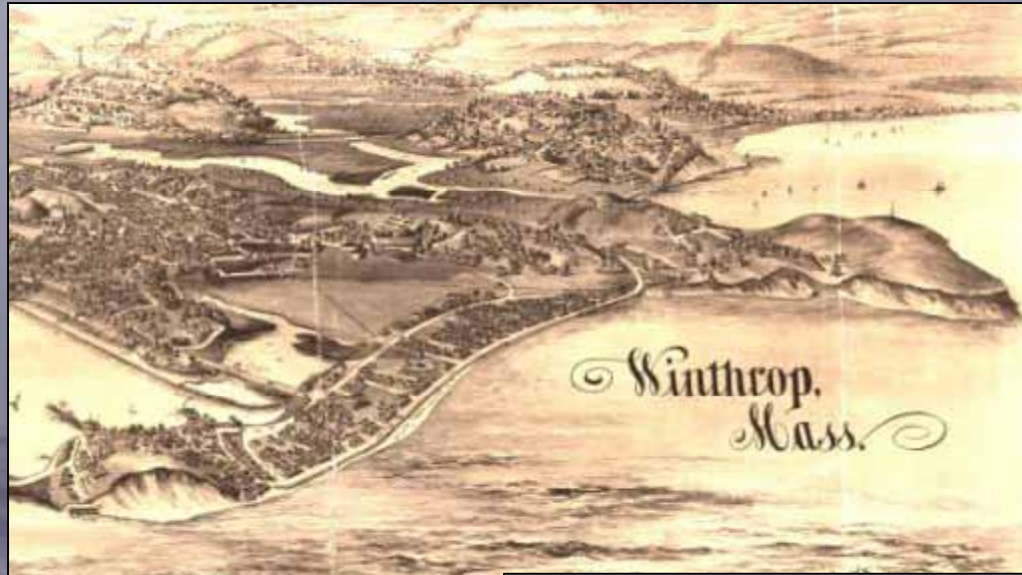
The influence of 380+ years of coastal development

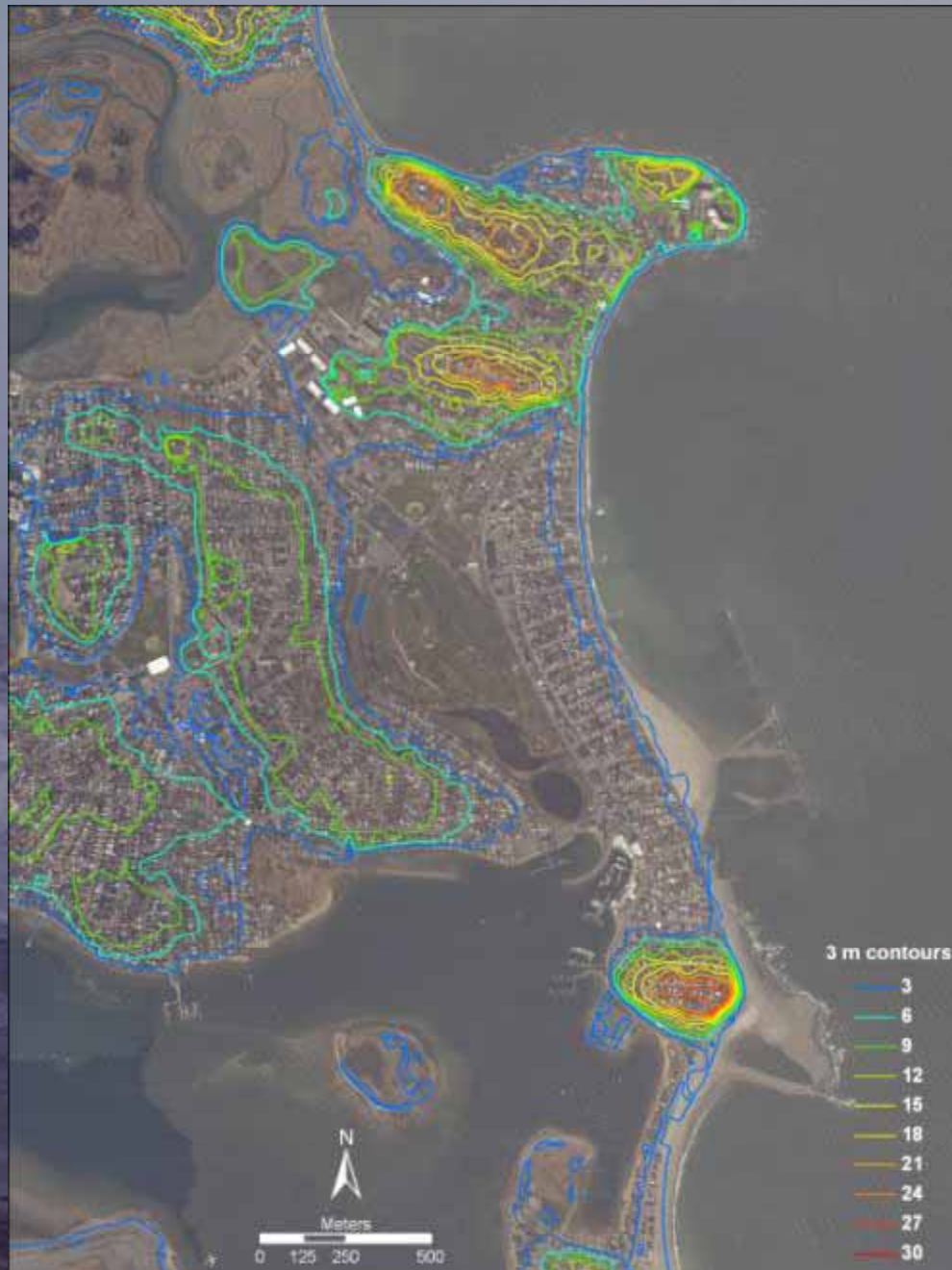


What Makes the Massachusetts Shoreline Unique?

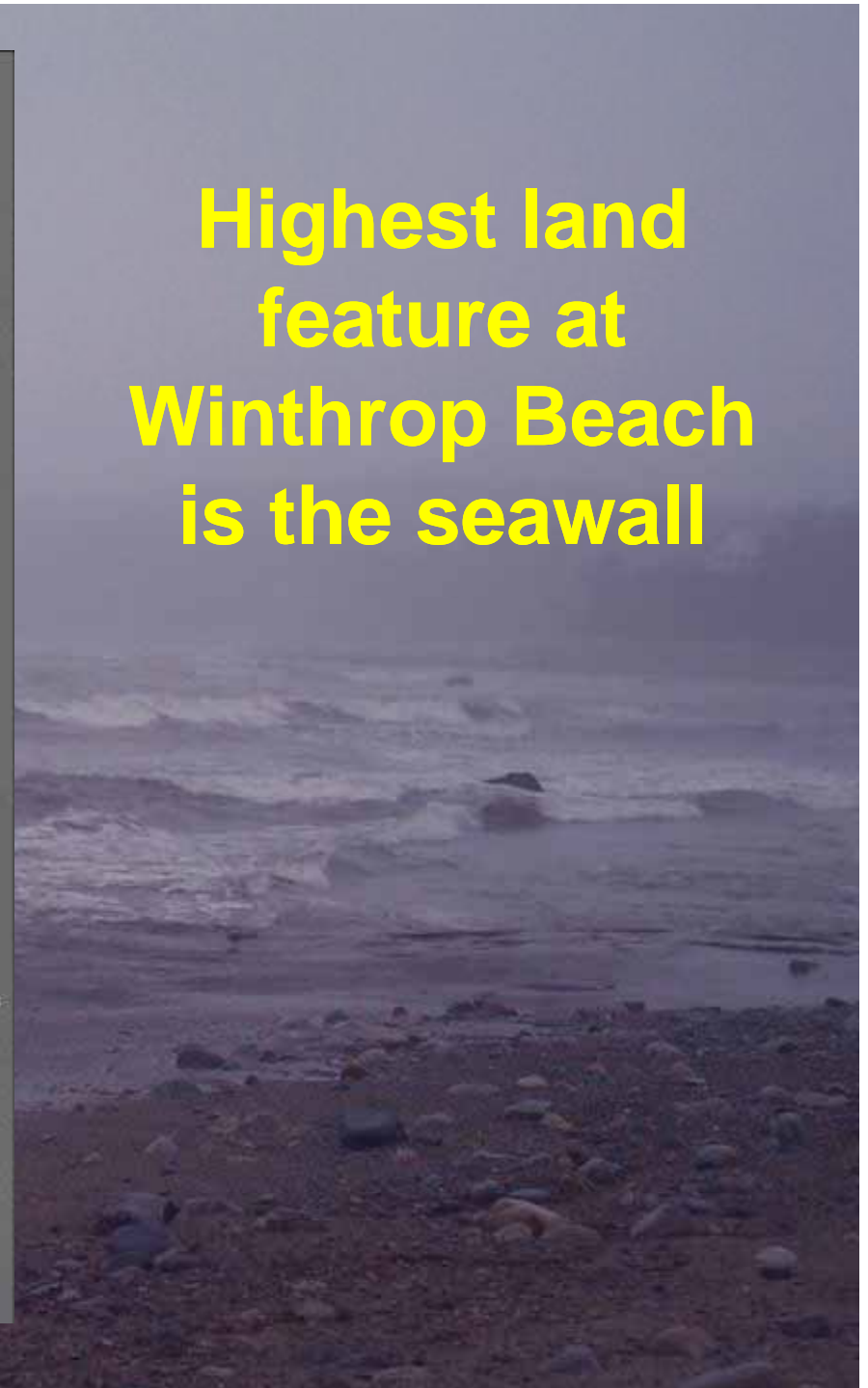


What Makes the Massachusetts Shoreline Unique?





**Highest land
feature at
Winthrop Beach
is the seawall**



What Makes the Massachusetts Shoreline Unique?



What Makes the Massachusetts Shoreline Unique?

Historic Shoreline Armoring



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Historic Shoreline Armoring

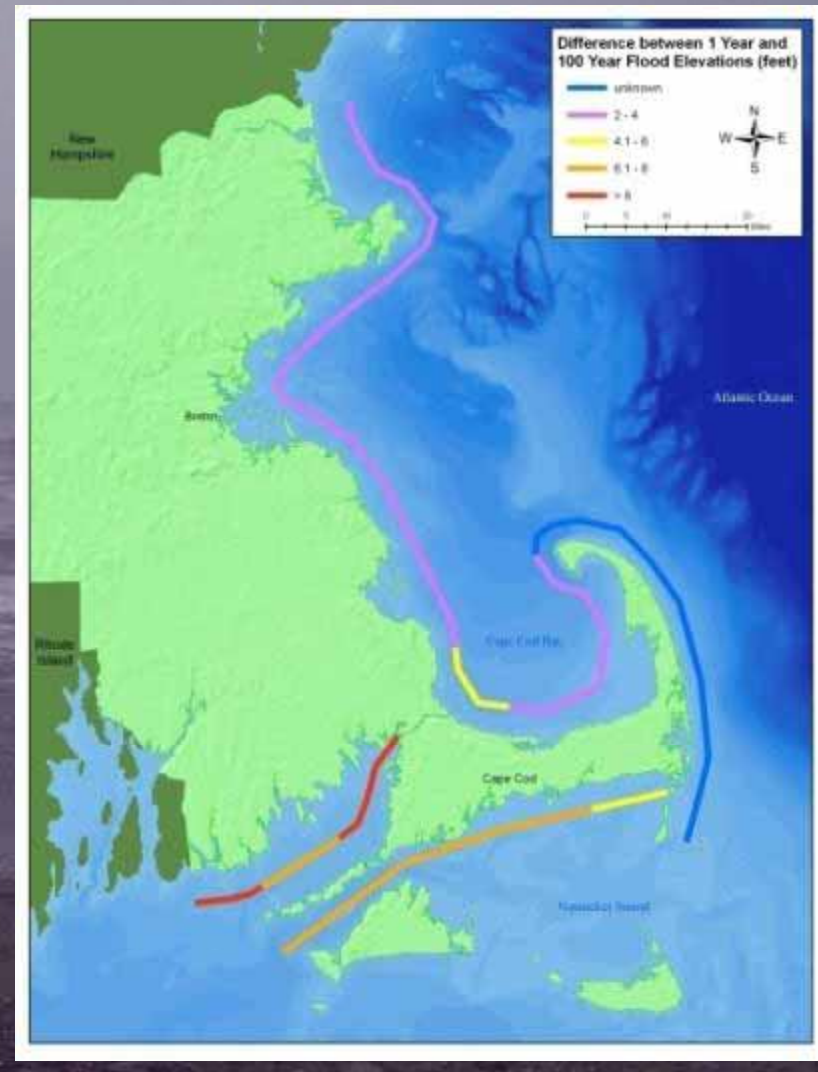
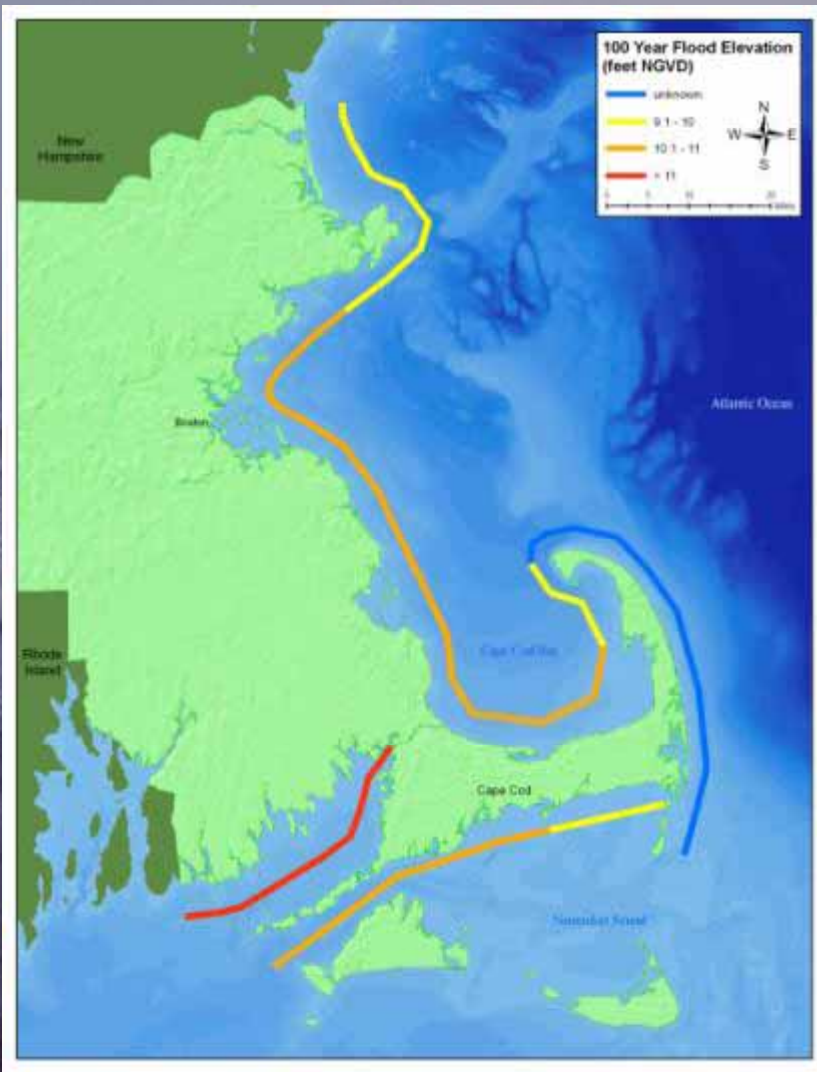


What Makes the Massachusetts Shoreline Unique?



What Makes the Massachusetts Shoreline Unique?

Influence of Storms



How do these factors influence long-term stability?

Long-term Lowering of Beach



How do these factors influence structure design?

Undersized Armor



The Result... Emergency Repairs



But this solution is only a “band-aid”



Putting It All Together... Think Regionally

- Understanding local coastal processes is critical
- Establish alternatives analysis criteria
- Expectations need to be reasonable
- Economic evaluation should consider design life
- Realistic evaluation of environmental impacts



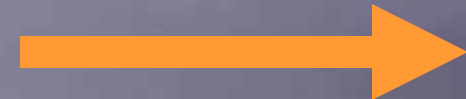
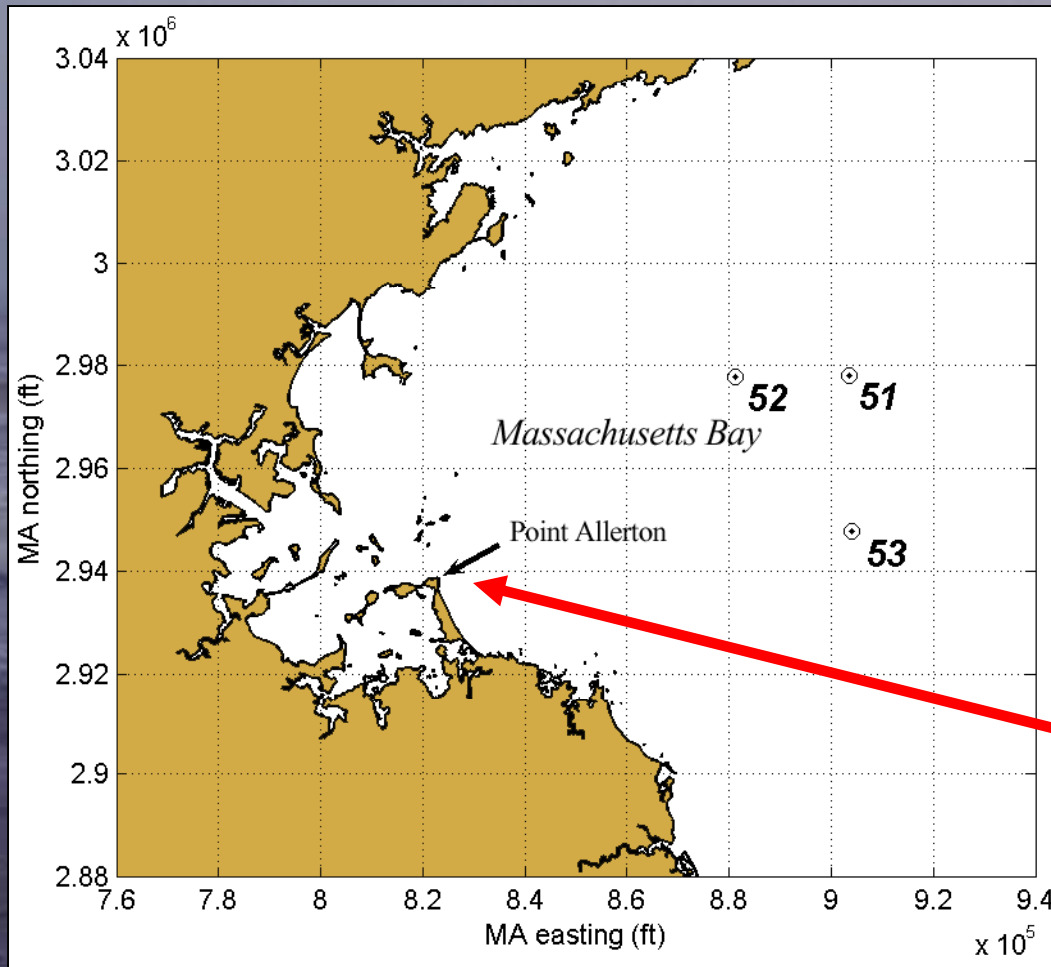
Project Goals

“Solution to the Problem”

- Project design appropriate for site
 - define project purpose and need
 - define design expectations
 - anticipate environmental constraints
 - evaluate short- and long-term economics

How do these factors influence design?

Massachusetts Design Example - Point Allerton



**Open
Atlantic**

**Point
Allerton**

How do these factors influence design?

Massachusetts Design Example - Point Allerton



How do these factors influence design?
Massachusetts Design Example - Point Allerton



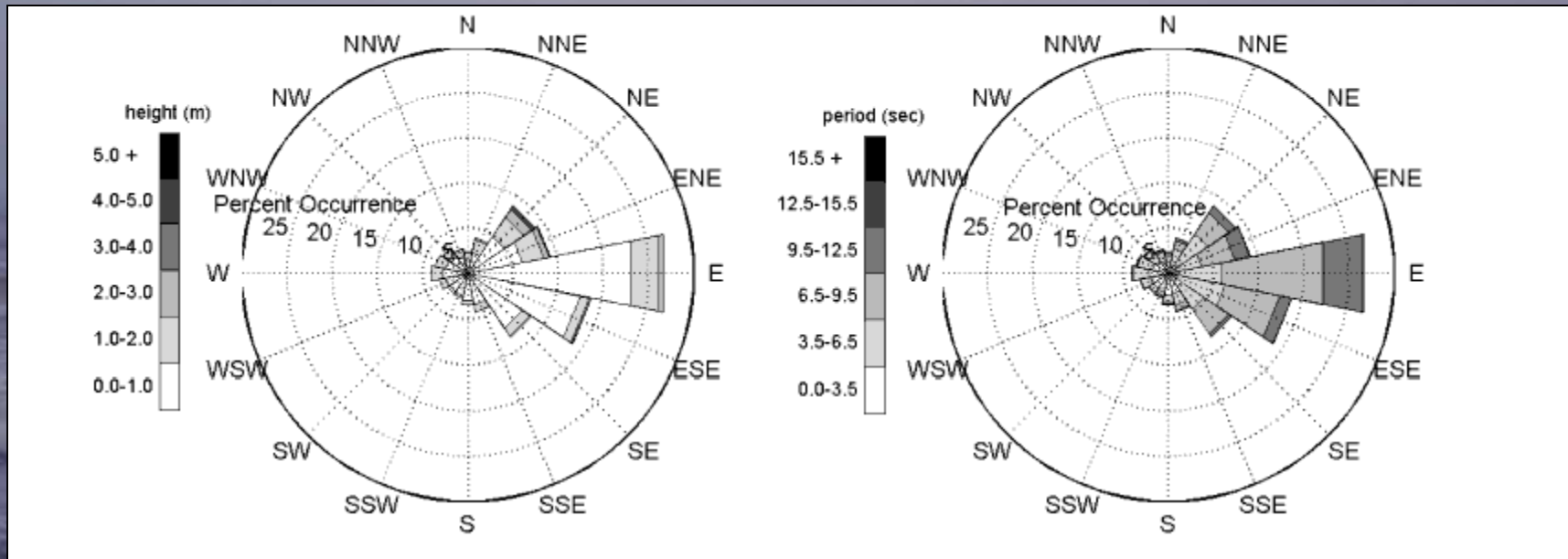
How do these factors influence design?

Increased Overtopping Rates



How do these factors influence design?

Massachusetts Design Example - Point Allerton



WIS Station 52

How do these factors influence design?

Massachusetts Design Example - Point Allerton

100-Year Significant Wave Heights at Seawall Toe	
Existing Profile	9.1 ft
2.5 Feet of Scour	10.4 ft
5.0 Feet of Scour	11.8 ft

Median Design Stone Weight	
Existing Profile	12.5 tons
2.5 Feet of Scour	16.4 tons
5.0 Feet of Scour	20.9 tons

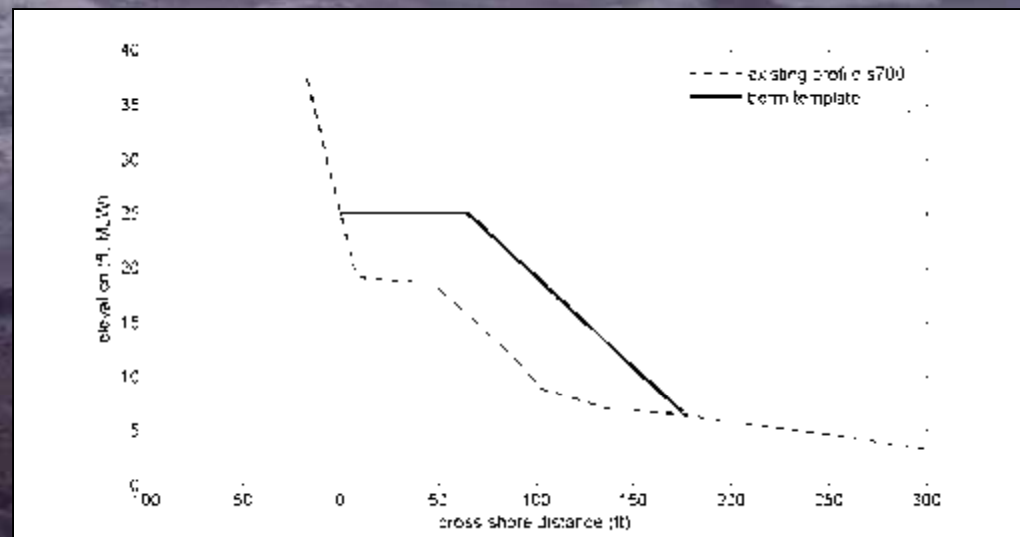
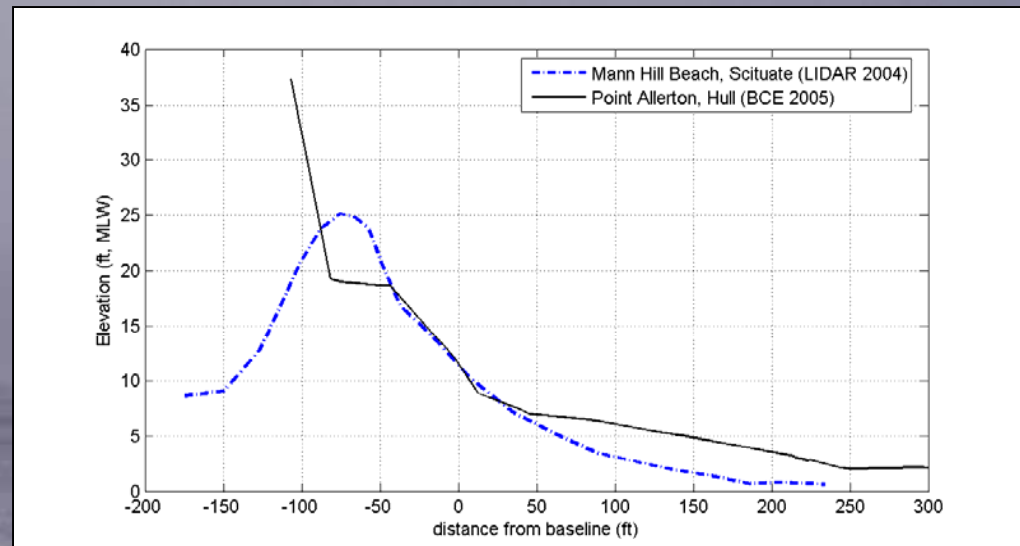
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Massachusetts Design Example - Point Allerton



How do these factors influence design?

Massachusetts Design Example - Point Allerton



Re-Establishing Regional Sediment Supply

Massachusetts Example – Revere Beach



Re-Establishing Regional Sediment Supply

Massachusetts Example – Winthrop Beach

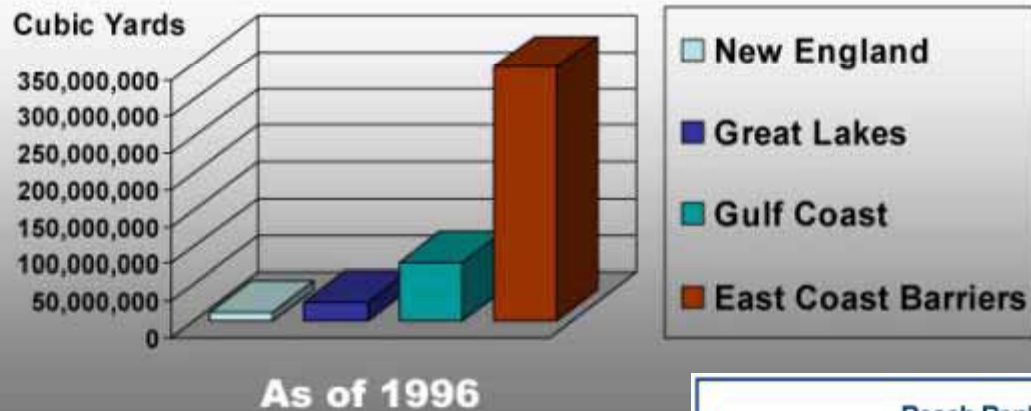


Pre-Nourishment



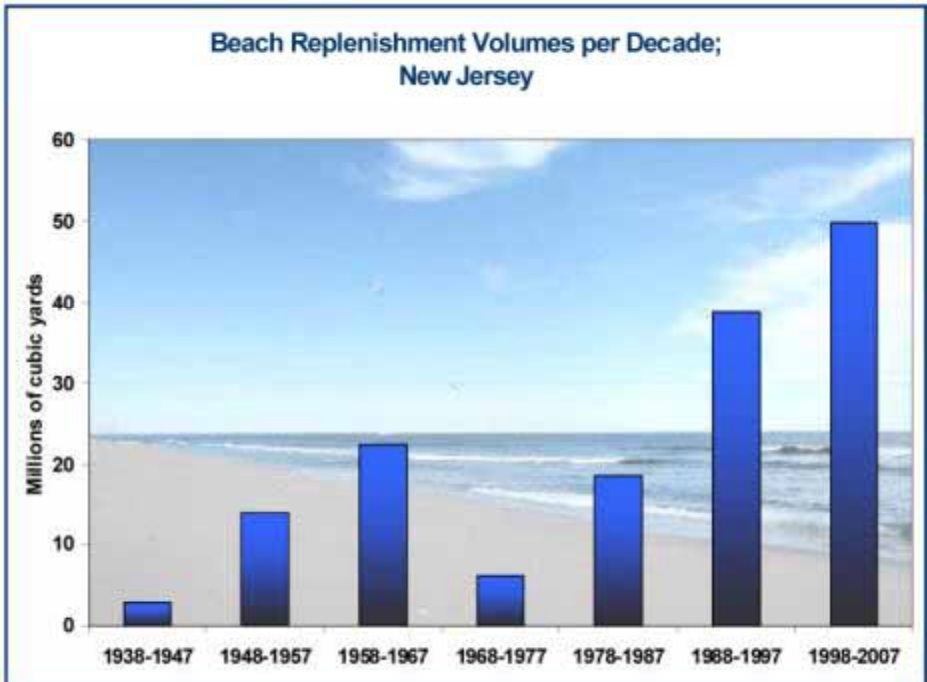
Post-Nourishment

How Are Shorelines Managed Elsewhere?



U.S. East Coast

New Jersey



Other Issues

Definition LSCSF Based on FEMA



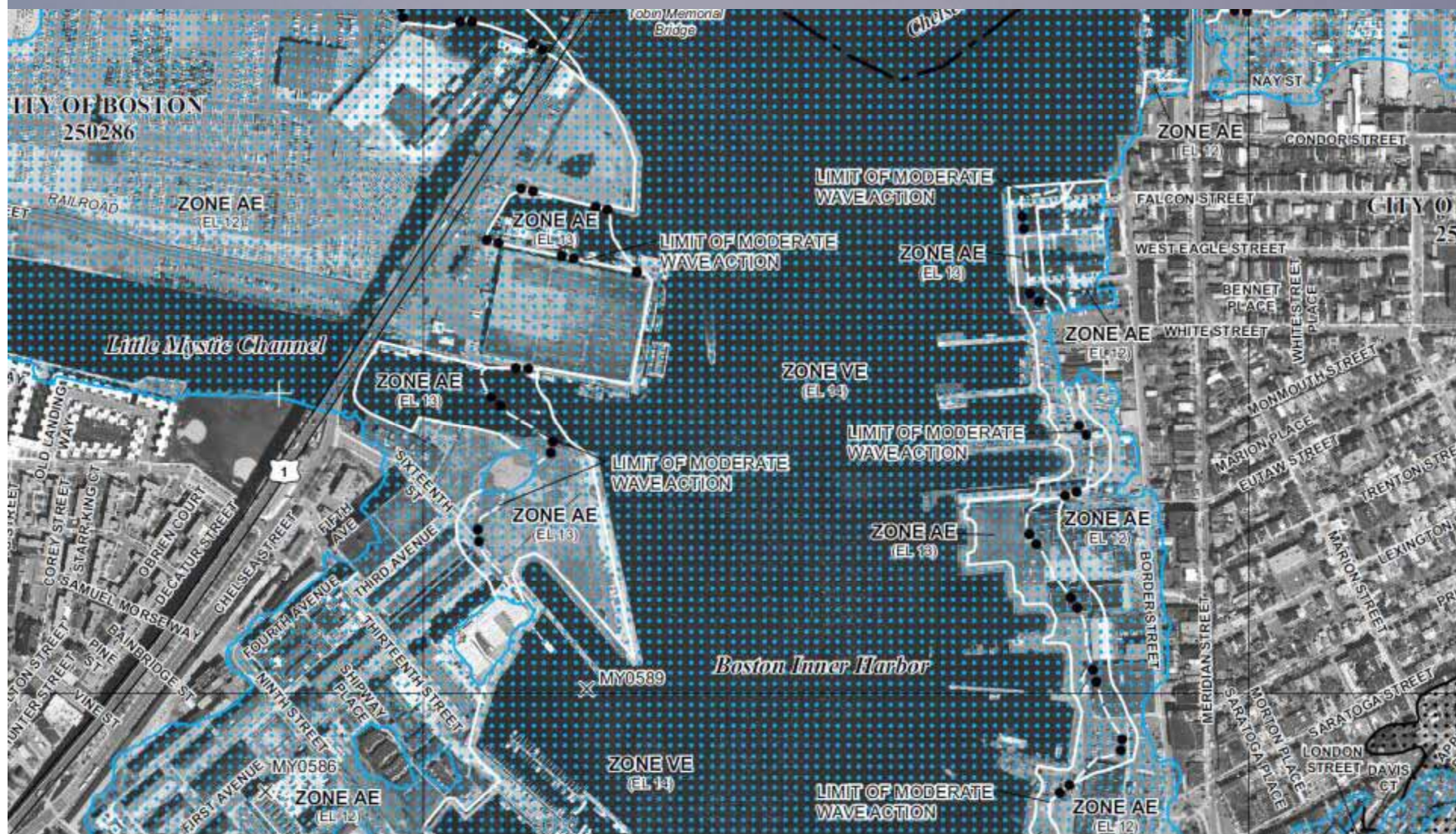
Other Issues

Definition LSCSF Based on FEMA



Other Issues

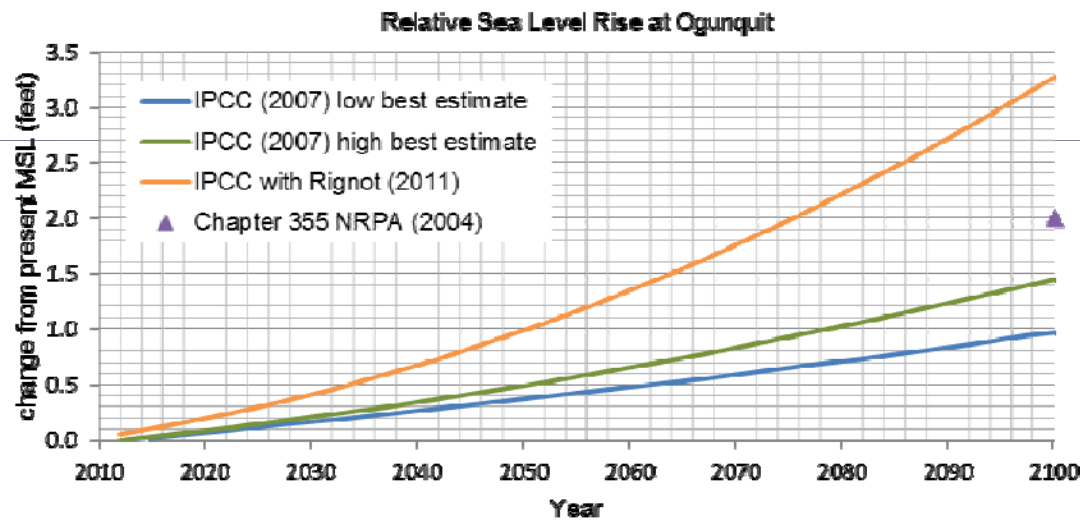
Chelsea Example – Preliminary FIS Maps



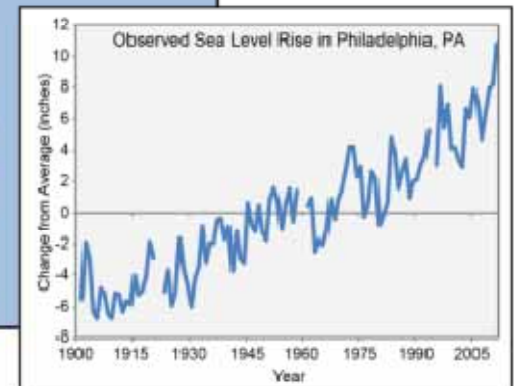
Other Issues

Regional Relative Sea-Level Rise

Massachusetts Subsidence -0.84 mm/year



Sea Level is Rising



Other Issues

Ogunquit– Flooding Example



Questions?

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