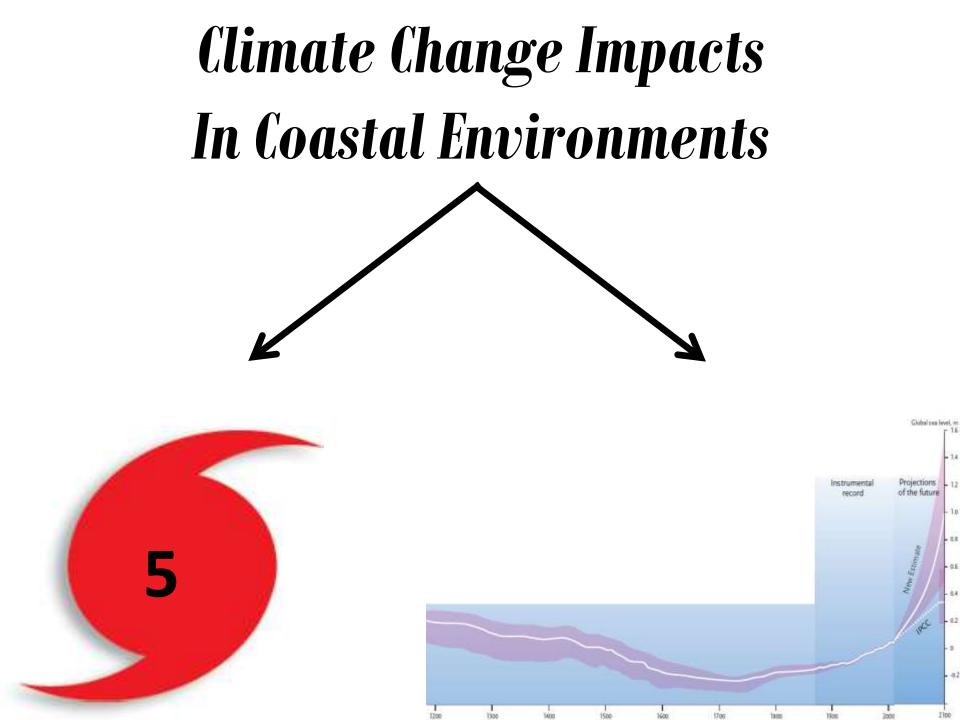
2<sup>ND</sup> ANNUAL CAPE COASTAL CONFERENCE



Linking Science with Local Solutions and Decision-Making

# Dealing With Erosion: The Spectrum of Coastal Erosion Control Methods

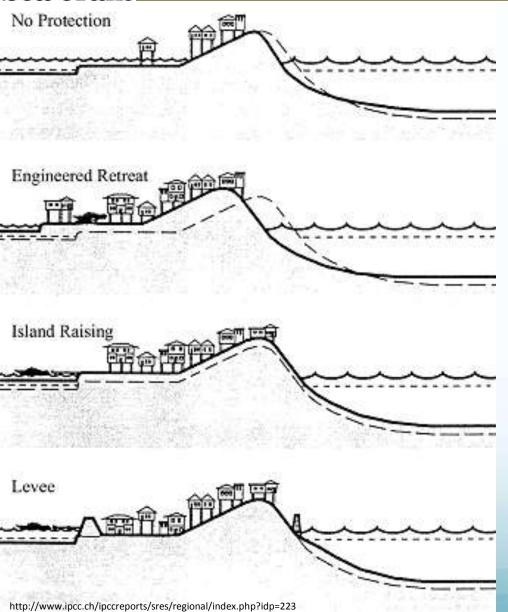
Greg Berman (Woods Hole Sea Grant & Cape Cod Cooperative Extension) Dealing With Erosion: The Spectrum of Coastal Erosion Control Methods





### **Coastal Adaptation**





# On Cape Cod we manage at parcel scale





#### Why protect properties.....?

#### **Town of Brewster example**



The Facts

Value = \$333,000,000

**The Implications** 

(don't want takings)

Only ~1% of properties ~3% of town area but they make ~10% of the real estate taxes To keep the same revenue, the tax rate would go from 8.18 to 9.06 or ~\$300 per household





Do nothing

- 1. Will system recover by itself?
- 2. How far is the structure from the water?
- 3. Grandfathering protects structures (not lawn) before August 10, 1978





#### The Spectrum of Coastal Erosion Control Methods



#### Do nothing

Vegetation



Plant Natives: Root systems stabilize. Take up water. Break the impact of raindrops or wave-splash. Slow down runoff

#### **Remove Invasive**









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- Do nothing
- Vegetation
- Re-grade









- Do nothing
- Vegetation
- Re-grade
- Managed retreat











- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment = Fill of a CRA





#### <u>Sacrificial</u>



#### Cobble (Mixed)





- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment







- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing











- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing













- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing









- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourish
- Sand fencing









- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls

Diameter 12"-20"









OF HARRIS

- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls











- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes







- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes







- Do nothing
- Vegetation
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- Coir Envelopes







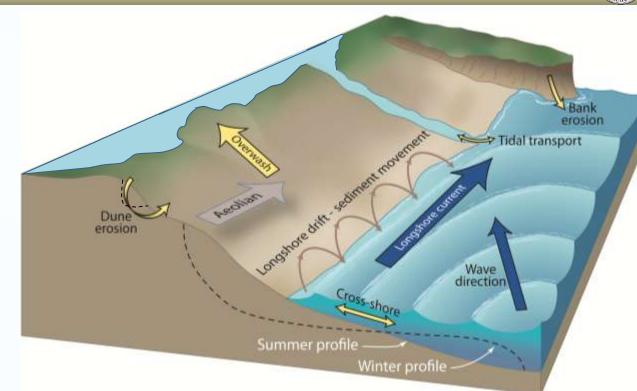






- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes

# CES



<u>WPA:</u> Coastal engineering structure means, but is not limited to, any breakwater, bulkhead, groin, jetty, revetment, seawall, weir, riprap or any other structure that is designed to **alter wave, tidal or sediment transport processes** in order to protect inland or upland structures from the effects of such processes.





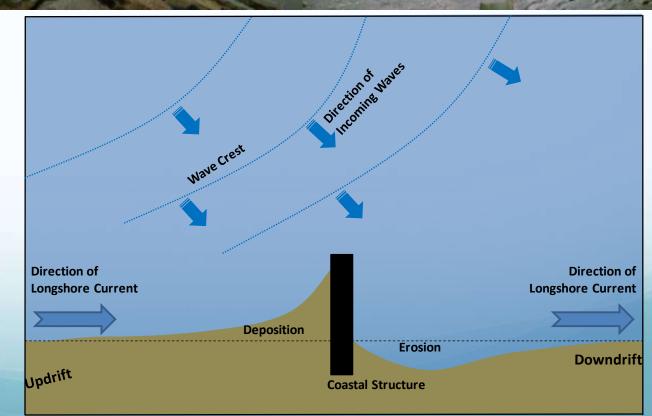
- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes

CES

• Groin











- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls

CES

Groin

Jetty

Coir Envelopes









- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- **Beach nourishment**

•

- Sand fencing
- Fiber rolls
- **Coir Envelopes**

CES

Jetty

Groin

**Sand Bags** 









- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment

- Sand fencing
- Fiber rolls
- Coir Envelopes



Jetty

• Groin

- Sand Bags
- Gabion













TOP Department

- Do nothing
- Vegetation
- Re-grade
- Managed r
- Beach nou
- Sand fencir
- Fiber rolls
- Coir Envelopes

CES

Jetty

- Groin
- Sand Bags
- Gabion
- Breakwater / Sill







- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment

- Sand fencing
- Fiber rolls
- Coir Envelopes



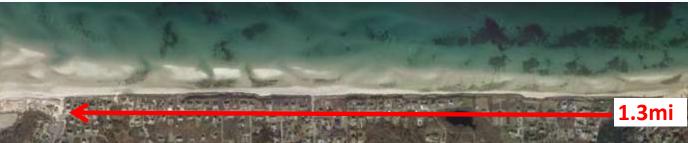
Jetty

• Groin



- Gabion
- Breakwater / Sill
- Revetment









OO . HAR TO

- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment

- Sand fencing
- Fiber rolls
- Coir Envelopes
  - CES

Groin

Jetty

- Sand Bags
- Gabion
  - Breakwater / Sill
- Revetment









- Do nothing
- Vegetation
- Re-grade
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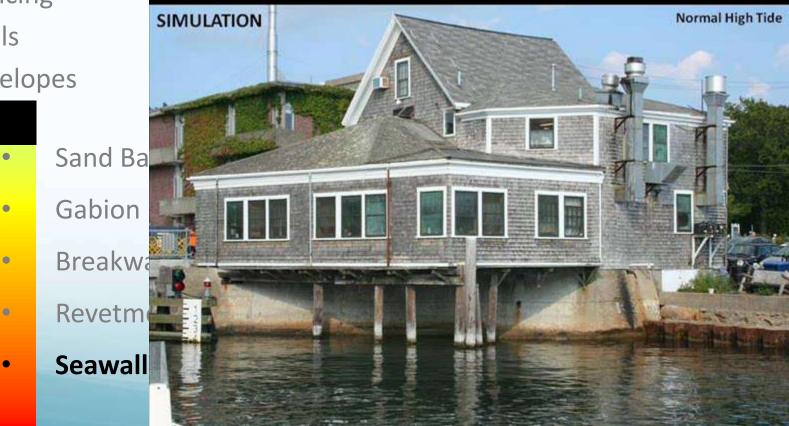
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Groin

Jetty

Coir Envelopes





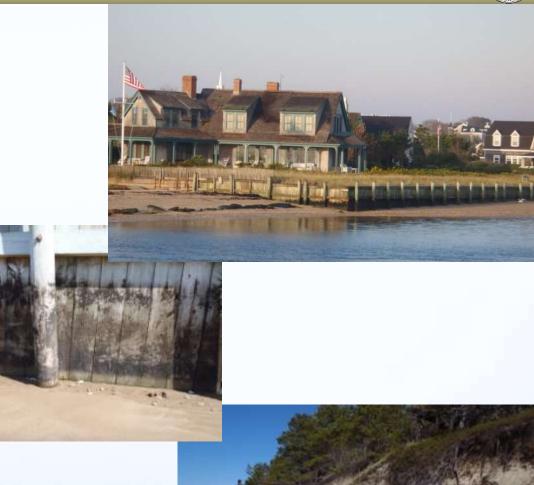


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- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes
  - CES Groin

Jetty

- Sand Bags
- Gabion
- Breakwater / Sill
- Revetment
  - Seawall
  - Bulkhead





- Do nothing-
- -Vegetation-
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes

## CES

Jetty

Groin
Sand

- Sand Bags
- Gabion
  - Breakwater / Sill
- Revetment
  - Seawall
  - Bulkhead

How the "Spectrum" could be used:

#### Notice of Intent (NOI) $\rightarrow \rightarrow \rightarrow \rightarrow \rightarrow$ Alternative Analysis

...start at top and move down, explaining why each one isn't suitable.

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(and methods are being invented/modified)

NEXT

Not a complete list



- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment

0

- Sand fencing
- Fiber rolls

CES

Groin

Jetty

Coir Envelopes









- Gabion
  - Breakwater / Sill
  - Revetment
    - Seawall
    - Bulkhead





- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes

	CES	)	
•	Groin	٠	Sand Bags
		•	Gabion
		•	Breakwate
		•	Revetment
	Jetty		Seawall
		•	Bulkhead

• Not a complete list

(and methods are being invented/modified)

• With revetments...if neighbors don't do the same then you'll have to keep extending return.







- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment

- Sand fencing
- Fiber rolls

CES

Groin

Jetty

Coir Envelopes

- Not a complete list (and methods are being invented/modified)
- With revetments...if neighbors don't do the same then you'll have to keep extending return.
- Very few projects only employ 1 method, and when we are determining if it's a CES we need to use the "hardest" aspect of the project.

- Sand Bags
  - Gabion
    - Breakwater / Sill
  - Revetment
    - Seawall
    - Bulkhead



- Do nothing
- Vegetation~
- Re-grade
- Managed retreat
- Beach nourishment-
- Sand fencing—
- Fiber rolls
- Coir Envelopes
  - CES Groin

Jetty

- Sand Bags
- Gabion

- Breakwater / Sill
- Revetment
  - Seawall
  - Bulkhead

#### Combination







- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment

- Sand fencing
- Fiber rolls—
- Coir Envelopes

## CES

Jetty

- Groin
- Sand Bags
- Gabion
  - Breakwater / Sill
- Revetment
  - Seawall
  - Bulkhead

#### Combination





Do nothing

#### Vegetation

- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls

Jetty

Coir Envelopes

• Groin • Sa

Sand Bags

- Gabion
  - Breakwater / Sill
- Revetment\_

Seawall -

Bulkhead

#### Combination





Stor Barris

Combination

- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment

- Sand fencing
- Fiber rolls –
- Coir Envelopes

С	Ε	S	

Groin

Jetty

- Sand Bags
- Gabion
- Breakwater / Sill
- Revetment
  - Seawall
  - Bulkhead





↑ Resilience  $\neq \downarrow$  Natural Systems

# Questions ?

