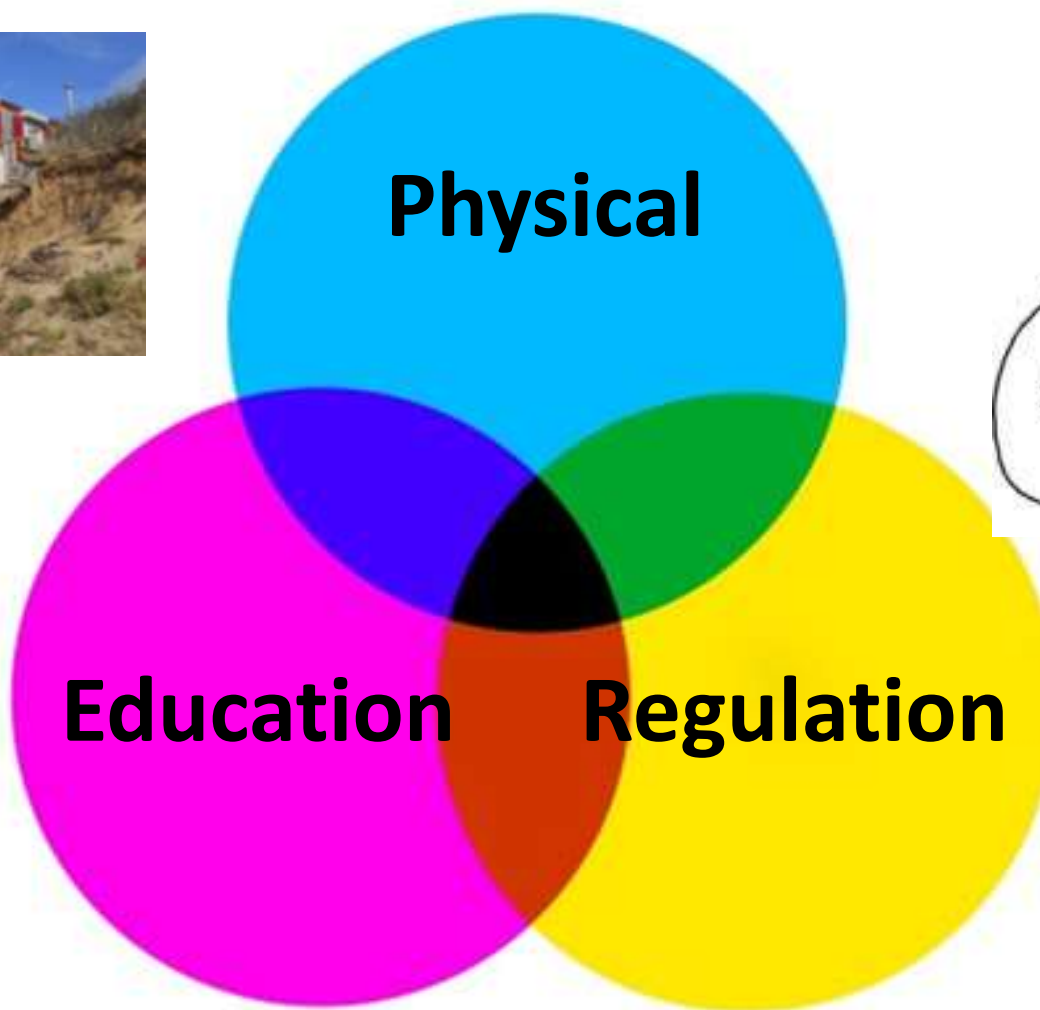




# The Erosion Problem:

Physical, Educational, and Regulatory Perspectives

Greg Berman



## What is a hotspot?

Erosion Rate / Vulnerability / Frame of Reference





# ***Sandwich – Town Neck***

## ***January 26, 2015***



# ***Sandwich – Town Neck***

## ***January 26, 2015***



Video by  
Peter  
Traykovski,  
WHOI



# ***Sandwich – Town Neck***

Video by Peter Traykovski, WHOI , Image by Issac Benaka



***January 27, 2015***

***February, 2015***





***July 30, 2015***







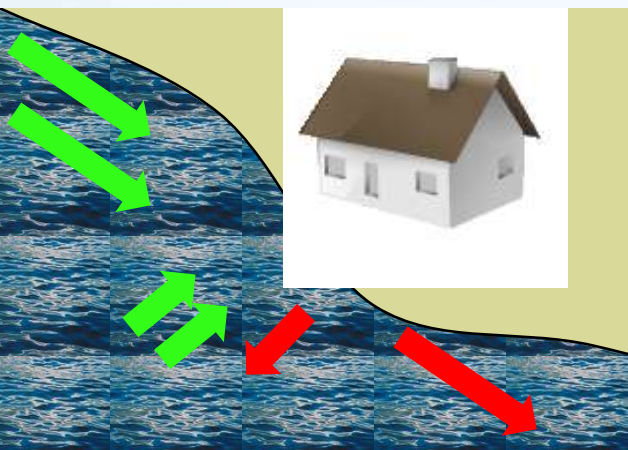




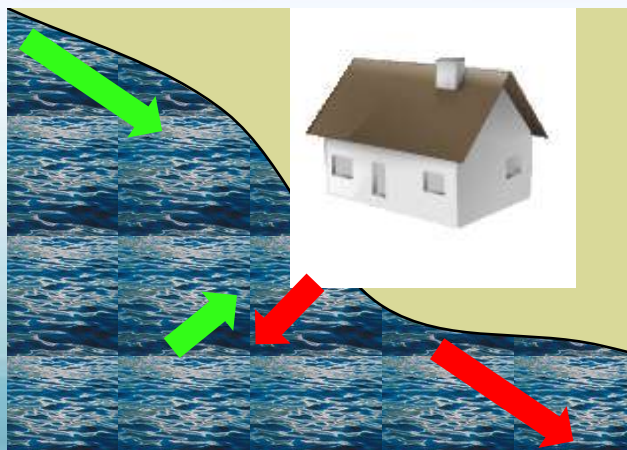
It's all sediment transport!

What is Erosion???..... just more leaving than coming in

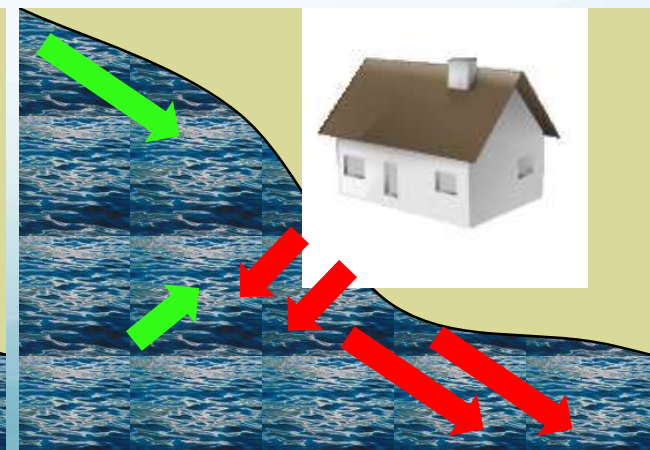
Accretion



Static Equilibrium



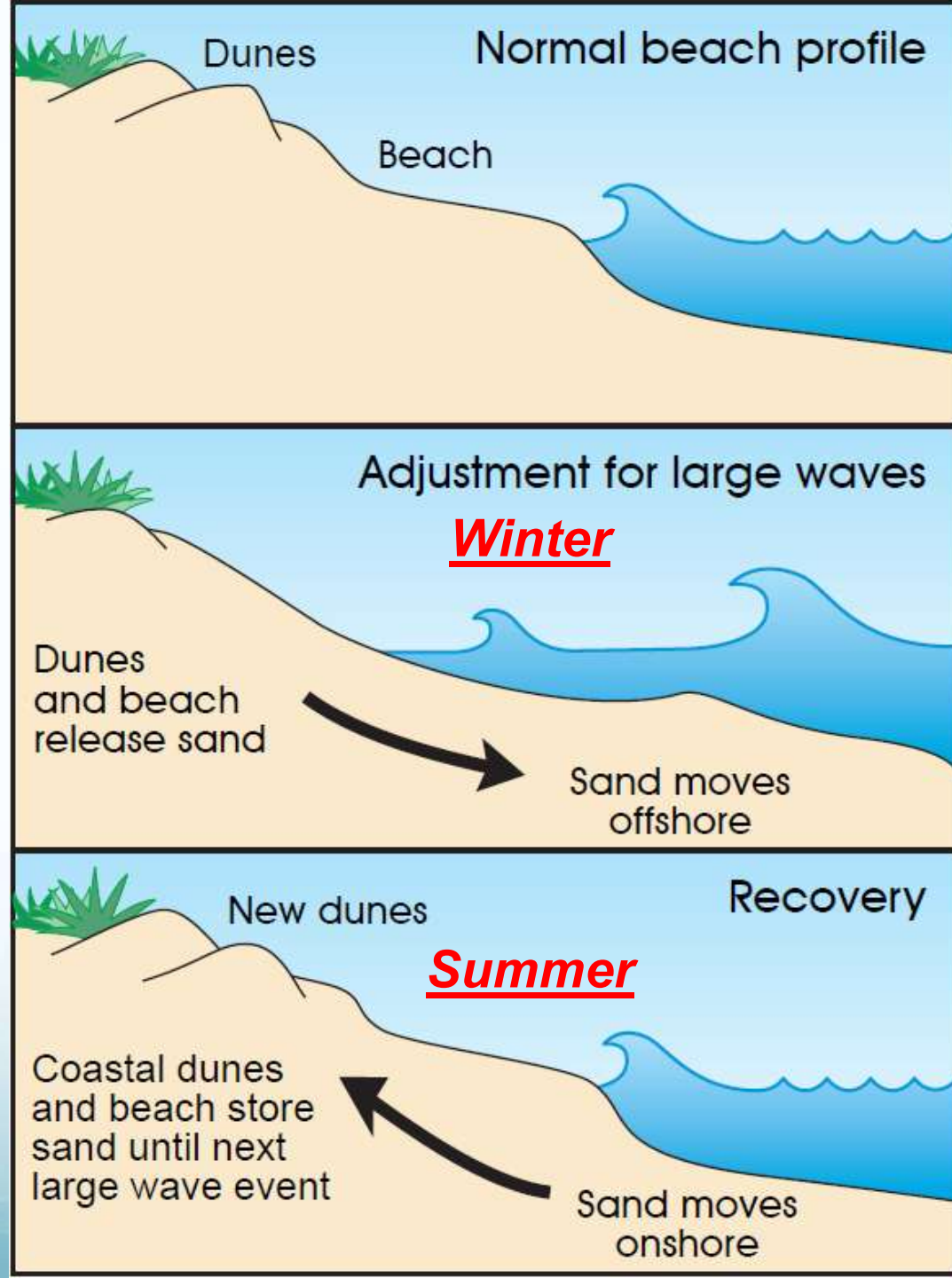
Erosion



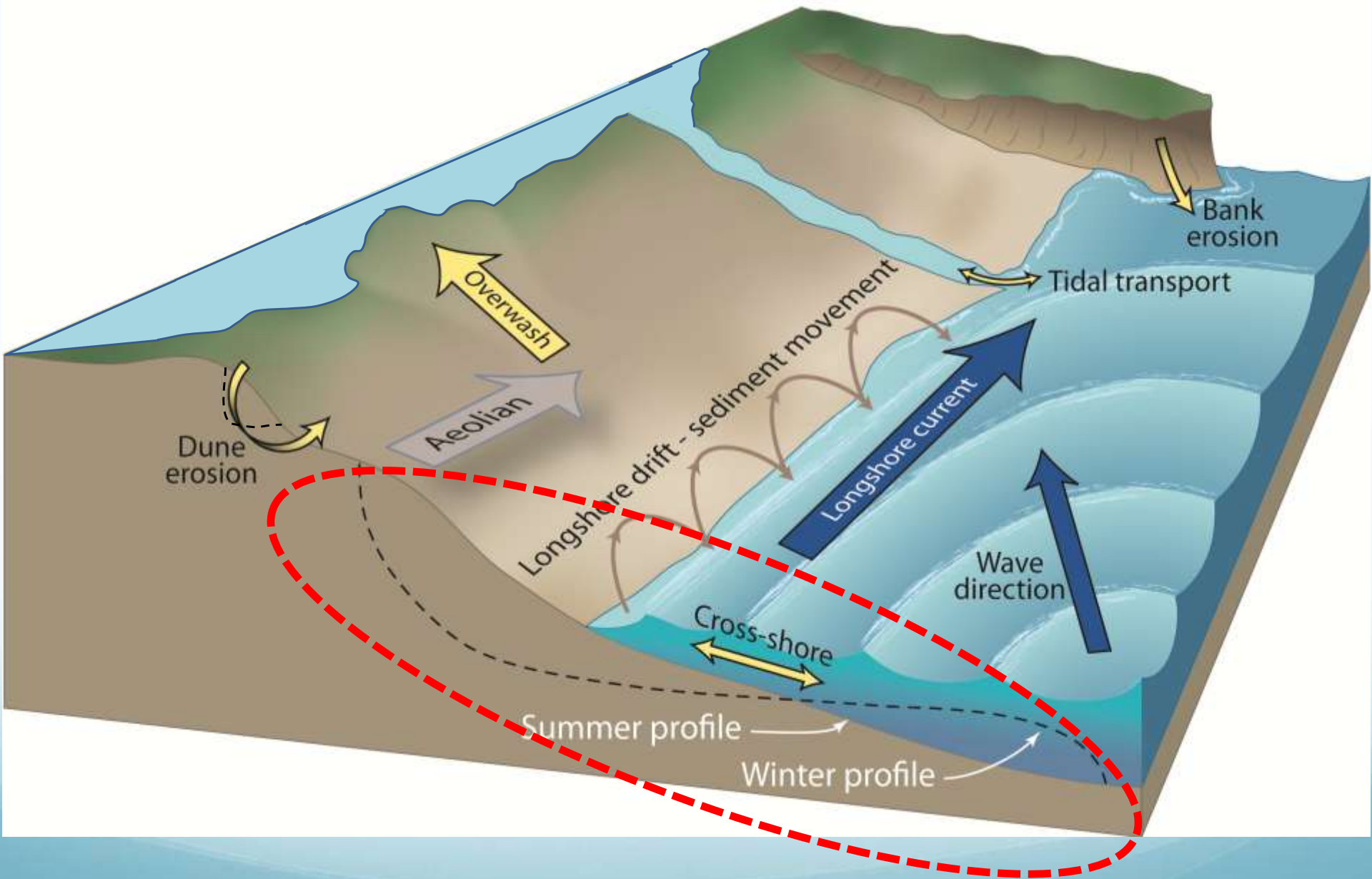
# Daily/Seasonal Variability

## Beach Profile Adjustments

Large waves, which tend to occur in the winter in Massachusetts, cause the beach to temporarily change its profile.







- **70 – 80% of MA shoreline is eroding**
- **Erosion rates have increased since 1950's**
- **Erosion is not steady...punctuated by storms  
(layers exposed can cause slumping)**



Designed to extend the “usable life” of a property.

General practice 1920s – 1950s.

Scientists wrote letter in 1970’s... MA “needs” erosion.



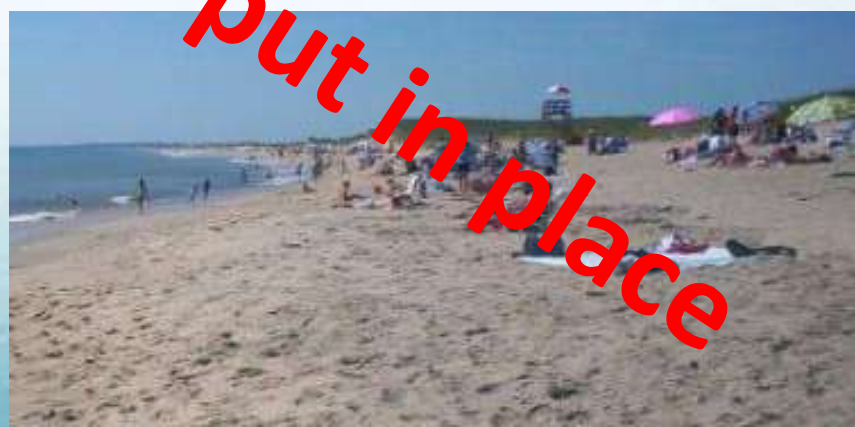
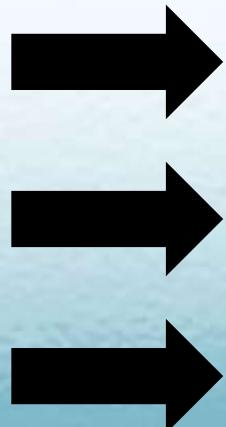
**MassDEP**

Massachusetts Department of Environmental Protection

**310 CMR 10: “no new coastal engineering structure on a coastal beach/dune/bank to protect a structure built after **8/10/1978**”**

**Towns: Engineered structures may require nourishment**

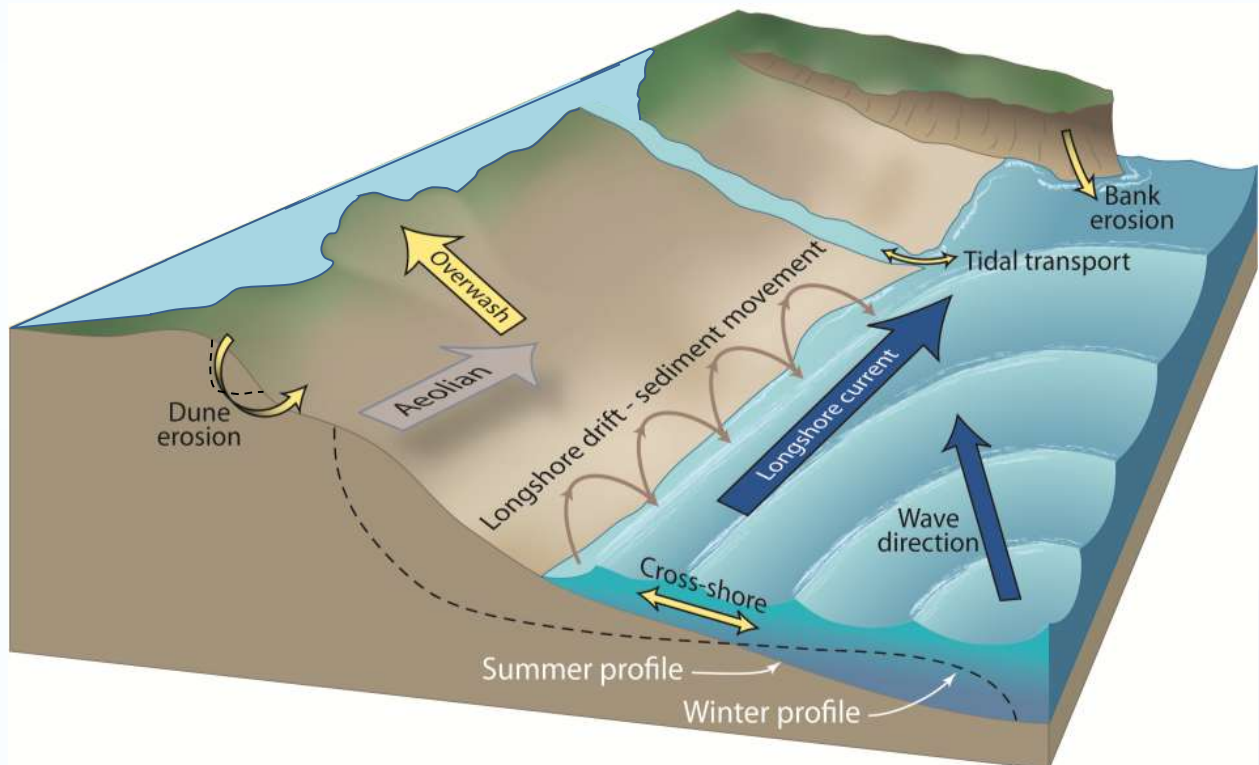
1. Erosion of glacial landforms is the MOST important source of sediment for dunes and beaches in Massachusetts.
2. Wind and waves then transport sediment.
3. Without erosion and then longshore re-deposition there would be no beaches.



*This is why the WPA was put in place*



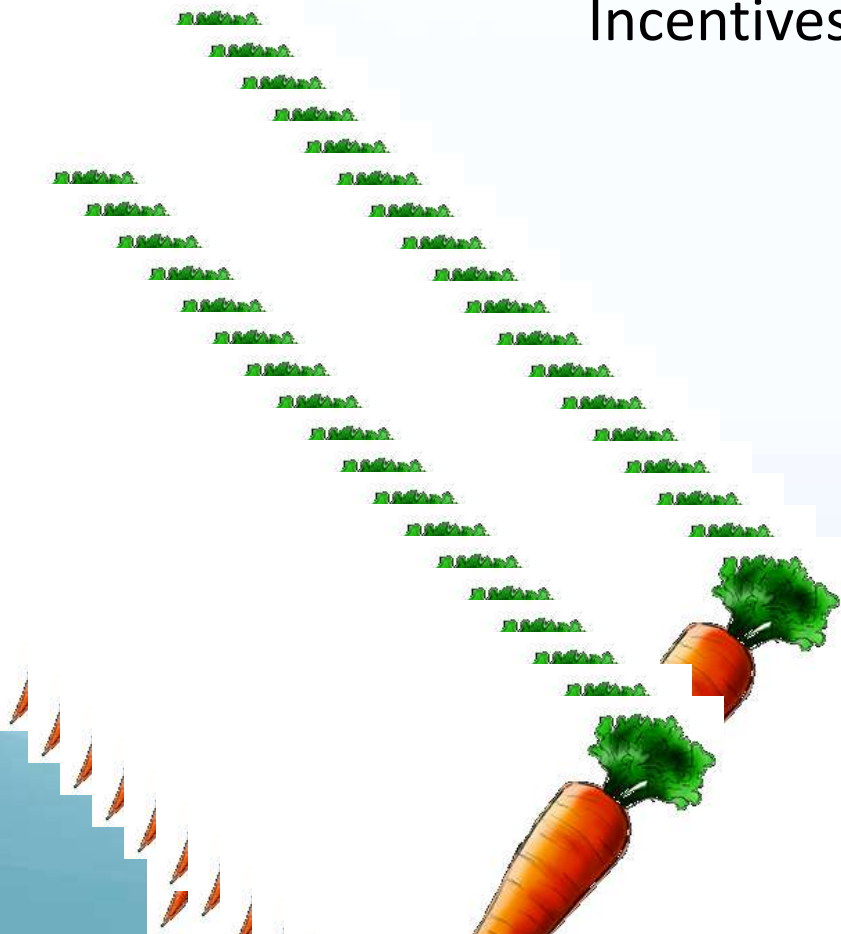
- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes

**C E S**

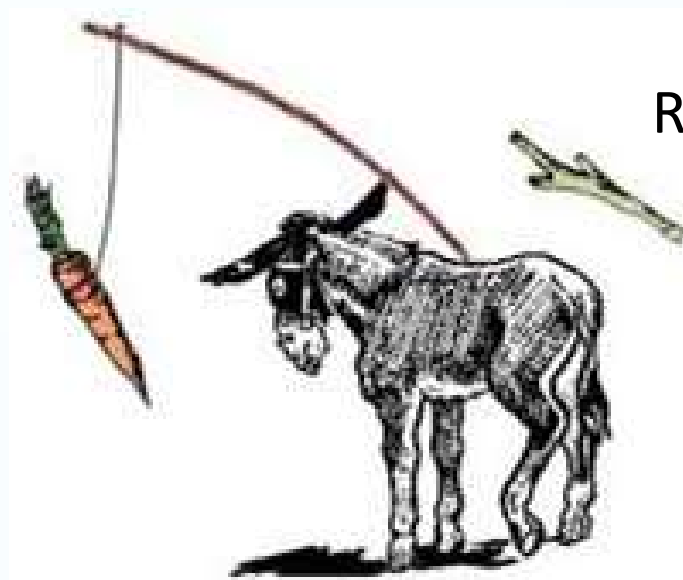
**WPA:** Coastal engineering structure means, but is not limited to, any breakwater, bulkhead, groin, jetty, revetment, seawall, weir, riprap or any other structure that is designed to **alter wave, tidal or sediment transport processes** in order to protect inland or upland structures from the effects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

## Stick vs. Carrot

Incentives



Regulations



Childhood Vaccines:  
Climate Change:  
GMO:

Scientists

86%

87%

88%

Public

68%

50%

37%

PEW

**High 90s%, if look at literature**

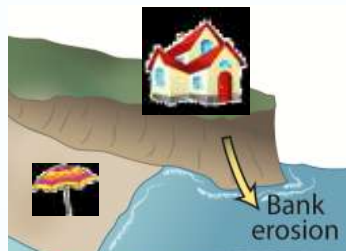
Cook et al 2013, IPCC 5th AR





## Coastal Property Owner

Preserve upland



Revetment



Nourishment trigger  
at local beach elevation



## Coastal Resource User

Preserve CRA width

Green Infrastructure



Nourishment is annual  
volume for downdrift beaches



Grandfathering....pre/post 1978

Buyer beware

Remove grandfathering or drop the 1978 restriction on CES  
Right now we've got 2 classes of property

NFIP tried to remove grandfathering BW12  
Lose grandfathering on change in ownership (2<sup>nd</sup> homes 1<sup>st</sup>)



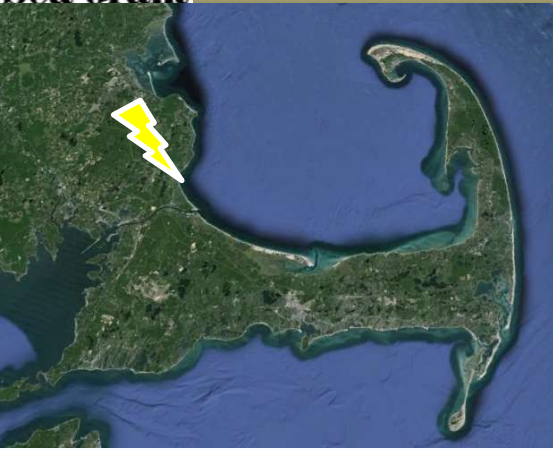
1. Post 1978 house
2. Scarp 50-60' from house
3. Poorly maintained fiber rolls
4. Several OOCs included “no CES”

Is it acting as a sediment source?...only needs to “play a role”.

Local ConCom permitted a **rock revetment (CES)**.

Abutters/Stakeholders appealed to State DEP





1. Mix of Pre and Post 1978 houses
2. Scarp 5-50' from houses
3. Revegetation of coastal bank attempted
4. Several OOCs included “no CES”
5. Town owned conservation land
6. Beach had Wetlands Restriction Act
7. Erosion down drift

Is it acting as a sediment source?...only needs to “play a role”.

Local ConCom denied project.

Likely changes/appeal coming soon.

**“No...you don’t understand...my house is going to fall in!”**



“Temporary Measures”



## Controversial Kline House in Truro has been sold



The Kline house at 27 Stephens Way in South Truro has been sold back to the trust that previously owned it.  
Merrily Cassidy/Cape Cod Times

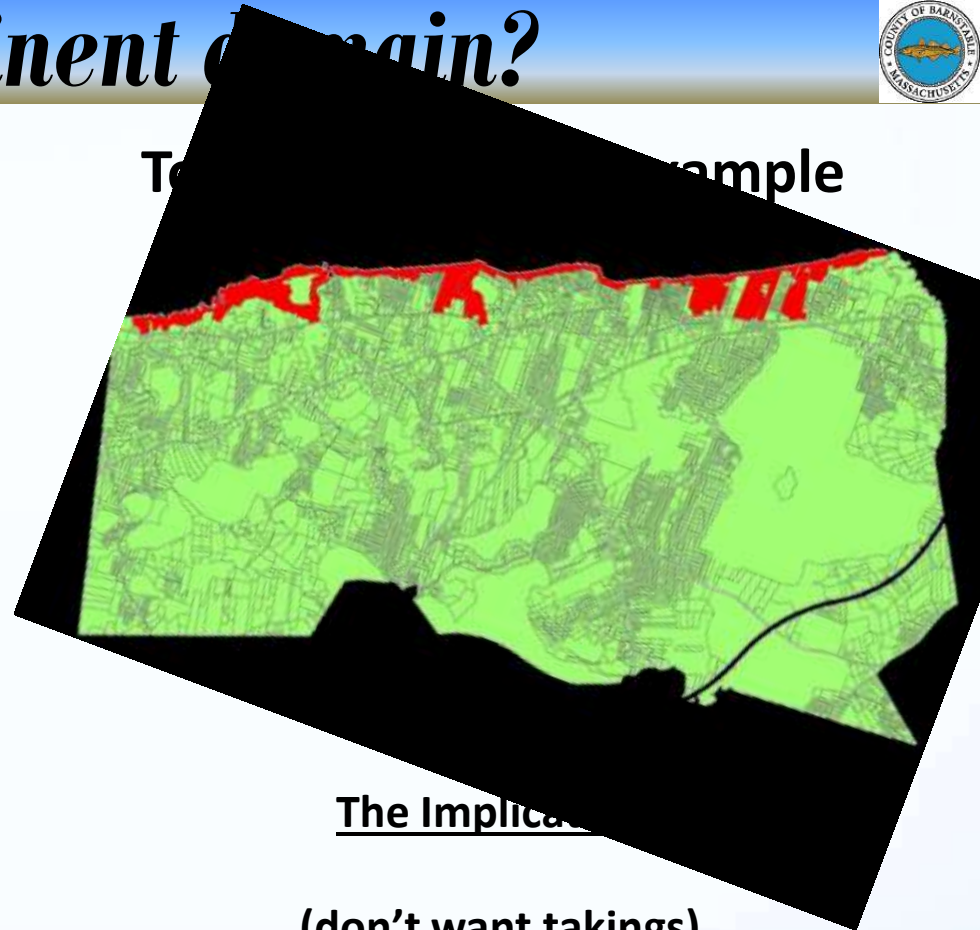
By Mary Ann Bragg  
mbragg@capecodonline.com





Why protect properties.....?

To protect the sample



## The Facts

Value = \$333,000,000

Only ~1% of properties  
~3% of town area

but they make ~10% of the real estate taxes

## The Implications

(don't want takings)

To keep the same revenue,  
the tax rate would go from 8.18 to 9.06  
or ~\$300 per household



[www.whoi.edu/seagrant](http://www.whoi.edu/seagrant)



[www.capecodextension.org/](http://www.capecodextension.org/)

# Questions?

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