

Sea Level Rise: Fight or Flight

What About Adaptation?

Douglas Janiec
Senior Project Scientist – Cardno ENTRIX



Pasture's Point

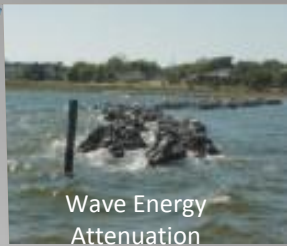


Fort duPont State Park

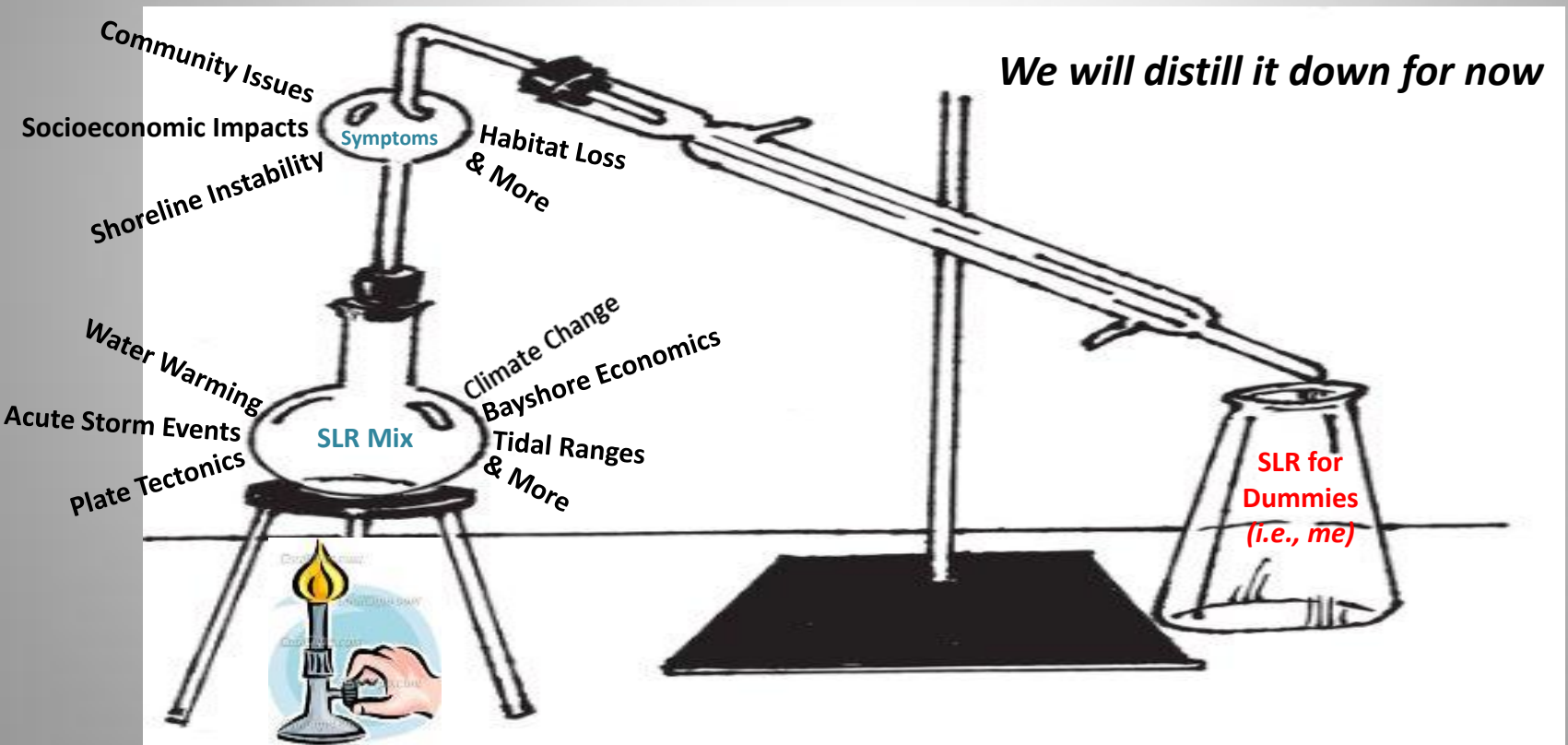


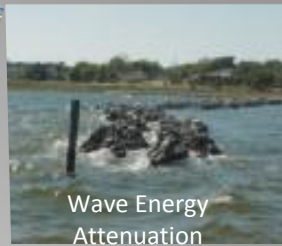
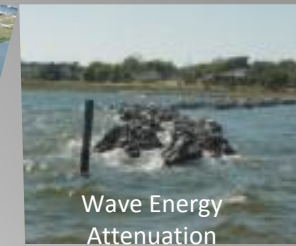
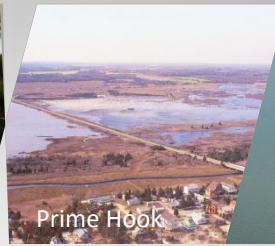
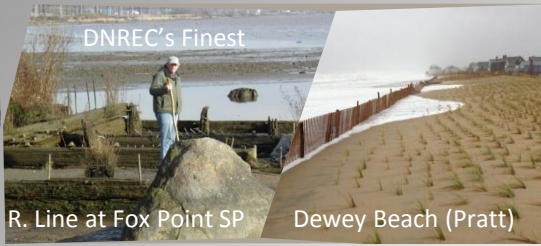
News Flash!

- SLR isn't something that's coming, it's been here
- 13 inches in last 100 years
- It just took everyone a while to put a name to it
- Many of our coastal issues are at least in part due to SLR



SLR can be viewed with Complexity or Simplicity

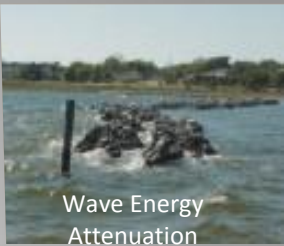
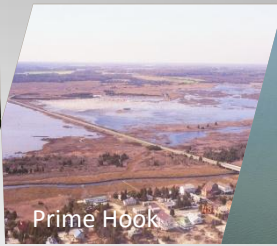




Eureka! SLR distilled to its essence!

*You may imagine that mad scientist
laugh, if you choose.*

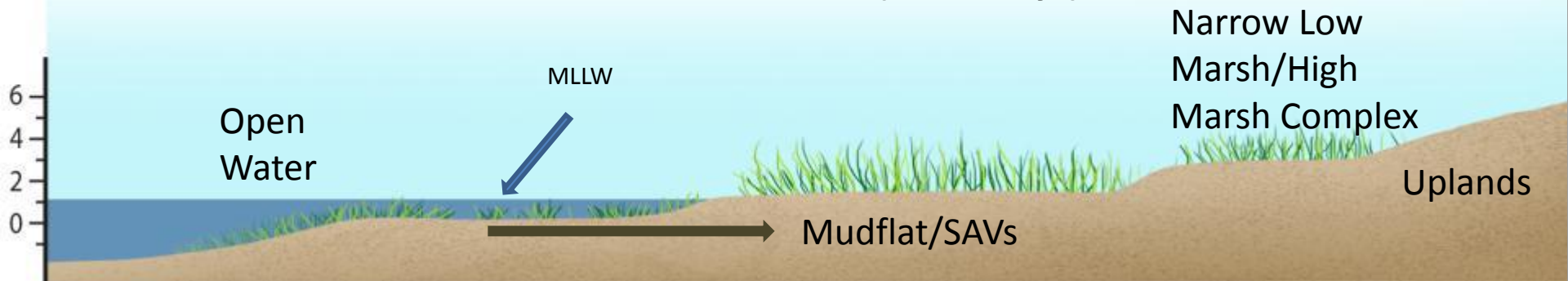




Today



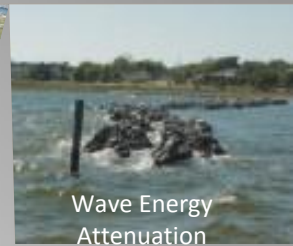
In 100 Years At Current Rate (≈ 3 mm/yr)



In 100 Years At Low Modeled SLR Rate (≈ 4.16 mm/yr)

Fox Point State Park, DE





In 100 Years At Middle SLR Rate (≈ 7.6 mm/yr)



In 100 Years At High SLR Rate (≈ 12.4 mm/yr)

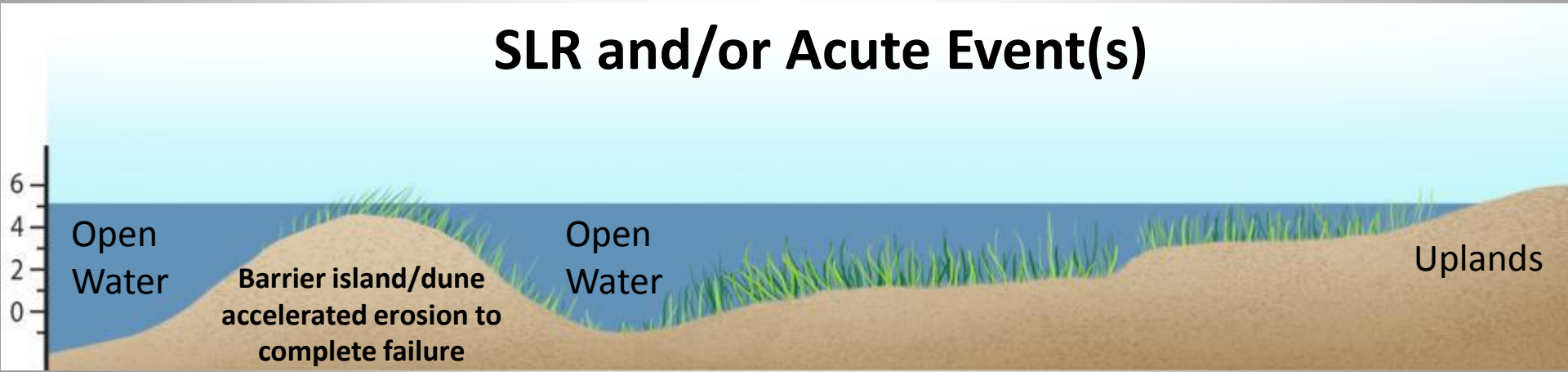
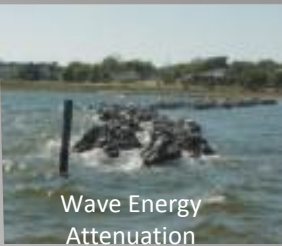
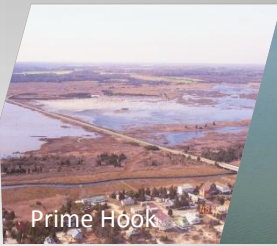




Opening up the inlet and SLR; increased water volume and higher energy can have a significant effect on a marsh system.



Indian River Inlet in 1930s vs. Recent Times



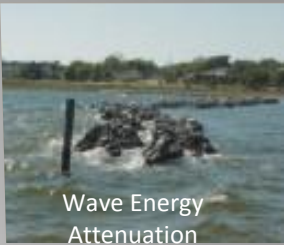


Prime Hook NWR post Sandy



Big Picture

Even at the lowest expected SLR rate, our subtidal, intertidal, and supratidal habitats will be migrating landward at a faster rate than new coastal habitats can develop from uplands; there will likely be extensive coastal habitat shrinkage.



Sustainable Coastal Restoration & Sea Level Rise

Fight or Flight

Fight

Flight



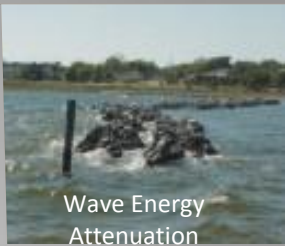
Revetments



Bulkheads



Beach Nourishment



Prime Hook NWR

R. Line at Fox Point SP

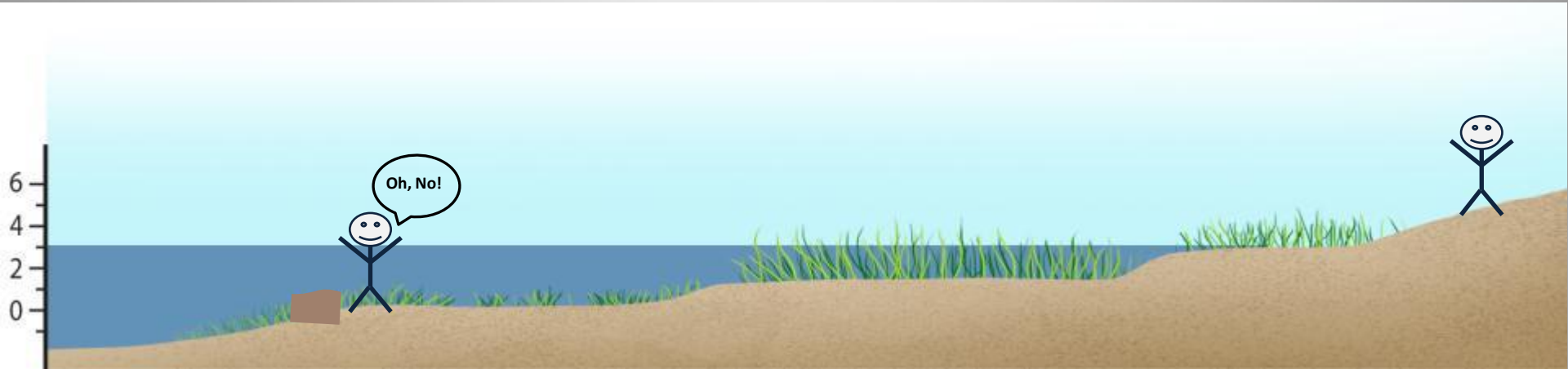
Dewey Beach (Pratt)

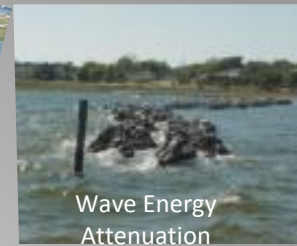
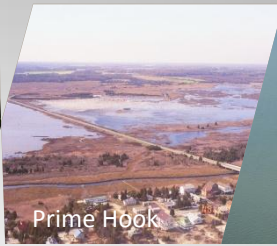
Fort duPont SP

Prime Hook

Pastures Point

Wave Energy Attenuation





Sustainable Coastal Restoration & Sea Level Rise

Energy Attenuation

←Hybrids→

Traditional Living Shorelines

Cool, Adaptation!

e.g., WADs

Coir Fiber Logs/Plantings

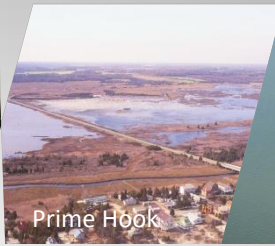
Let nature help us

- Control Flight
- Reduce Flight
- and even, Eliminate Flight

= Adaptation



Source: Partnership of the Delaware Estuary



Sustainable Coastal Restoration & Sea Level Rise

Hey Doug!

Maybe I can get her autograph?

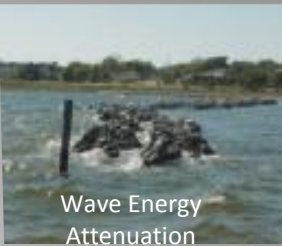
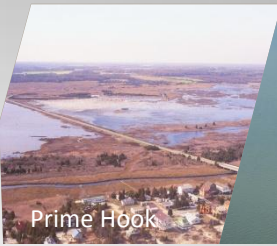


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It's Dr. Danielle Kreeger of the PDE! Looks like she's surveying mussels in the Delaware River.



DNREC's Finest

R. Line at Fox Point SP

Dewey Beach (Pratt)

Fort duPont SP

Prime Hook

Pastures Point

Wave Energy Attenuation

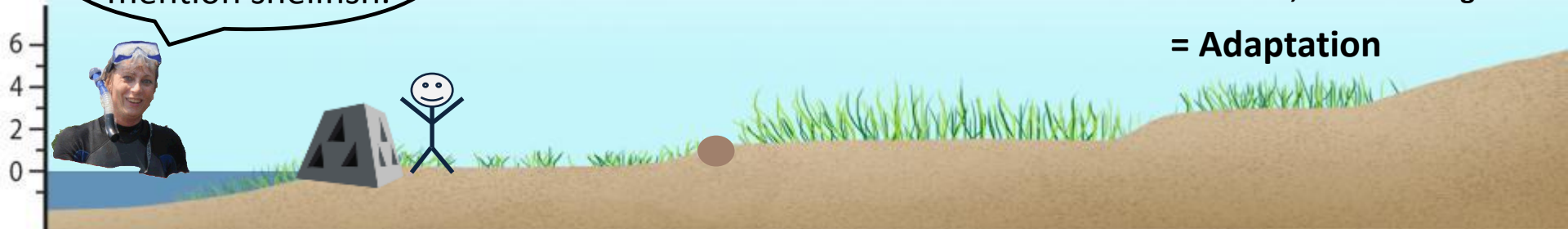
Sustainable Coastal Restoration & Sea Level Rise

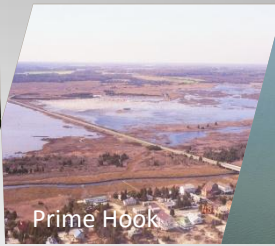
Don't forget to mention shellfish.

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DNREC's Finest

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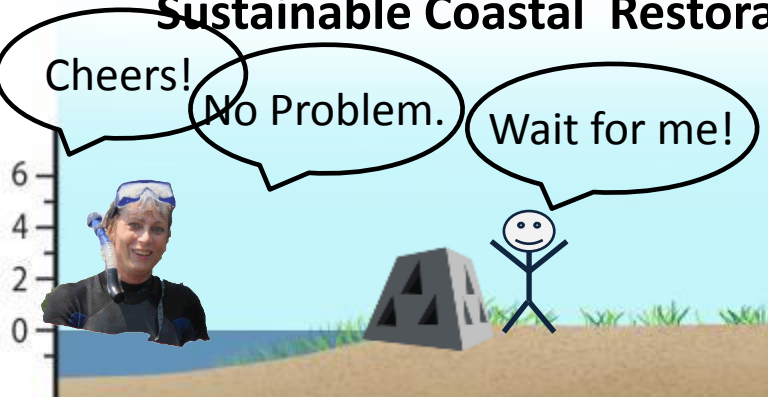
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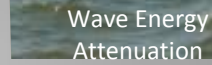
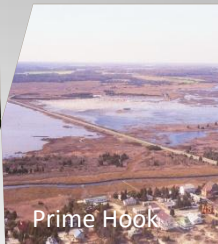


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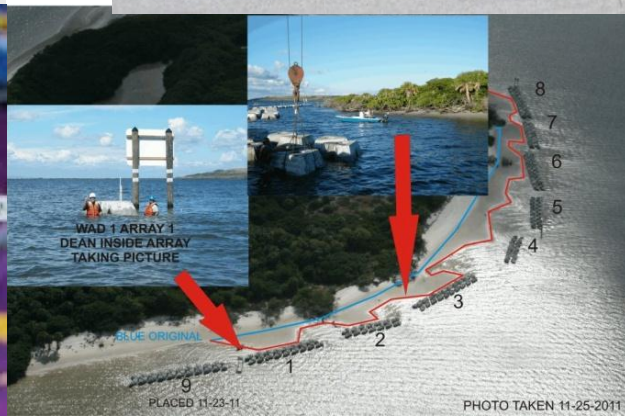
= Adaptation

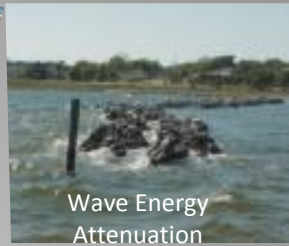
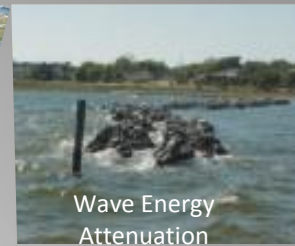
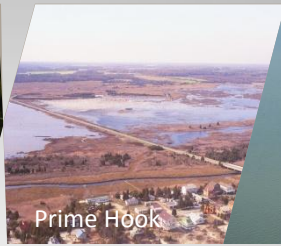
Stickman likes mussels, too!



Today's State-of-Science for Coastline Stabilization, Enhancement & Restoration, Allows Us To:

- Reduce, stop, reverse, or better manage coastal erosion and sediment transport
- Preserve critical habitat & species
- Help ensure future coastal
 - Business
 - Recreation &
 - Sports





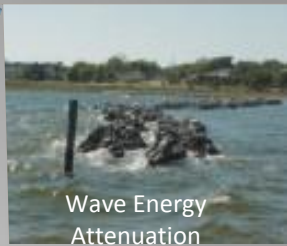
The Fourth Dimension of Coastal Design: **TIME (+ Green)**

OUR PROJECTS ARE HERE:

- Have an effective life of 5 to 25 years
- Target one endpoint habitat
- Often include large O&M and/or contingency costs
- Apply old, familiar technologies, regardless whether they are the most cost effective.
- Focus on the MHW & MHHW (habitat extent)
- Heavily focus nourishment and variations of armoring (Fight)

WE NEED TO START THINKING MORE TOWARDS HERE:

- Having an effective life of **50+ years**
- Targeting **multiple endpoint habitats** that track projected **SLR progression**
- **Reducing** O&M and/or contingency costs
- Applying **new, sustainable, cutting-edge technologies**, allowing for short-term and especially long-term cost savings
- Incorporating **MLW & MLLW** more into the design thought process (habitat type)
- Focusing more on **sediment retention and other approaches (Adapt)**



Through SLR adaptation, we can make a huge difference preserving our coastlines.



It is, and should always be, about the future.

Thank You