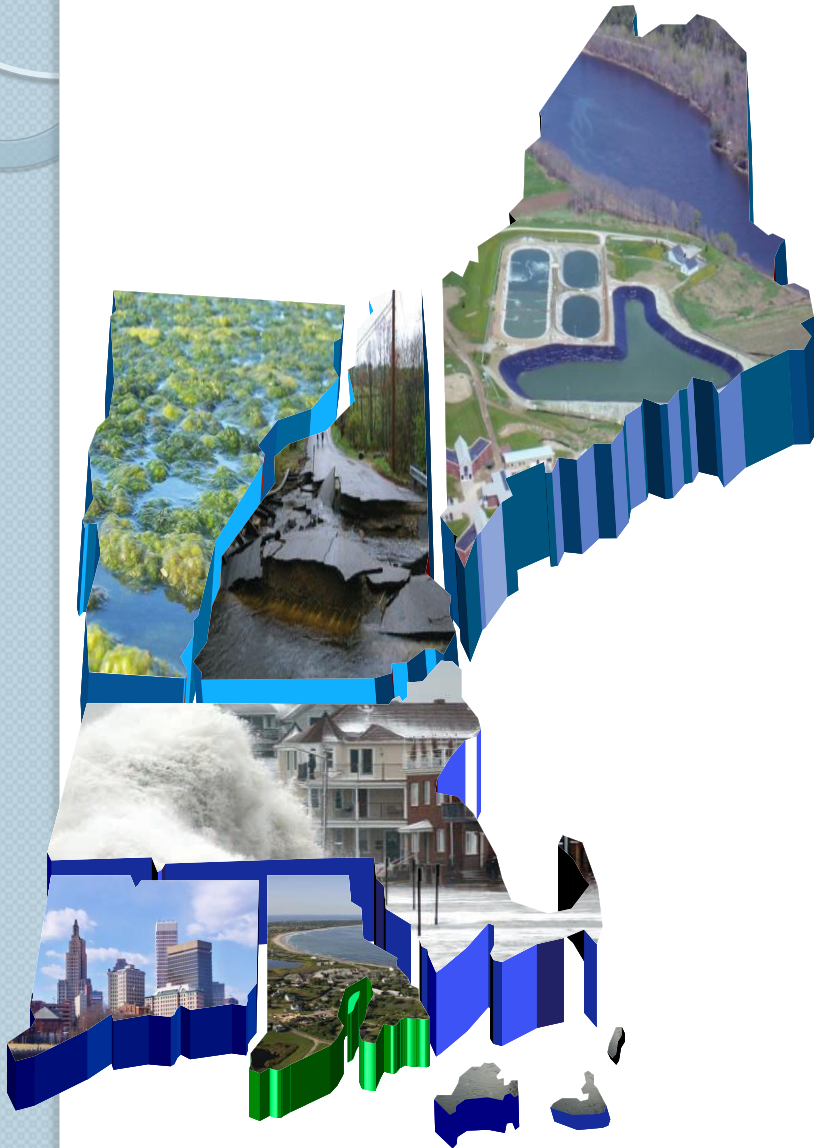


Adapting to Climate Change in New England



**EPA New England
Ports Working
Group
July 26th, 2011**





Ocean and Coastal Impacts

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EPA Region I

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Ocean and Coastal Protection Unit

Coastal Impacts

- **Climate Driven Changes:**

- Sea Level Rise/ Storm Surge
- Increase in storm intensity and frequency
- Increase Ocean Temperatures
- Ocean Acidification

- **Coastal Impacts:**

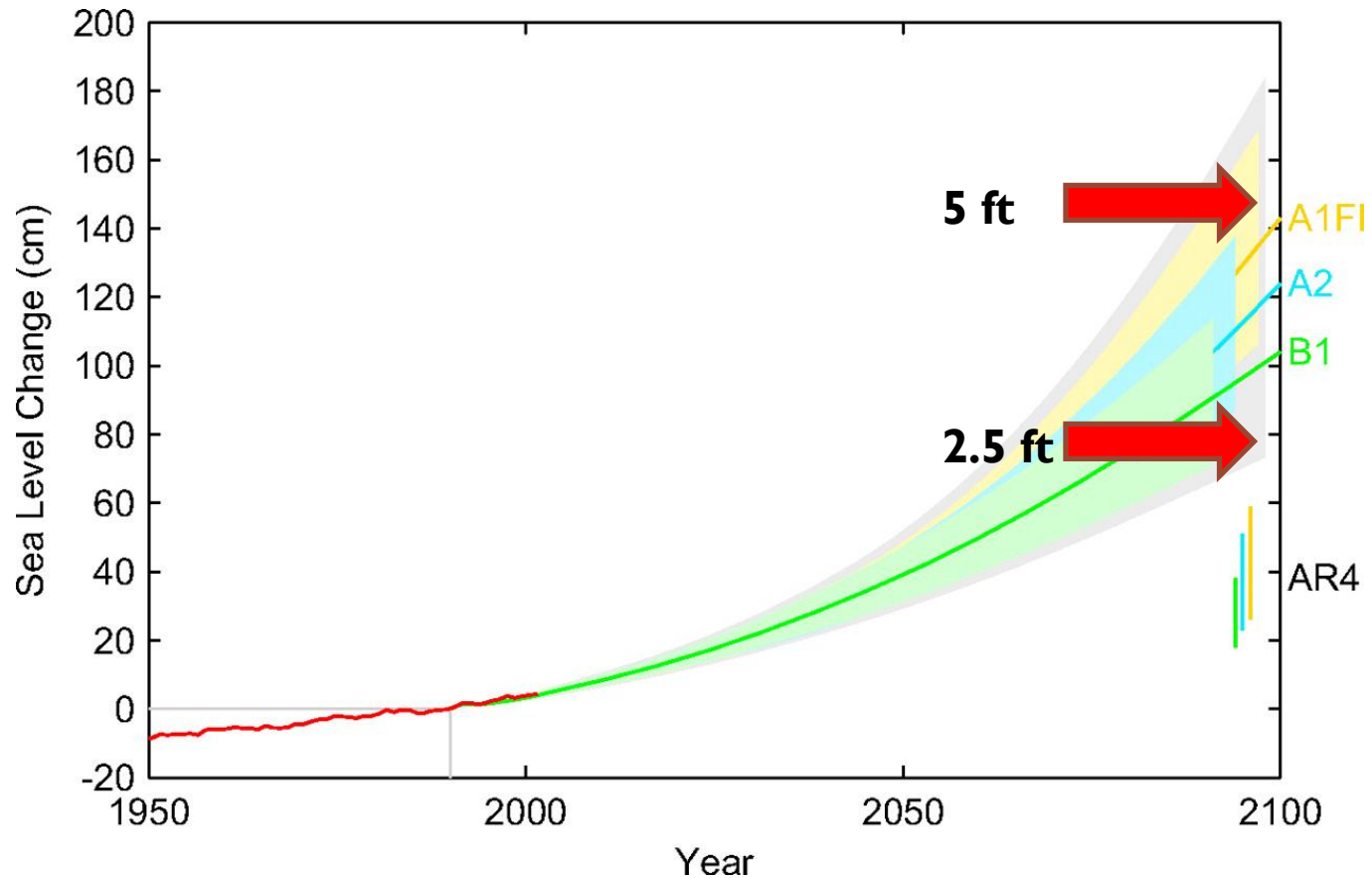
- Increased flooding events
- Increased erosion
- Increase in wetland loss
- Salt Water Intrusion
- Corrosion of infrastructure
- Increase in Algal Blooms
- Decrease in dissolved carbonate available for calcium carbonate shells and skeleton formation

Current Sea Level Rise (SLR)

- Global sea level rise (SLR) is accelerating
 - **1.8 mm/yr average 1961-2003**
 - **3.1 mm/yr average 1993-2003**
- Arctic sea ice decreased 2.7% / decade since 1978
- Between 2003 and 2008, the melting of the Arctic icecap accounted for 40 per cent of the global rise in sea level.
- Greenland and Antarctic Ice Sheets are thinning
- Mountain glaciers receding at unprecedented rates

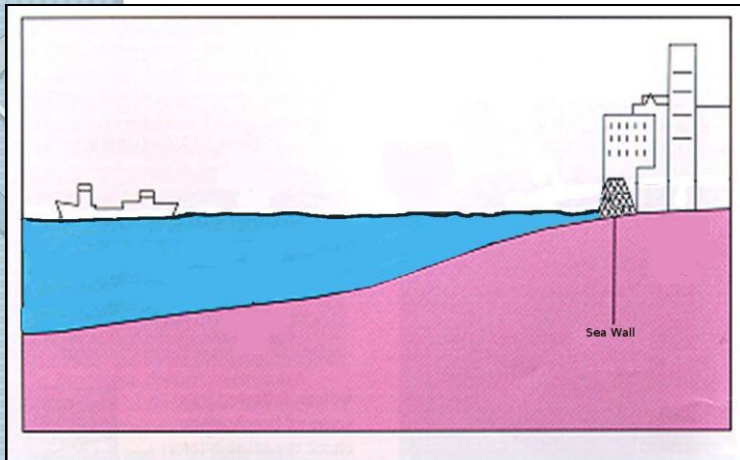
*“Sea level rise under warming is **inevitable.**”*

The Most Recent SLR Projections

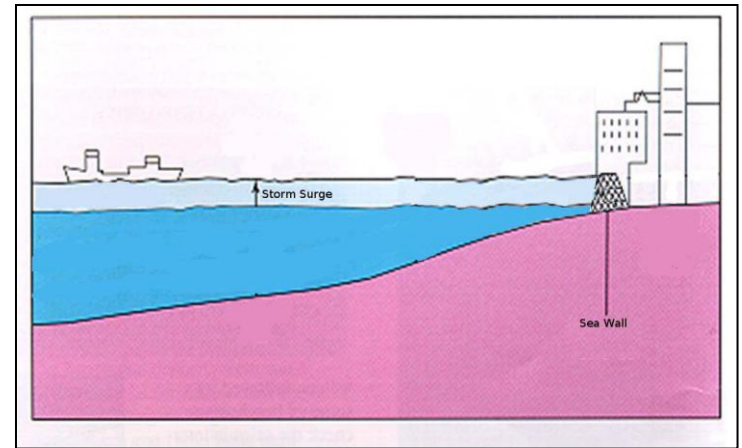


- **Previous** (2007) projections called for **7-23 inches** of SLR
- **Current** (2011) projections call for **35- 63 inches by 2100**
- Southern NE is expected to have a higher rate (than the nat. avg.) of SLR due to land subsidence

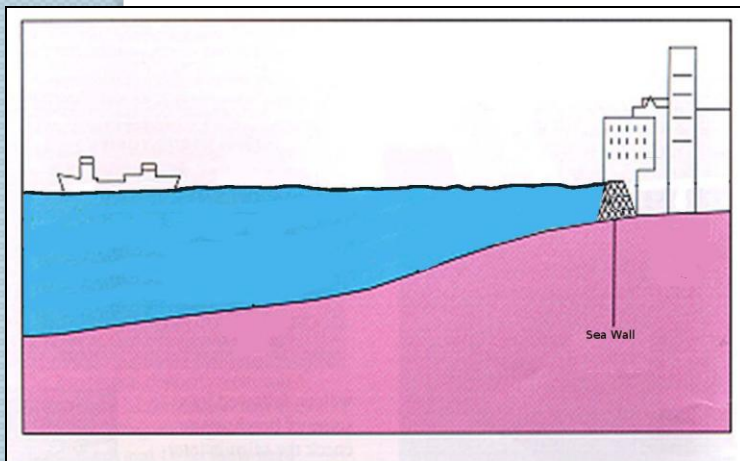
Effects of SLR and Storm Surge



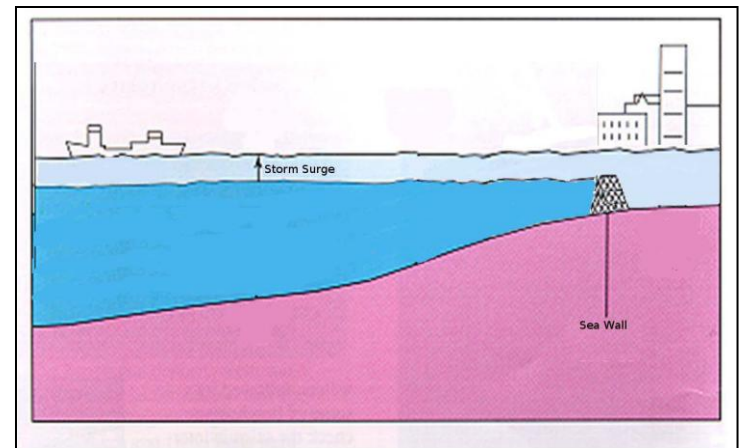
Current highest high tide or "King Tide"



Current storm surge during King Tide



Highest high tide or "King Tide" plus SLR



Storm surge during King Tide with SLR

Seem *Unbelievable?*



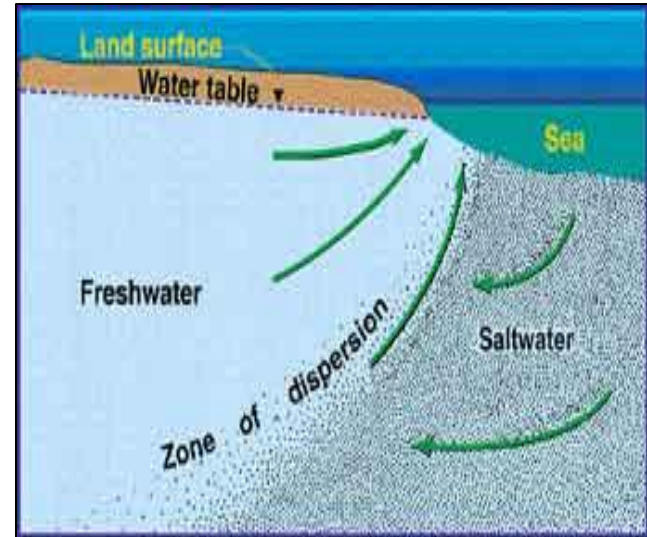
High Tide at Long Wharf & Central Wharf, June 2009

Source: Dr. Ellen M. Douglas, Environmental, Earth and Ocean Sciences University of Massachusetts, Boston

SLR Impacts



Inundation & corrosion of infrastructure



Salt water intrusion



PETER B. BRACE/The Independent

Increased coastal erosion



Displacement of coastal wetlands & habitat

Intense Storm Impacts



Flooded WW & DW treatment facilities



Contaminated waters

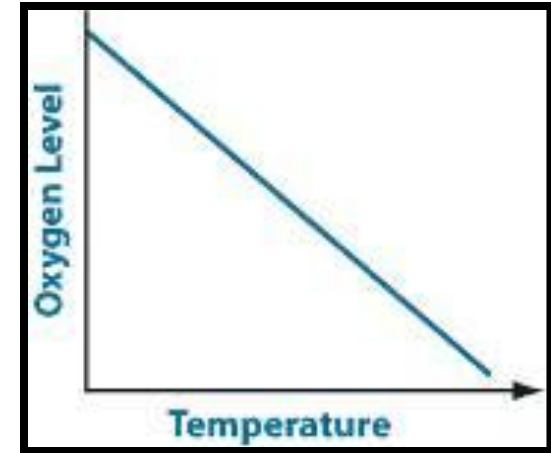


Culvert Failure

Ocean Temperature Impacts



Increase in Algal Blooms



Lower DO levels



Changes in the distribution and survival of aquatic species



Ocean Acidification: The Other Carbon Dioxide Problem

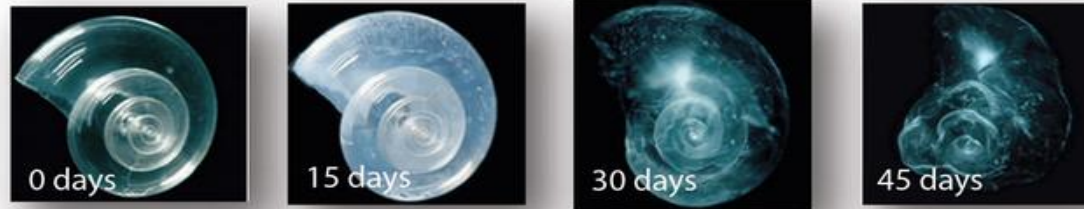


Photo credit: National Geographic Images

- The **ocean absorbs almost a third of the CO₂ we release** into the atmosphere every year, so as atmospheric CO₂ levels increase, so do the levels in the ocean.
- Based on BAU emission scenarios, by **end of this century** surface waters of the ocean could be **nearly 150 percent more acidic**
- As CO₂ dissolves in the ocean, the water becomes more acidic and the amount of dissolved carbonate available for **calcium carbonate** shell and skeleton formation – **important to corals, plankton and shellfish** – **decreases.**
- When shelled organisms are at risk, the **entire food web and associated economy** may **also be at risk**