Adapting to Climate Change in New England

EPA New England

Ports Working Group

July 26th, 2011

Ocean and Coastal Impacts

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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 she and skeleton formation

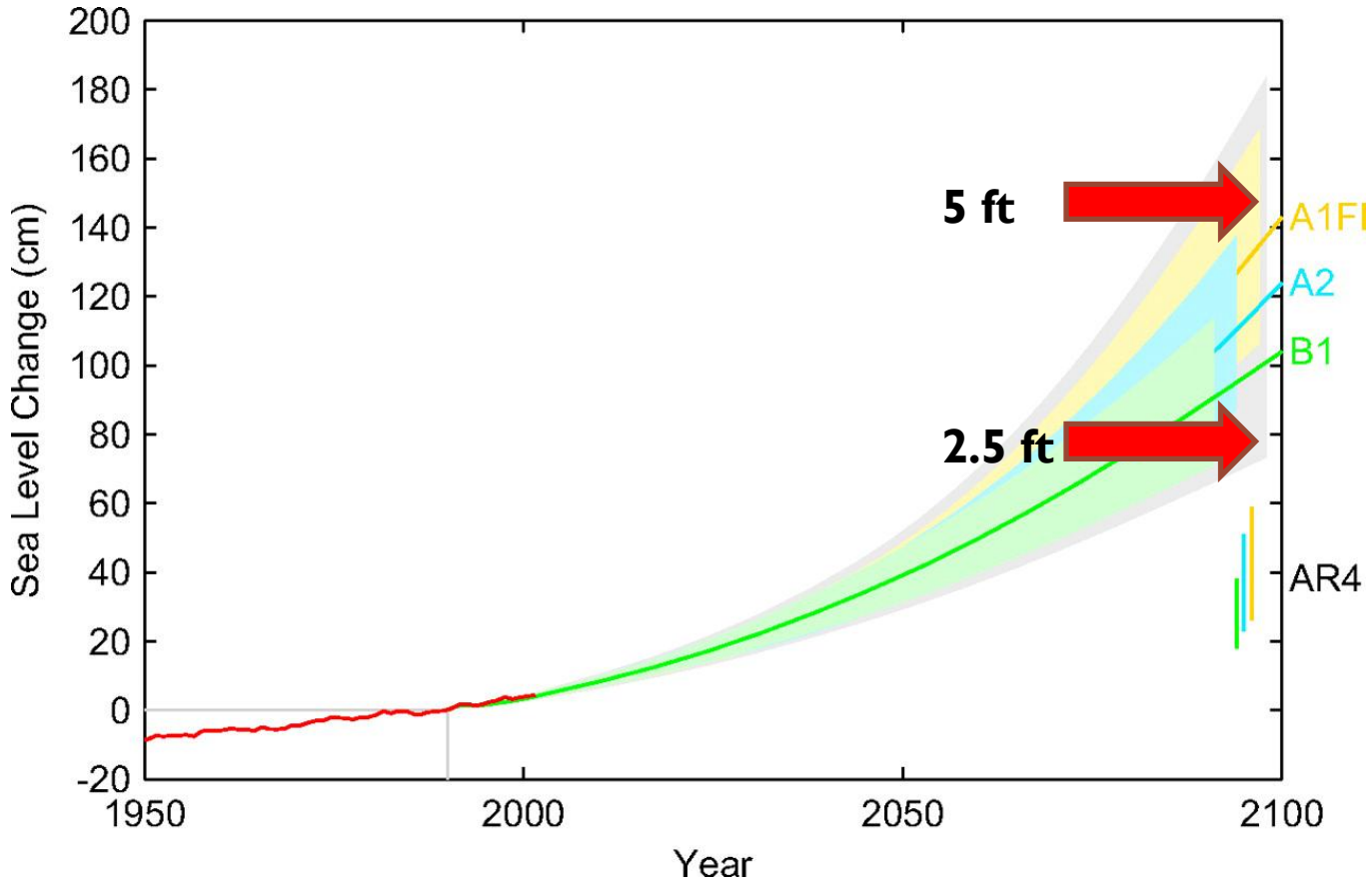
Current Sea Level Rise (SLR)

- 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.**"*

Sources: IPCC *Climate Change 2007: The Physical Science Basis—Summary for Policymakers*
The Arctic Monitoring and Assessment Program, 2011: "*Impacts of climate change on snow, water, ice and permafrost in the Arctic*"

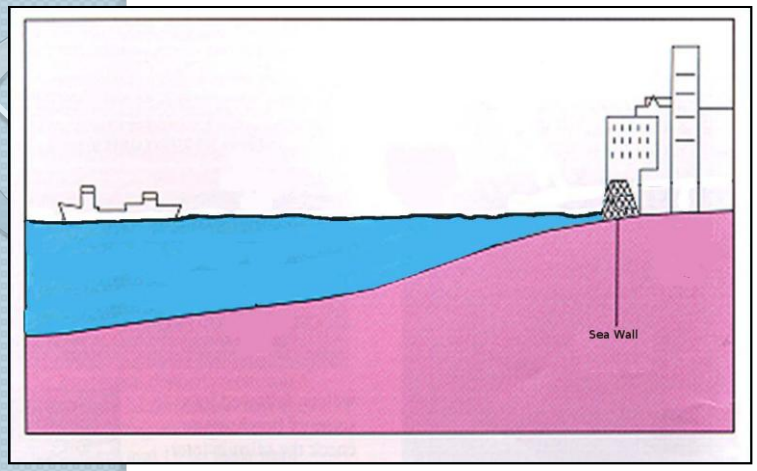
The Most Recent SLR Projections



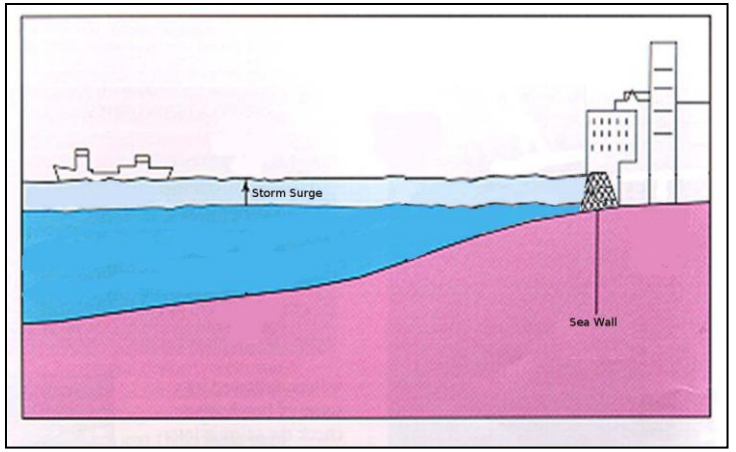
- **Previous** (2007) projections called for **7-23inches** of SLR
- **Current** (2011) projections call for **35- 63 inches by 2100**
- Southern NE is expected to have a higher rate (than the nat. avg.) of SLR due to land subsidence

Source: Vermeer, M. and S. Rahmstorf, 2009. PNAS, 106:21527-21532
The Arctic Monitoring and Assessment Program, 2011: "*Impacts of climate change on snow, water, ice and permafrost in the Arctic*"

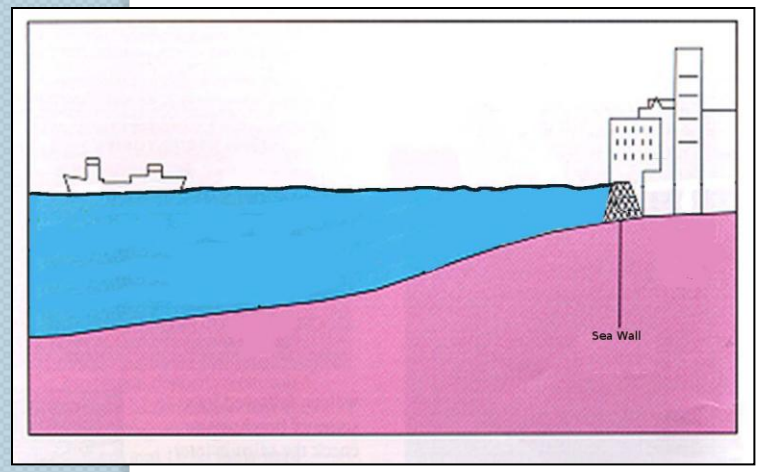
Effects of SLR and Storm Surge



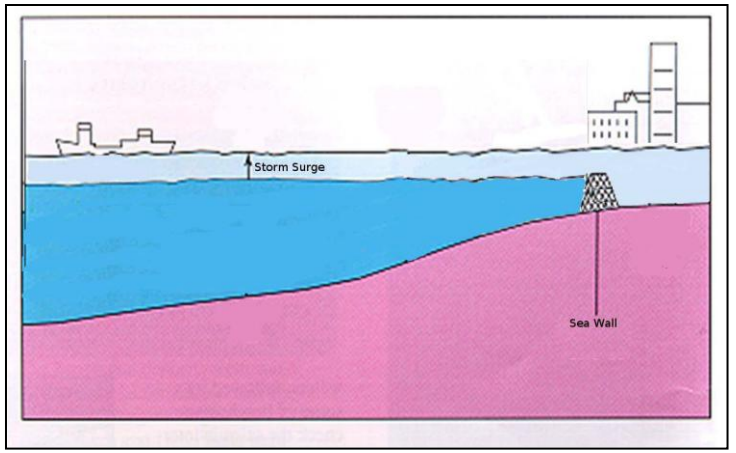
Current highest high tide or "King Tide"



Current storm surge during King Tide



Highest high tide or "King Tide" plus SLR



Storm surge during King Tide with SLR

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

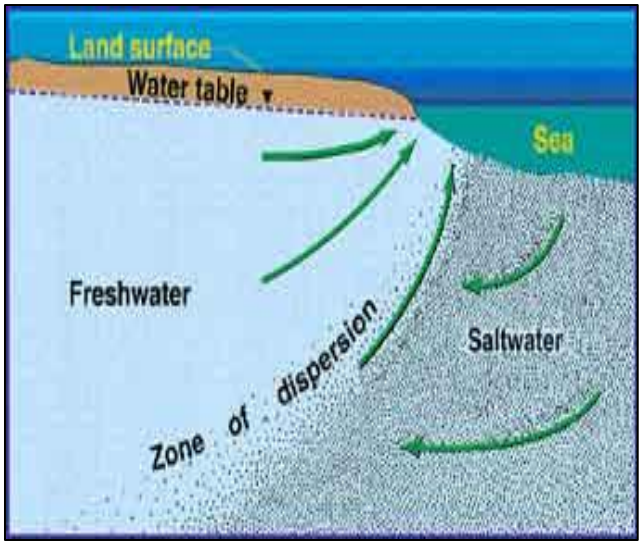
Seem *Unbelievable*?

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

Increased coastal erosion

Displacement of coastal wetlands & habitat

Intense Storm Impacts


The Providence Journal

projo.com

THE FLOODS OF 2010 | COPING WITH THE AFTERMATH

Sewage plants overwhelmed; residents, retailers left reeling

Road closure severs state; scenes of loss

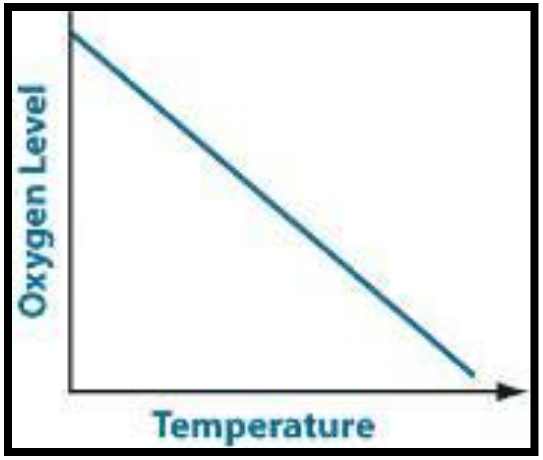
Flooded WW & DW treatment facilities

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

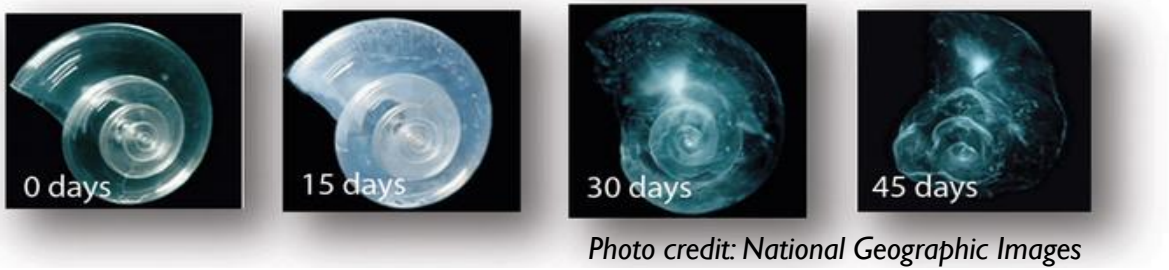


Photo credit: National Geographic Images

- The **ocean absorbs almost a third of the CO_2 we release** into the atmosphere every year, so as atmospheric CO_2 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**