

Water Policy Implications Associated with Future Climate Change

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Broward Leaders Water
Academy

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CDM

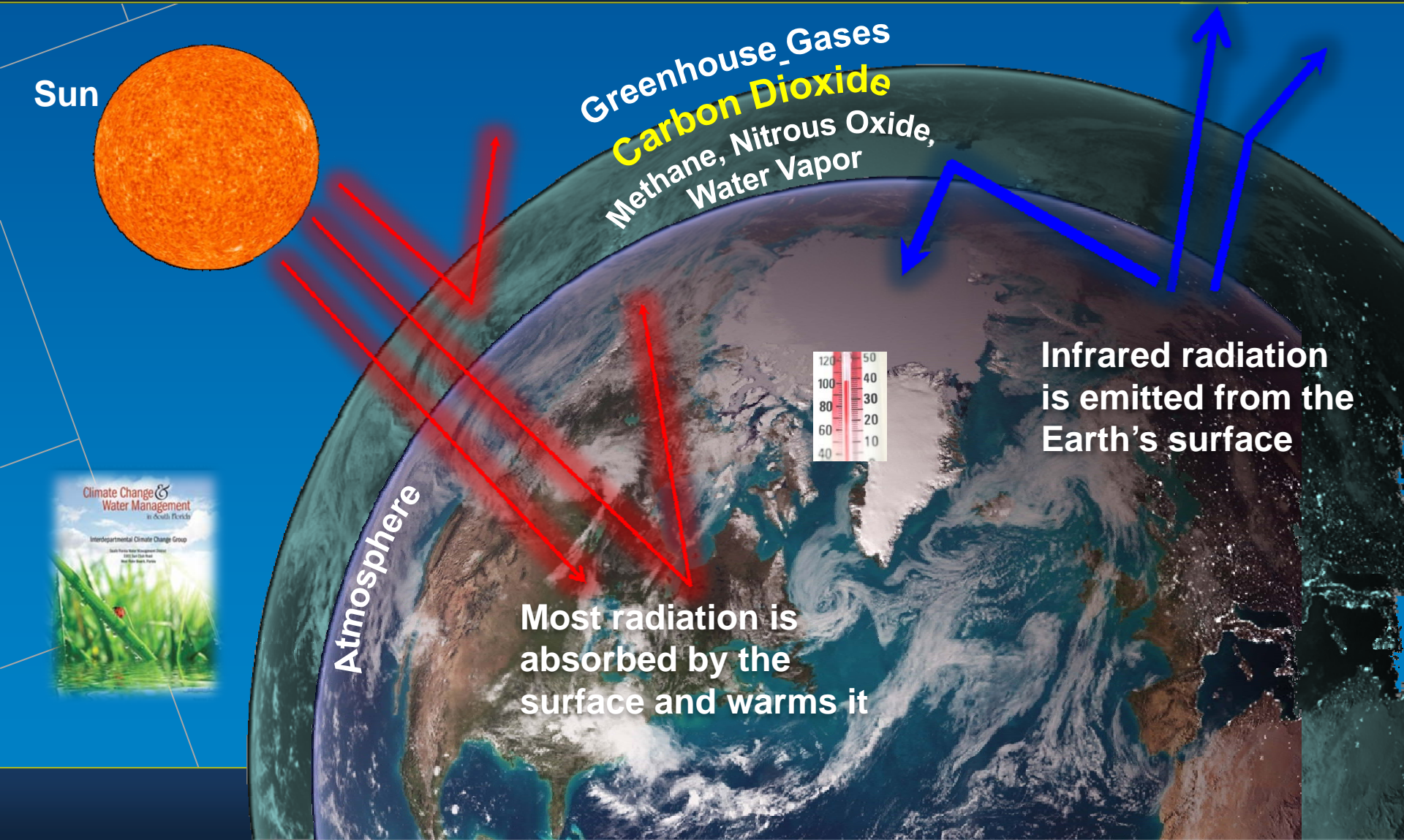
Some Factoids About Climate Change

- Climate change is the new normal
- Summer 2010 in South Florida was the hottest on record; Miami temperature was 2.0 degrees above normal, and the Palm Beach International Airport was 2.4 degrees above normal.
- 2009 was the second warmest on record globally; the largest temperature increases were in the Arctic and Antarctic
- The sea ice area for the Arctic shows near record minimums since 2002
- The fabled Northwest Passage through the Arctic is now open during the summer and fall

Factoids (cont'd)

- Summer 2010 in Russia was the hottest ever recorded with a drought sparking hundreds of wildfires
- The heaviest monsoon rains on record in 2010 in Pakistan left 14 million people homeless and killed 1,500
- China had the worst floods in decades in 2010 with floods and landslides killing 1,100 people
- In Greenland, a 100-square-mile chunk of ice calved off the Petermann Glacier, the most massive ever recorded
- Northeast Australia is currently suffering worst flooding in half century due to La Nina

Greenhouse Effect Makes Life Possible on Earth - But Can Be Too Much of a Good Thing!



Sun

Greenhouse_Gases
Carbon Dioxide

Methane, Nitrous Oxide,
Water Vapor

Atmosphere

Most radiation is
absorbed by the
surface and warms it

Infrared radiation
is emitted from the
Earth's surface

Climate Change &
Water Management
in South Florida

Interdepartmental Climate Change Group

South Florida Water Management District
2010 South Florida
Water Watch Report

Atmospheric CO₂ at Mauna Loa Observatory

Scripps Institution of Oceanography
NOAA Earth System Research Laboratory

PARTS PER MILLION

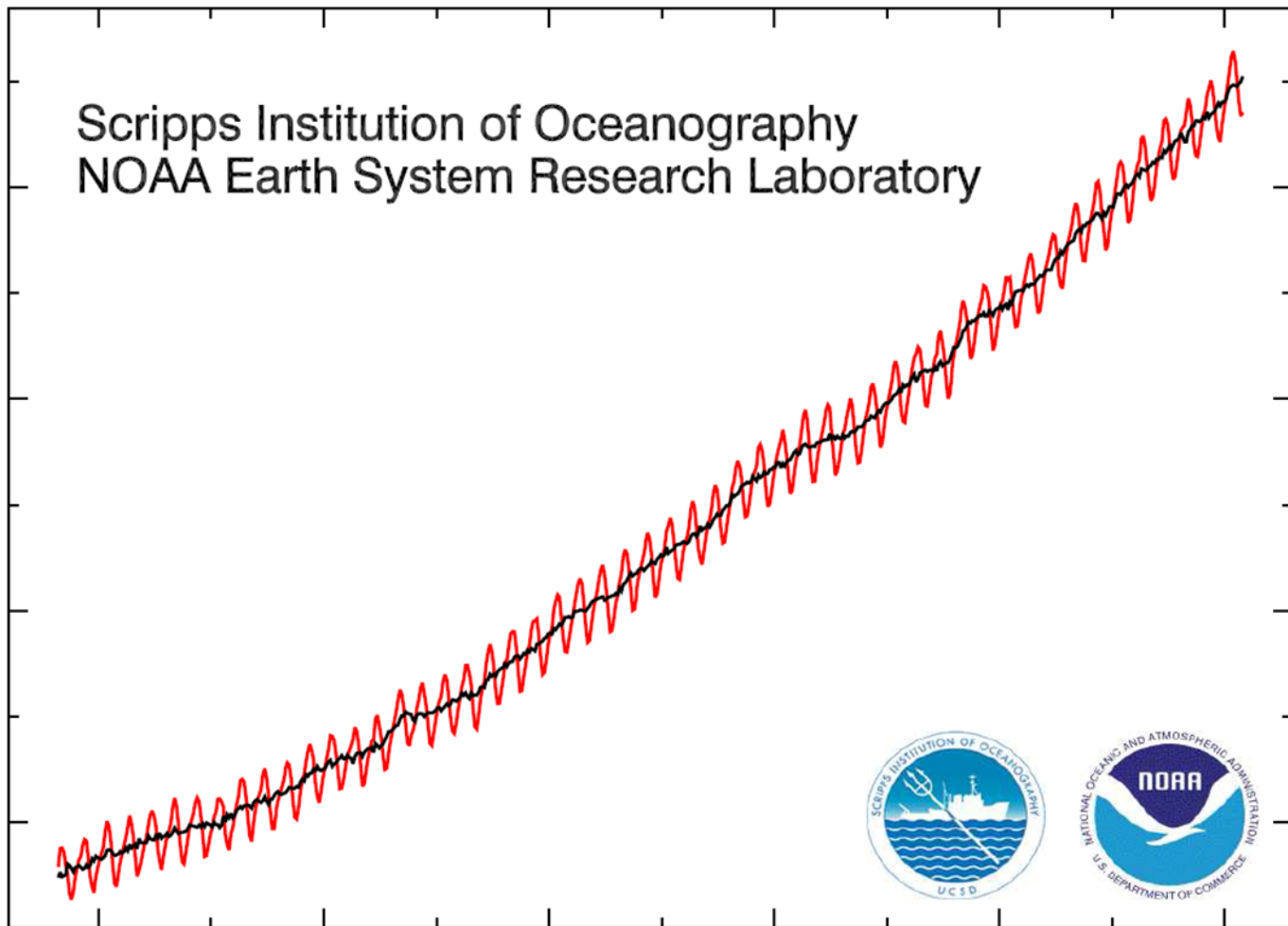
380
360
340
320

1960 1970 1980 1990 2000 2010

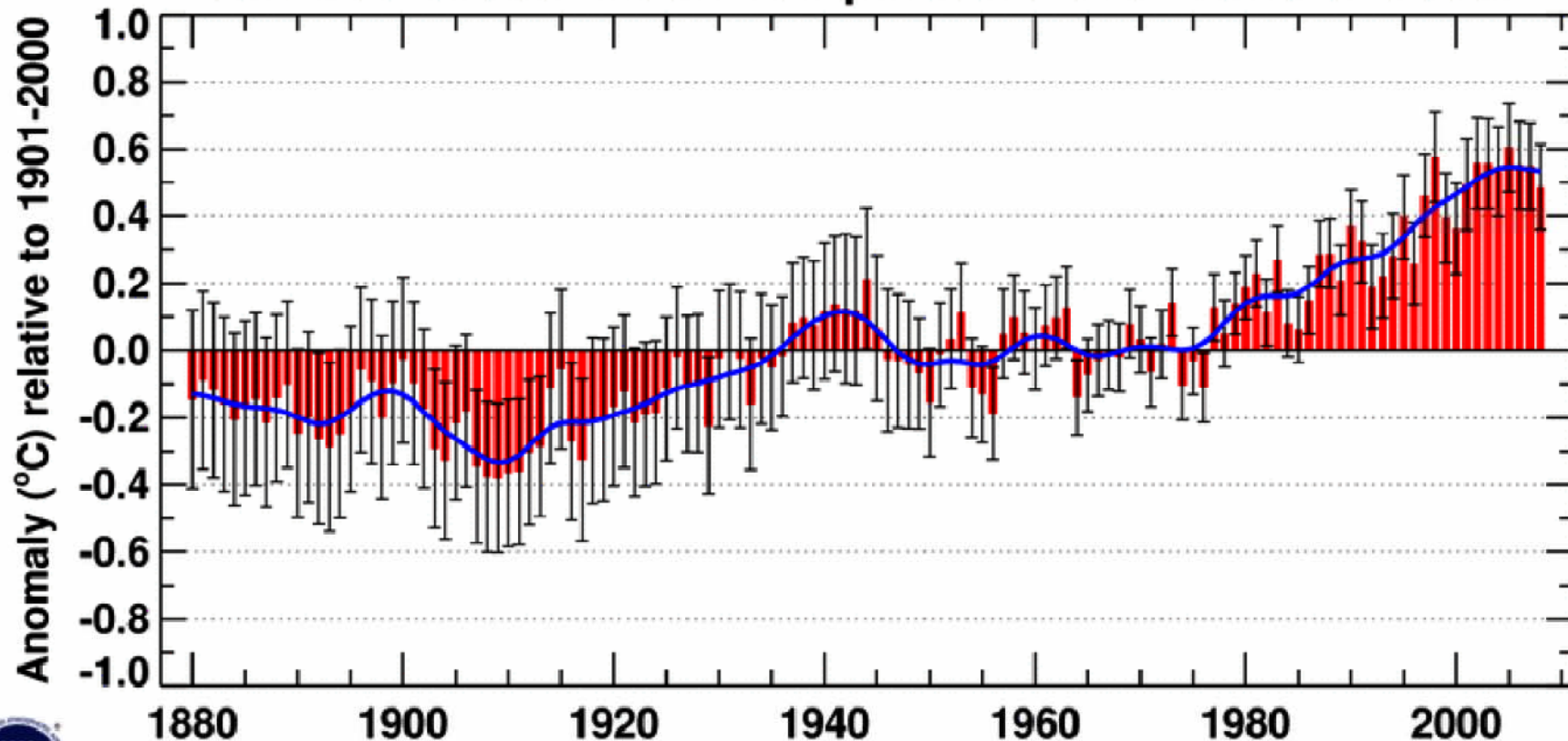
YEAR



November 2010



Jan-Dec Global Mean Temperature over Land & Ocean



NCDC/NESDIS/NOAA

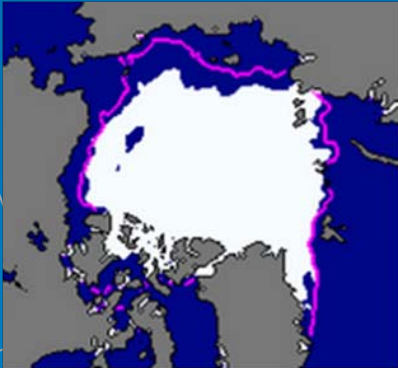
The Arctic Ice Cap Is Disappearing



September 2002



September 2005



September 2006



September 2007



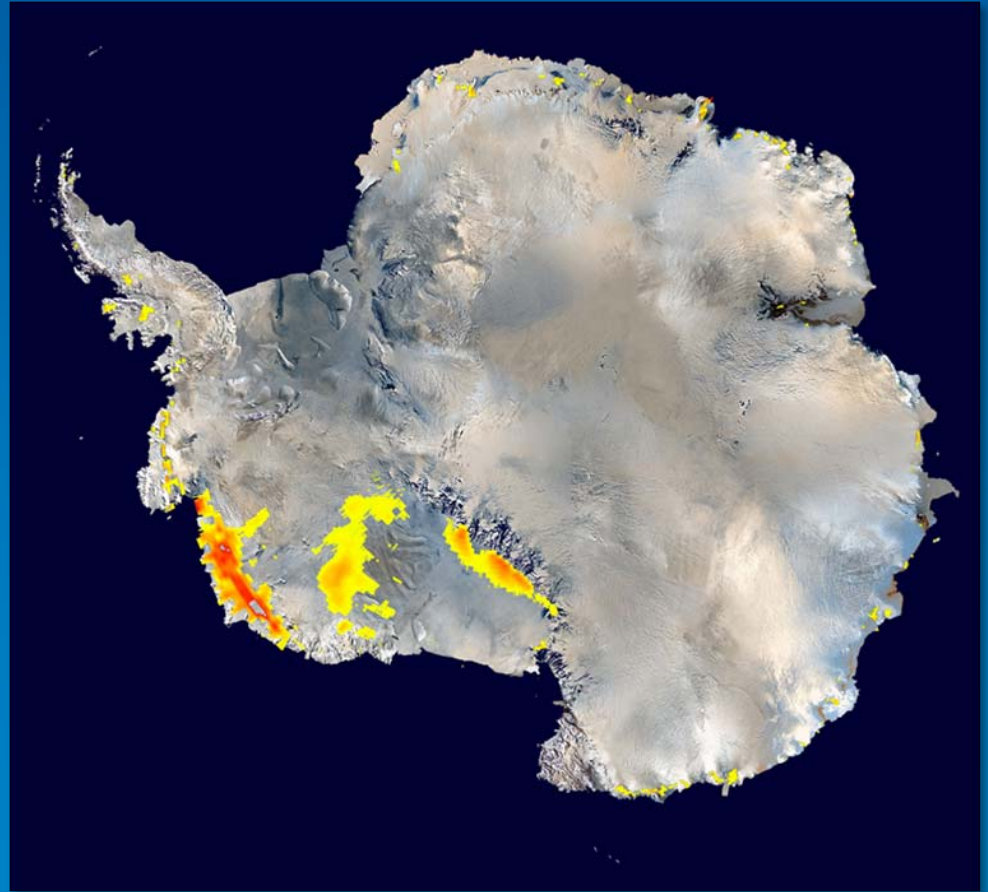
Source: National Snow and Ice Data Center; 1979-2000 average extent.

Future Projections of Sea Level Rise: Polar Ice Uncertainty

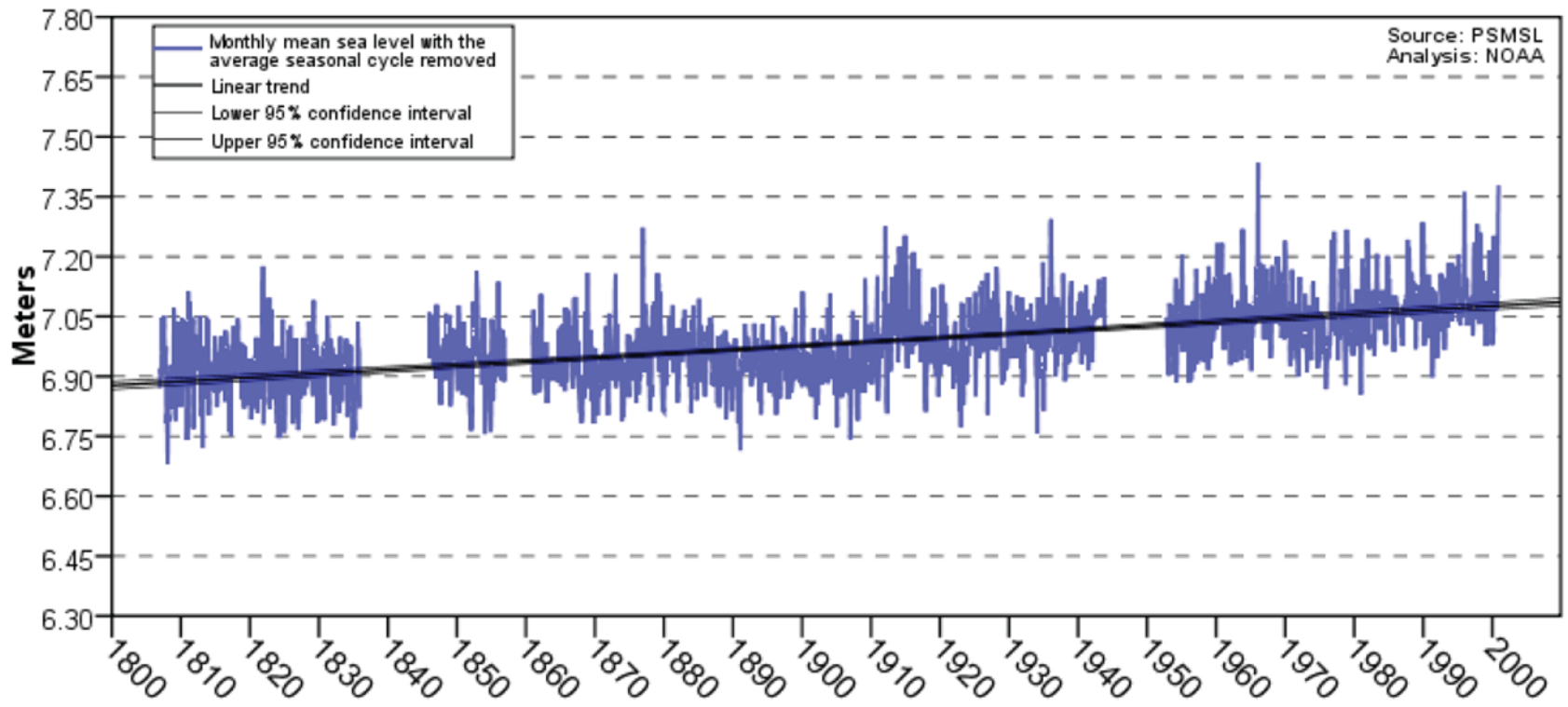
Greenland
(~2 million km²)



Antarctica
(~5.4 million km²)

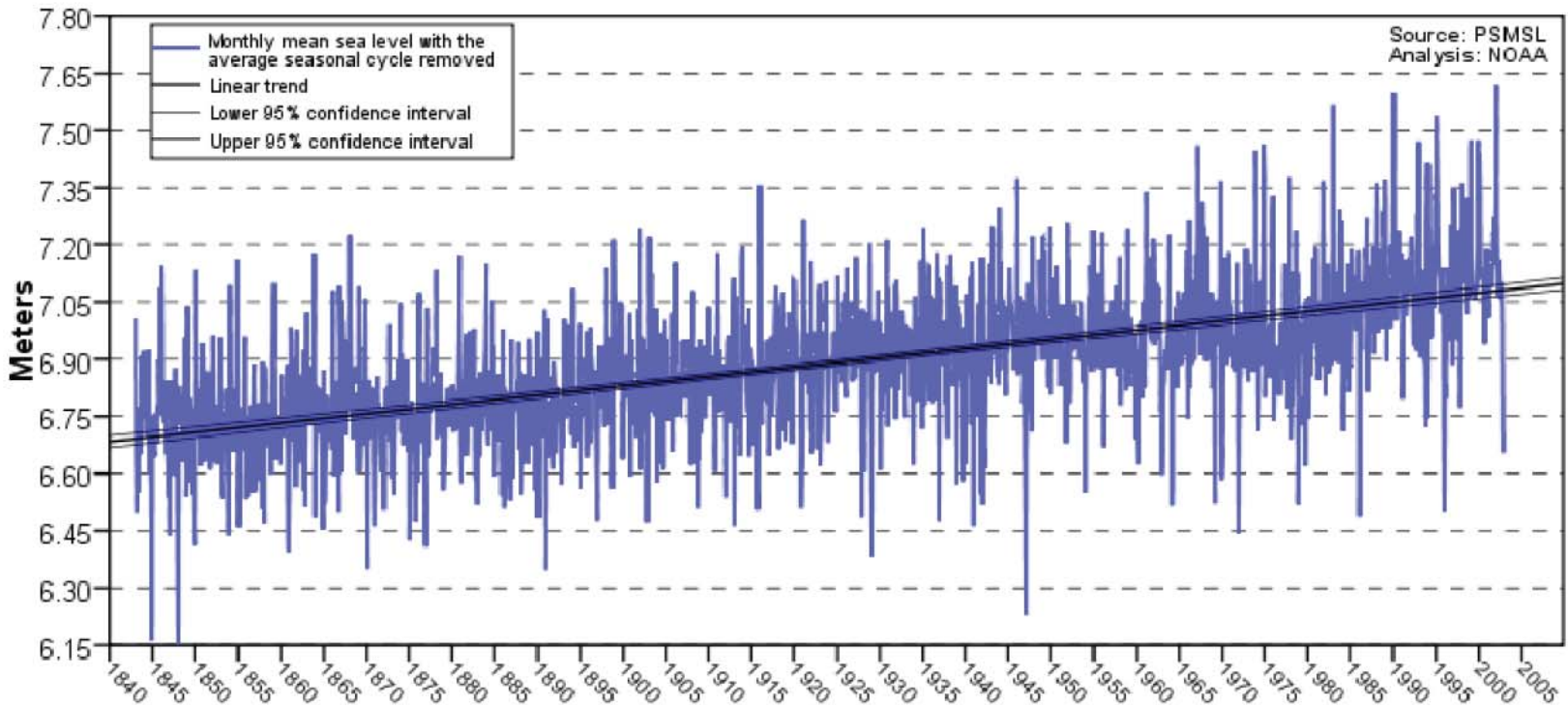


Brest, France **1.00 +/- 0.08 mm/yr**



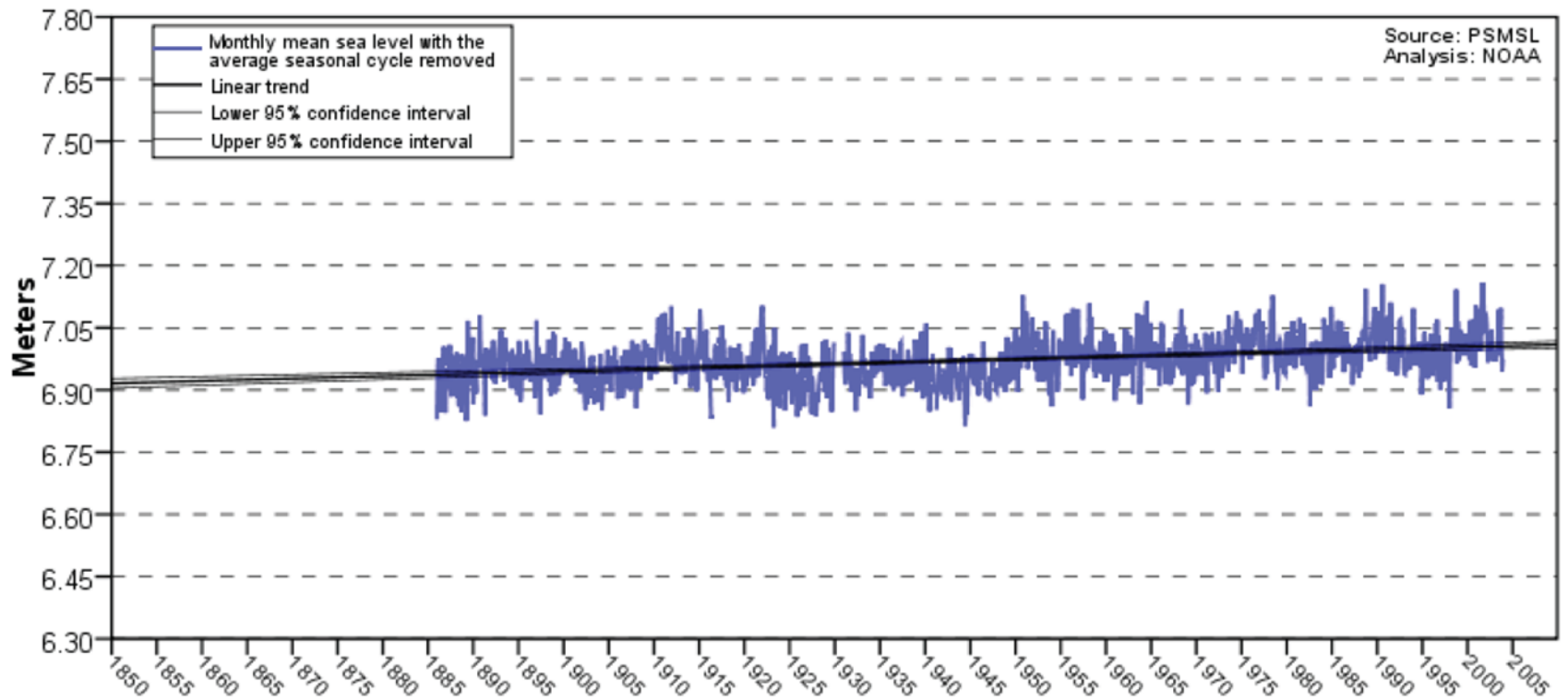
Cuxhaven, Germany

2.44 +/- 0.17 mm/yr



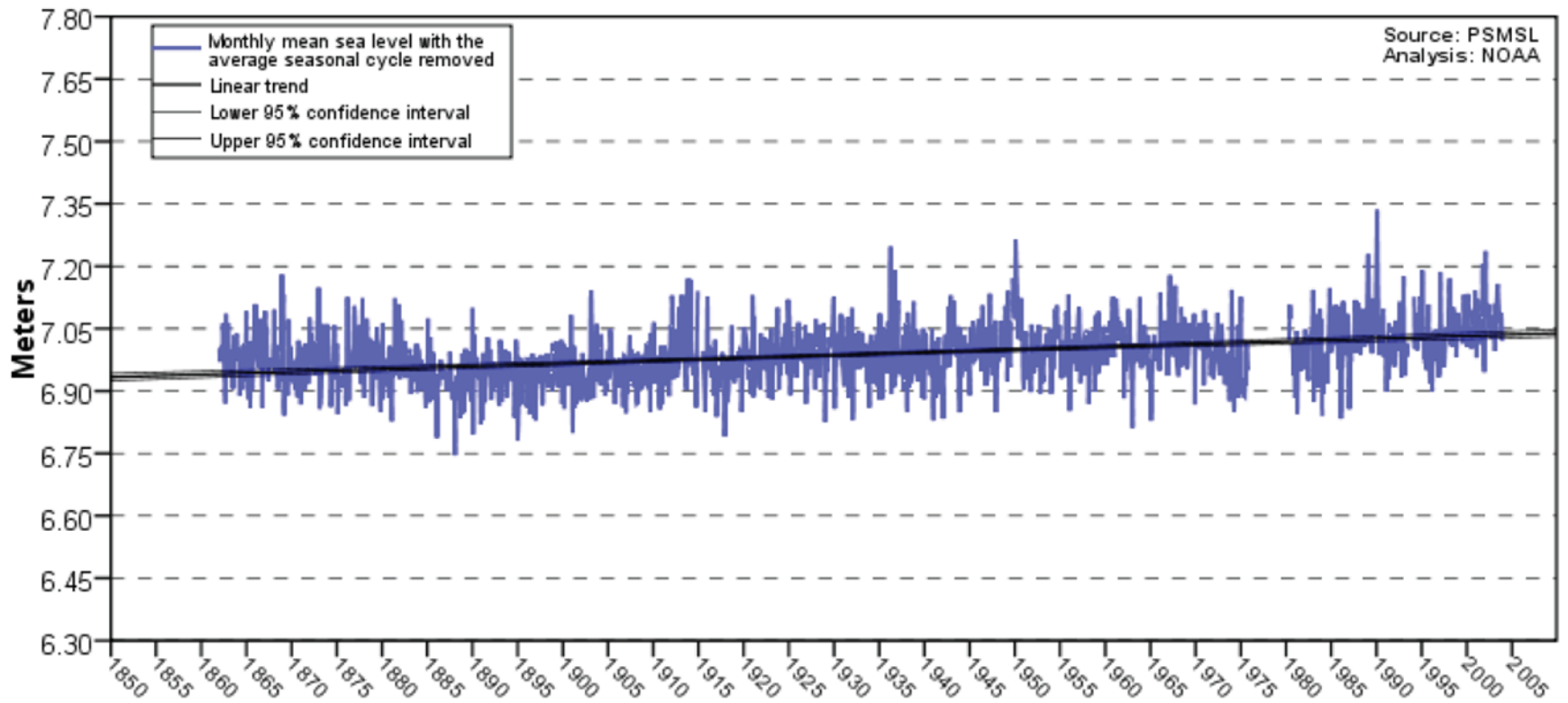
Sydney, Australia

0.59 +/- 0.11 mm/yr



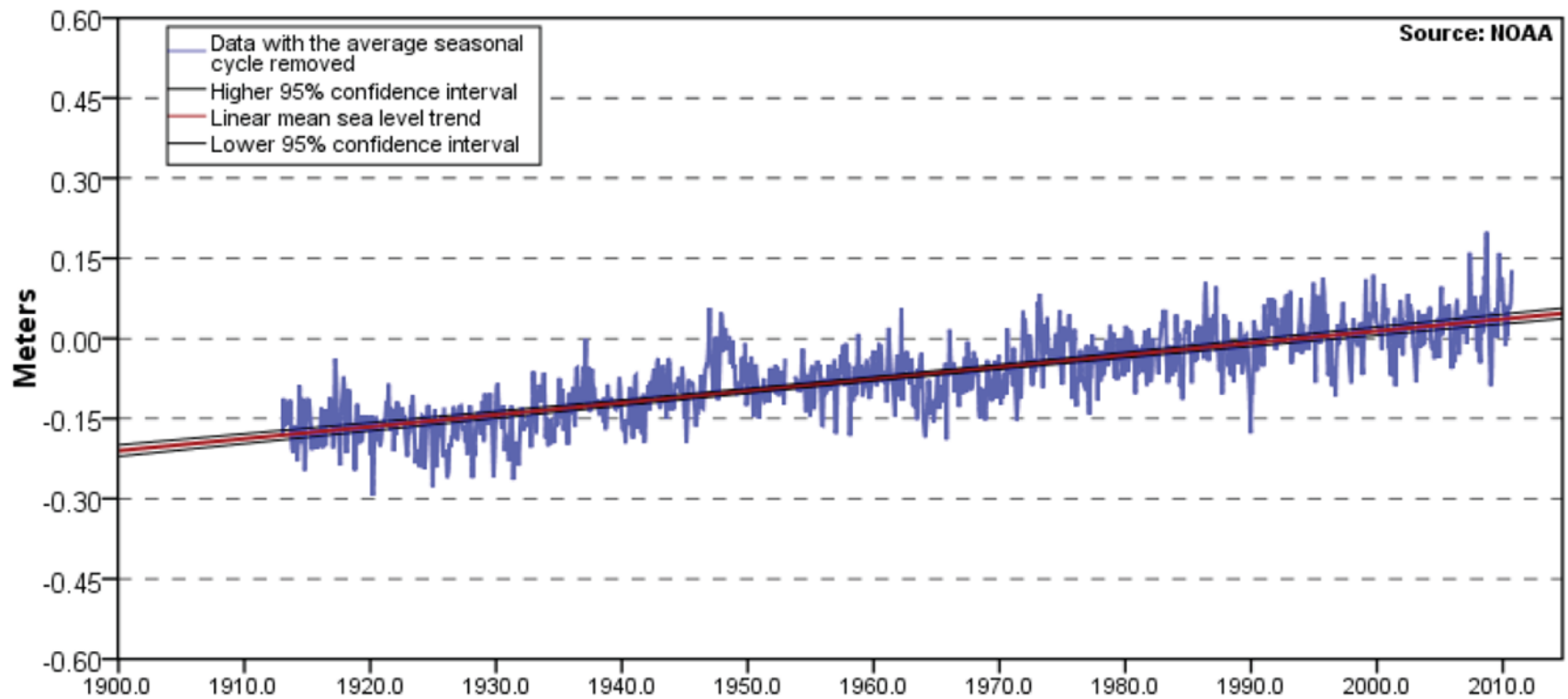
Aberdeen, UK

0.66 +/- 0.10 mm/yr



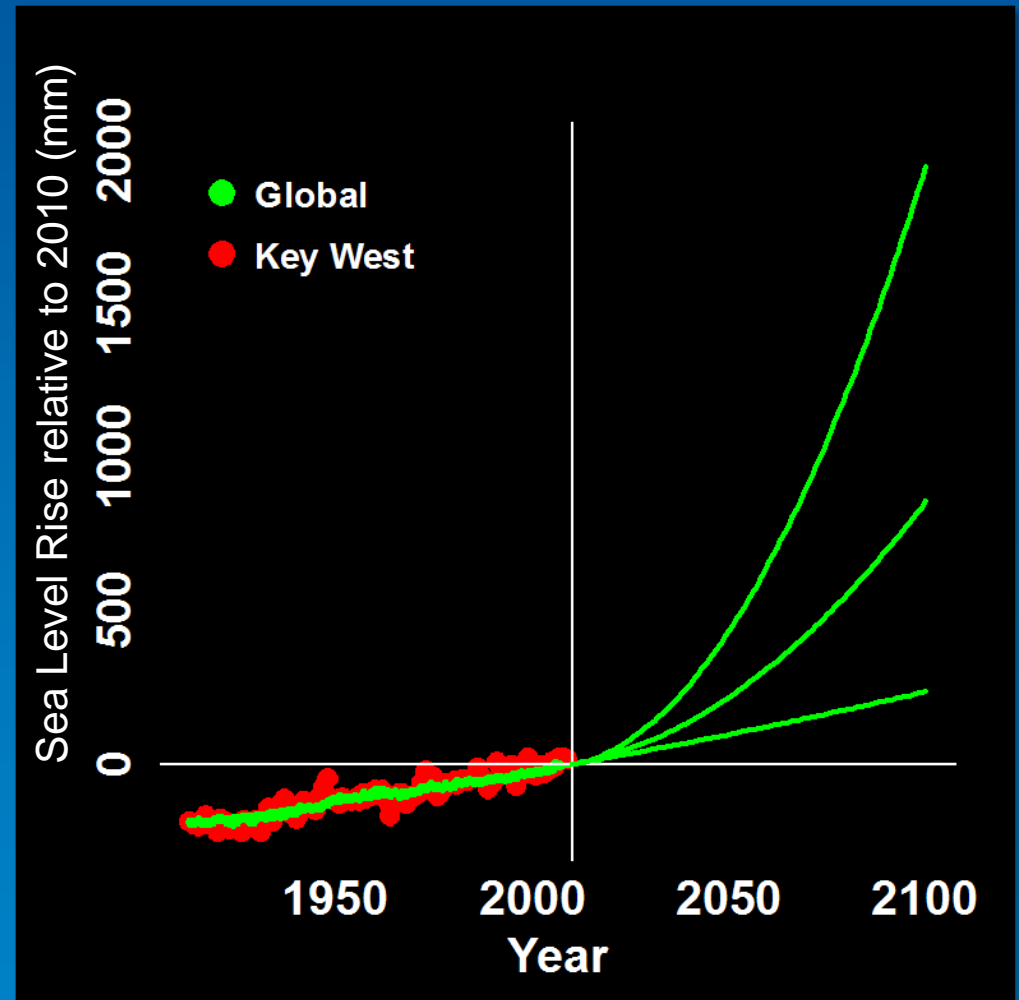
Source: PSMSL
Analysis: NOAA

Key West, FL 2.24 +/- 0.16 mm/yr



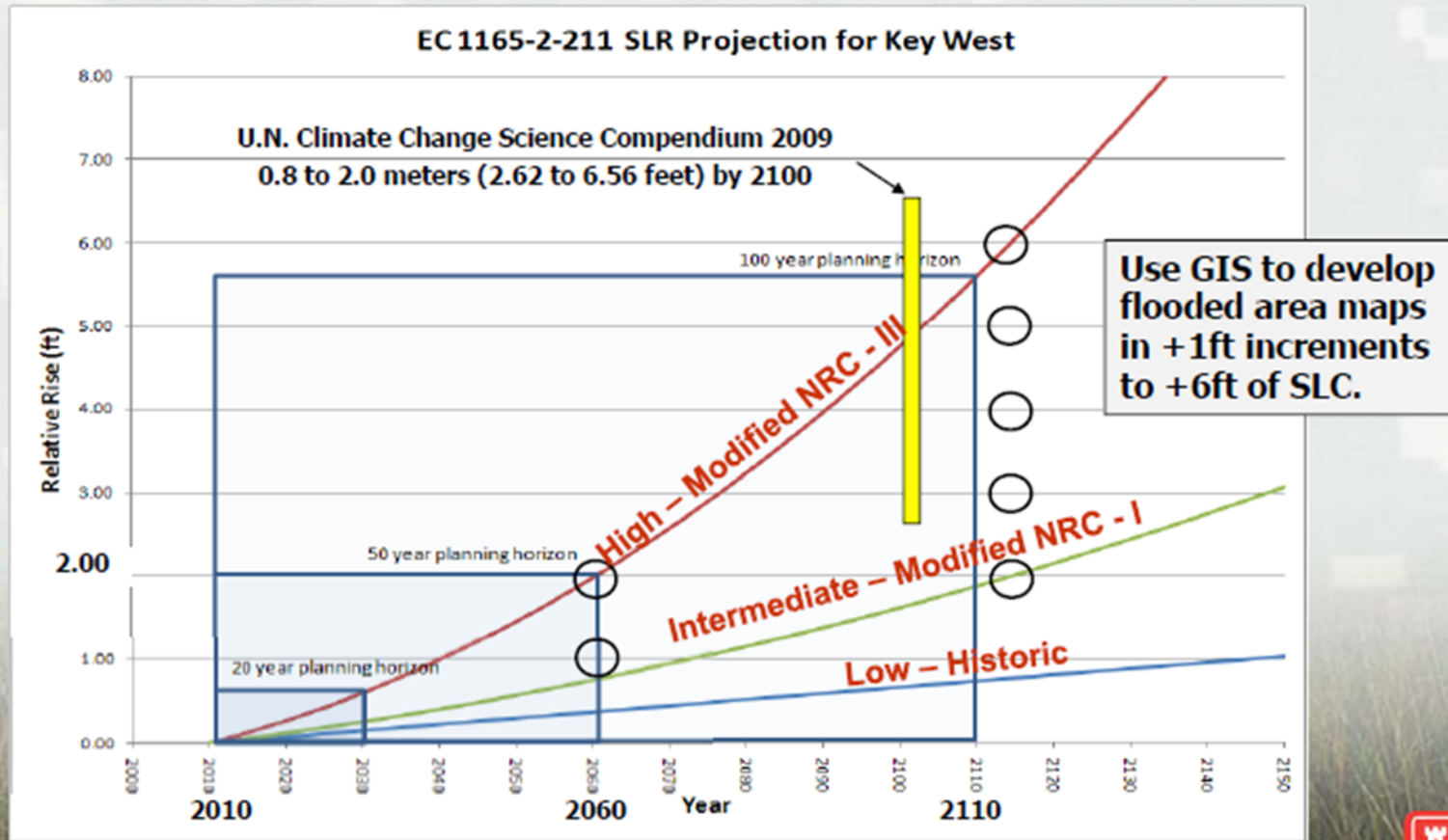
What Is the Future Rate of Acceleration?

- Rapid acceleration due to ice sheet loss
- Medium acceleration
- Continuing current trend



USACE National Guidance

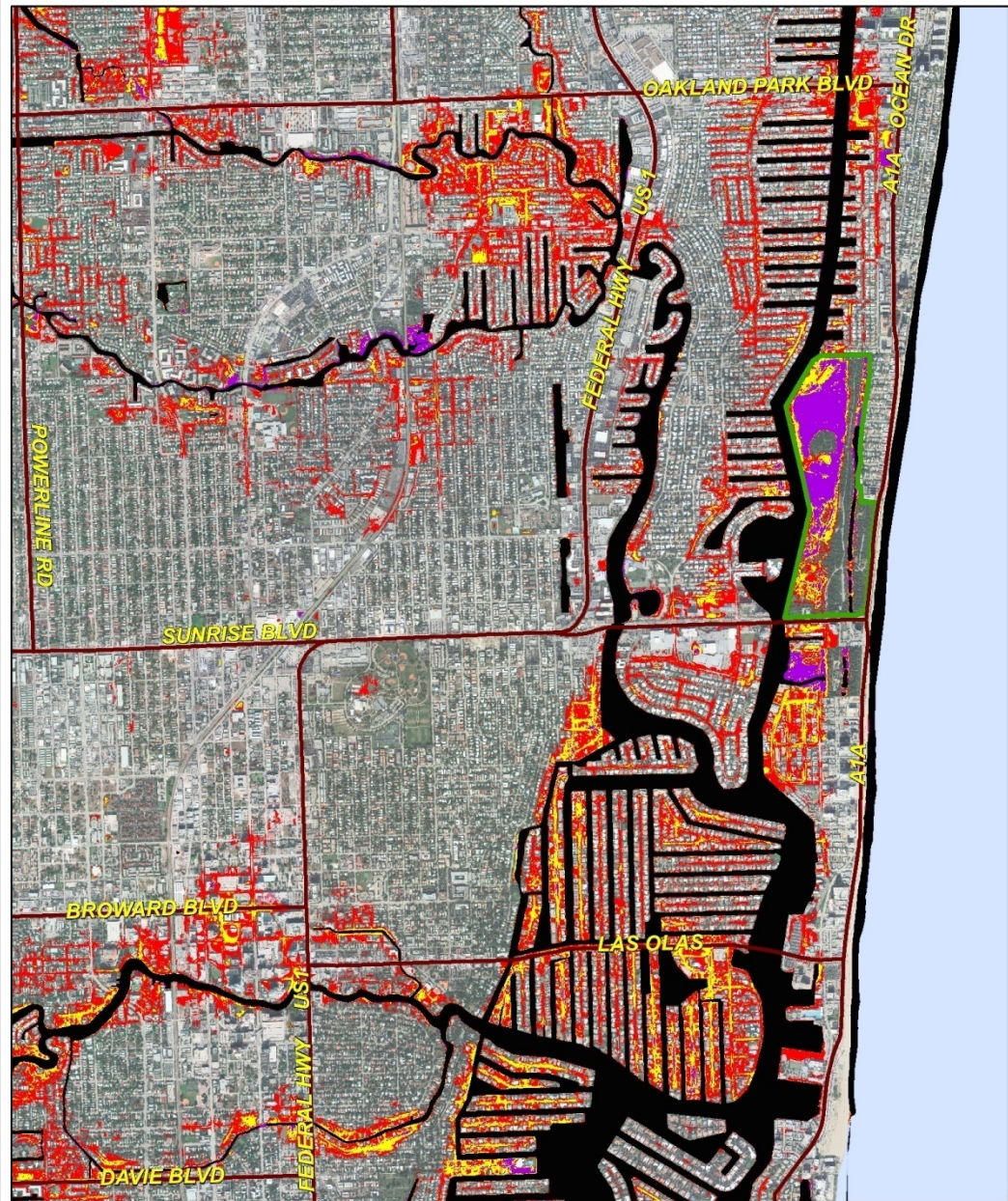
Scenarios for Sea-Level Rise



Tidal Flooding






EAST FORT LAUDERDALE AREA



LEGEND

-  County Parks
-  State Parks

Areas at Risk

-  +1 Foot Sea Level Rise
-  +2 Foot Sea Level Rise
-  +3 Foot Sea Level Rise

Source: Broward County

Prepared By:
Broward County GIS
Planning and Redevelopment Division
Environmental Protection and Growth Management Dept

DRAFT

This map is for illustrative purposes only.

emusgrave August 2009

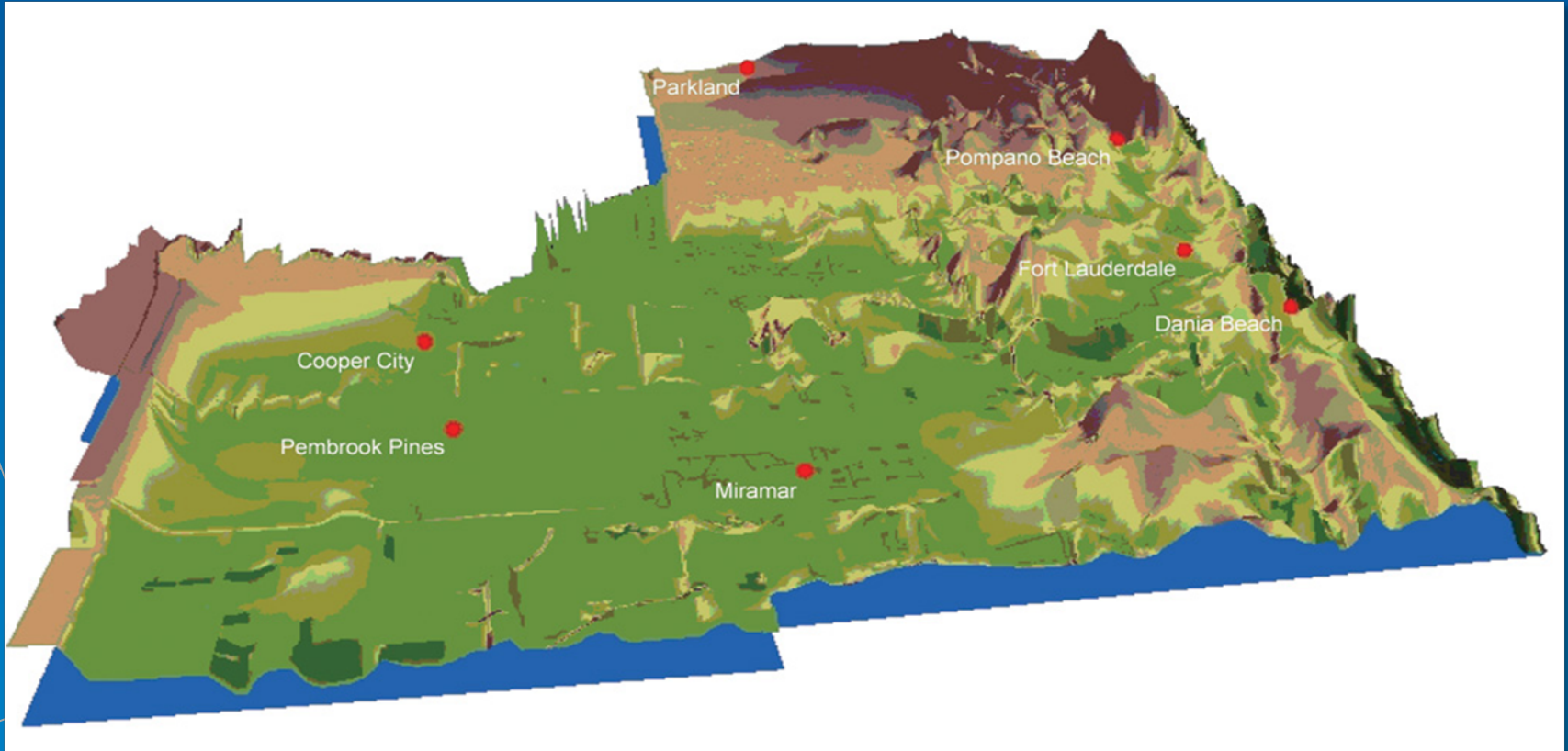
Taxable Value Potentially Impacted by Sea Level Rise Scenarios*

Costs of Inaction

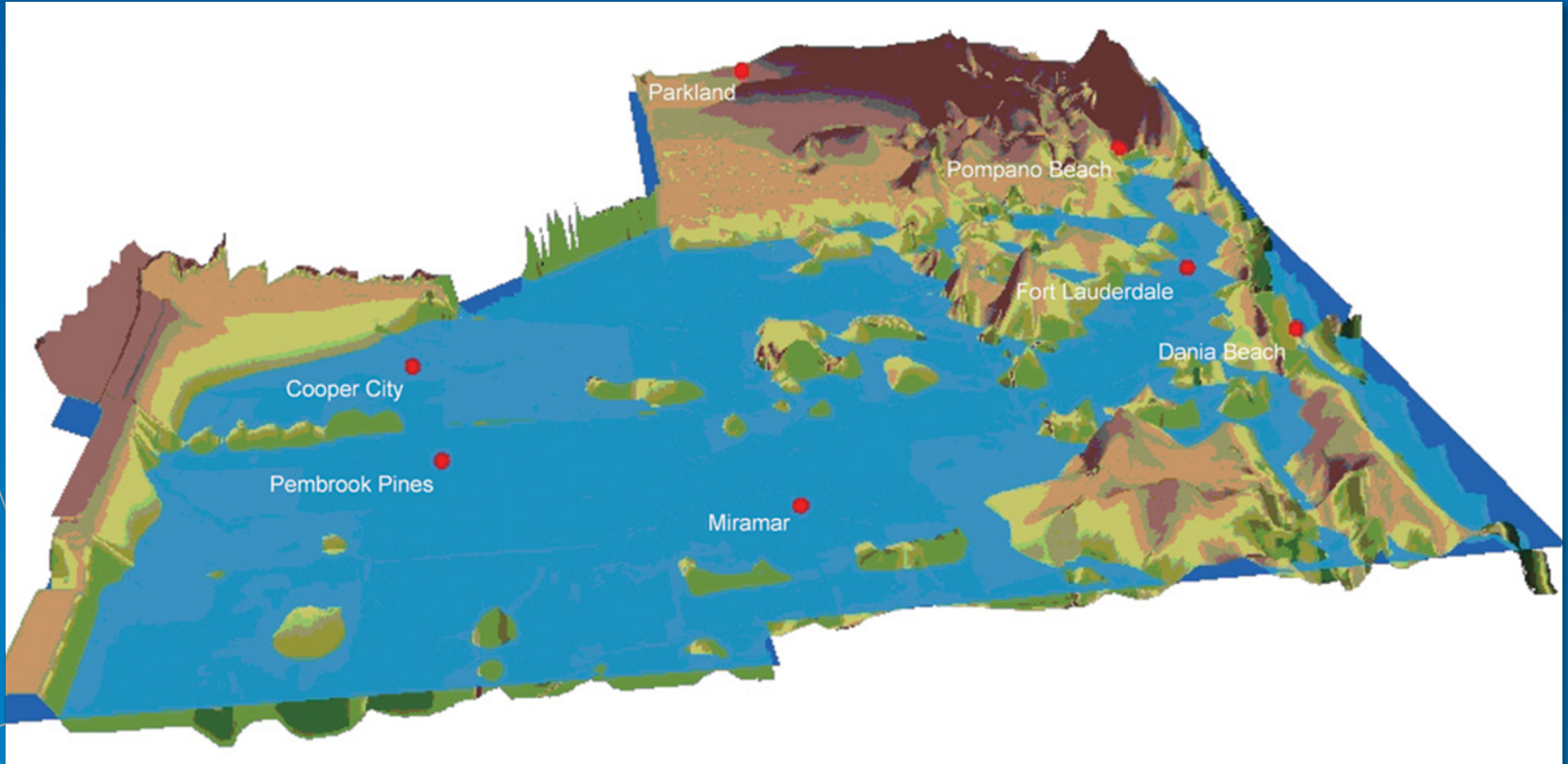
Scenario	Taxable Value	Percent of County Total Taxable Value
1 foot	\$ 468,927,000	0.3%
2 foot	\$4,541,904,000	3.2%
3 foot	\$24,406,356,000	17.5%

**Source: Broward County Planning and Redevelopment Division Estimates Based Upon 2009 Broward County Property Appraiser Data*

Modern Broward County Sea Level

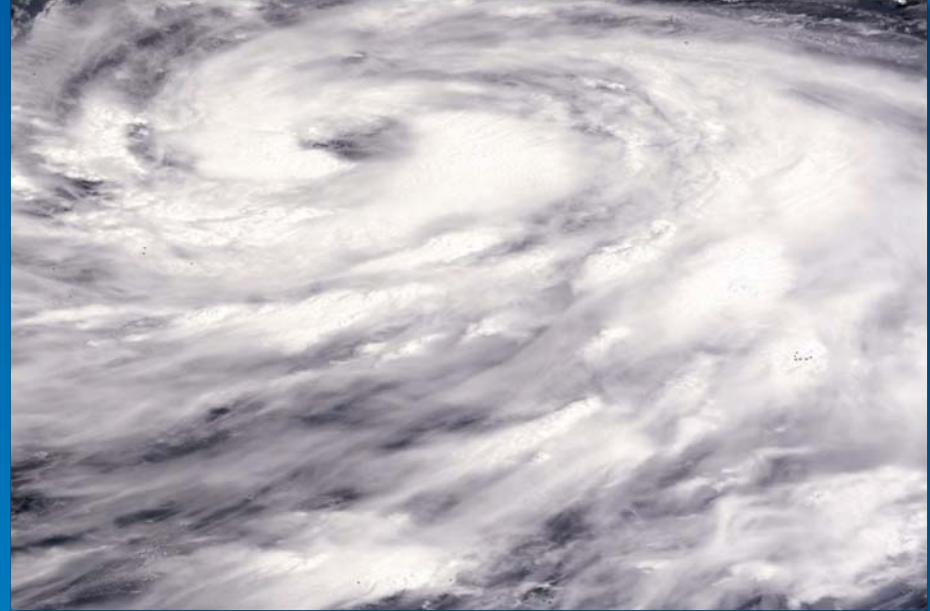


6 Foot Sea Level Rise – the Venice of Florida



Nothing Good About Climate Change for South Florida

- Milder winters farther north
- Elimination of low-lying real estate
- Much hotter...yes, it's possible
- More intense hurricanes
- Water supply problems
- Mosquito-borne diseases... dengue fever is just a start

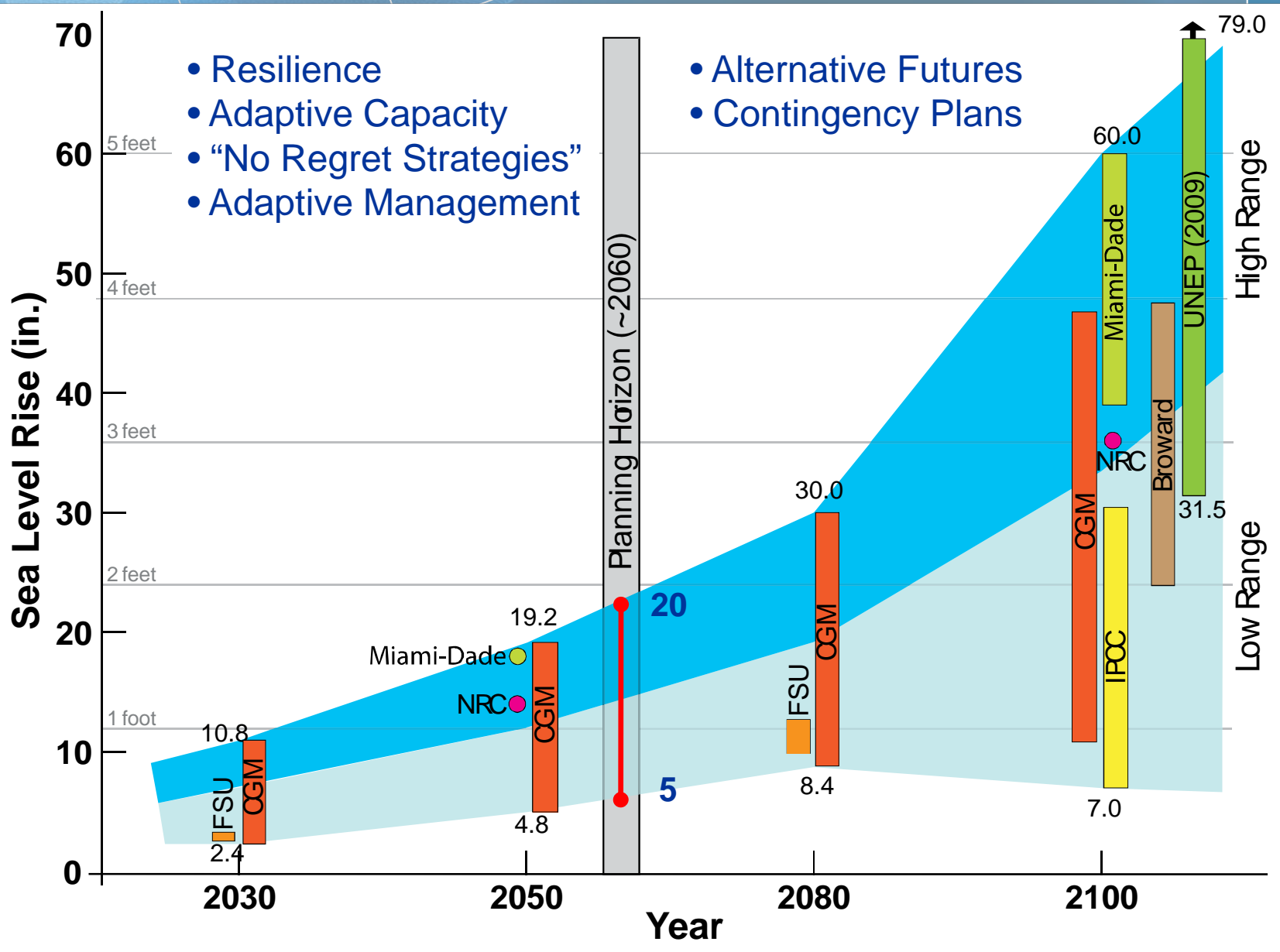


Economic Harm Implications of Sea Level Rise Are Tremendous

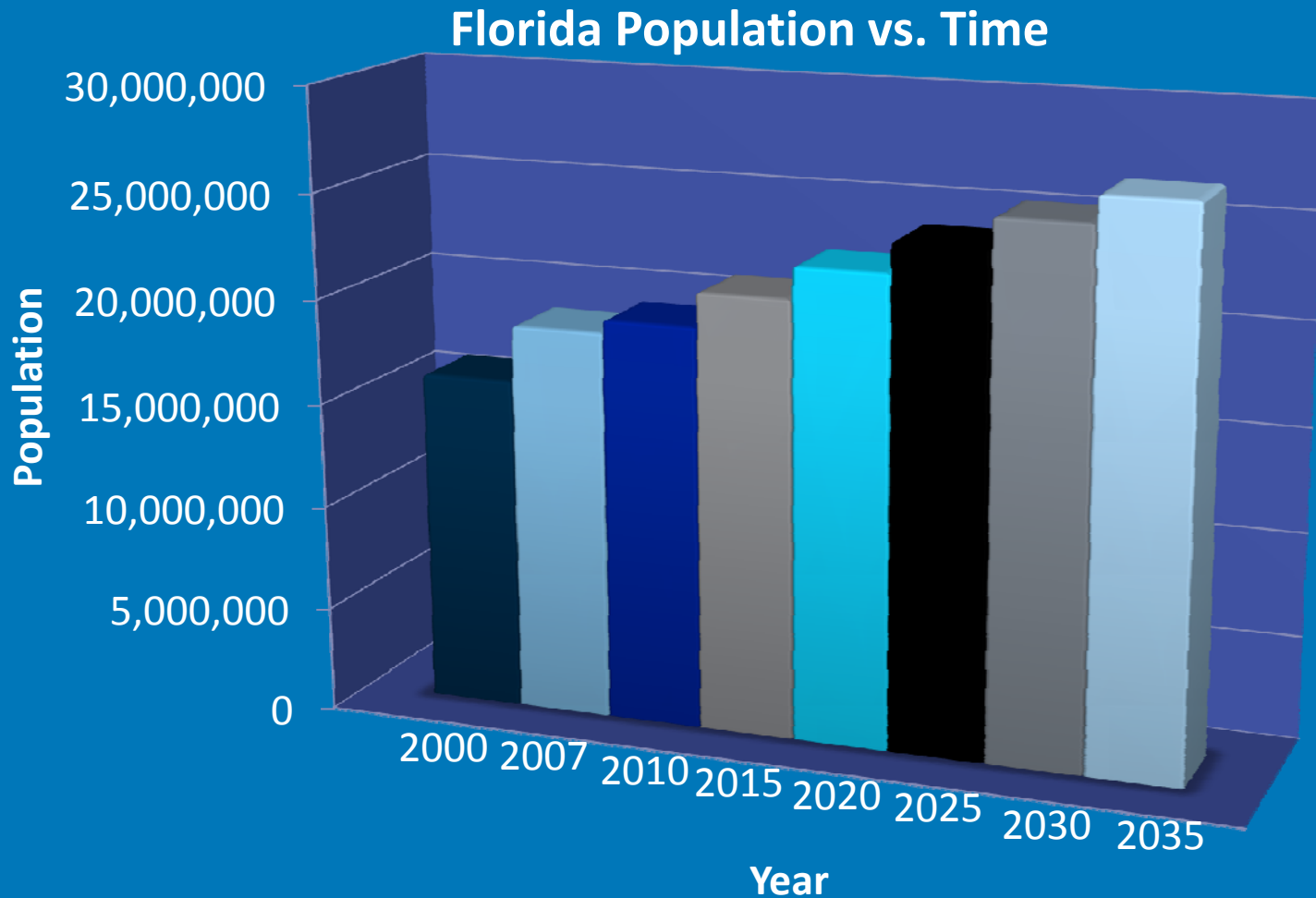
- Credible acceleration of sea level will signal onset of economic problems
- Potential elimination of Southeast Florida by 2100 under worst case scenario
- Insurance and mortgage companies will act far in advance of the actual sea level rise to deny property owners

How Do Achieve Sustainability in the Face of Sea Level Rise?

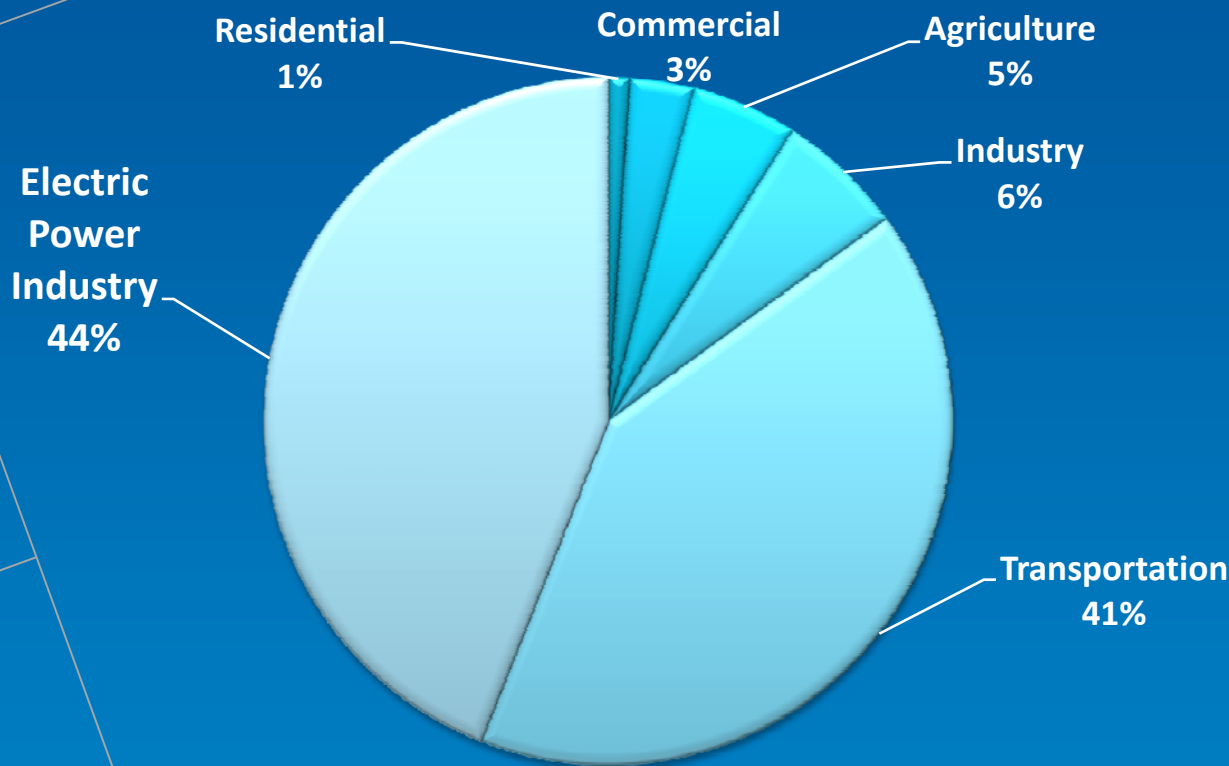
- Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs
- Greenhouse gas emissions and global warming are the problem
- Mitigation
- Adaptation
- Potential development of alternative futures



Florida's Sustainability is Complicated by Population Growth



Florida Produces 1% of Global Greenhouse Gas Emissions

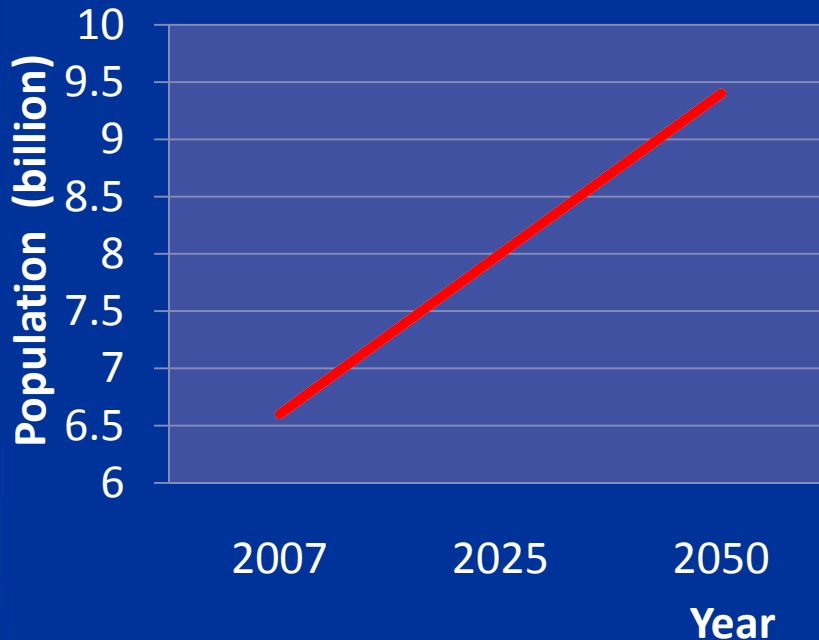


Florida GHG emissions in 2005 by economic sector

- ◆ FL GHG emissions ~5% of U.S. total (7,260.4 Tg CO₂ equiv. in 2005); FL was about 6% of U.S. population

Source: U.S. EPA, April 2007, Inventory of U.S. Greenhouse Gas Emissions 1990-2005

World Population Increase, Energy Usage and Increased Greenhouse Gas Emissions Are the Issue



Future of South Florida Depends on Local as Well as Global Efforts to Change Energy Consumption

The Earth at Night



Florida Will Require Reinvention To Be Sustainable in the Future

- Areas of Policy Change To Reduce Greenhouse Gas Emissions
 - Water
 - Energy
 - Communities
 - Transportation

**WATER CONSERVATION =
GREENHOUSE GAS EMISSION
REDUCTIONS**

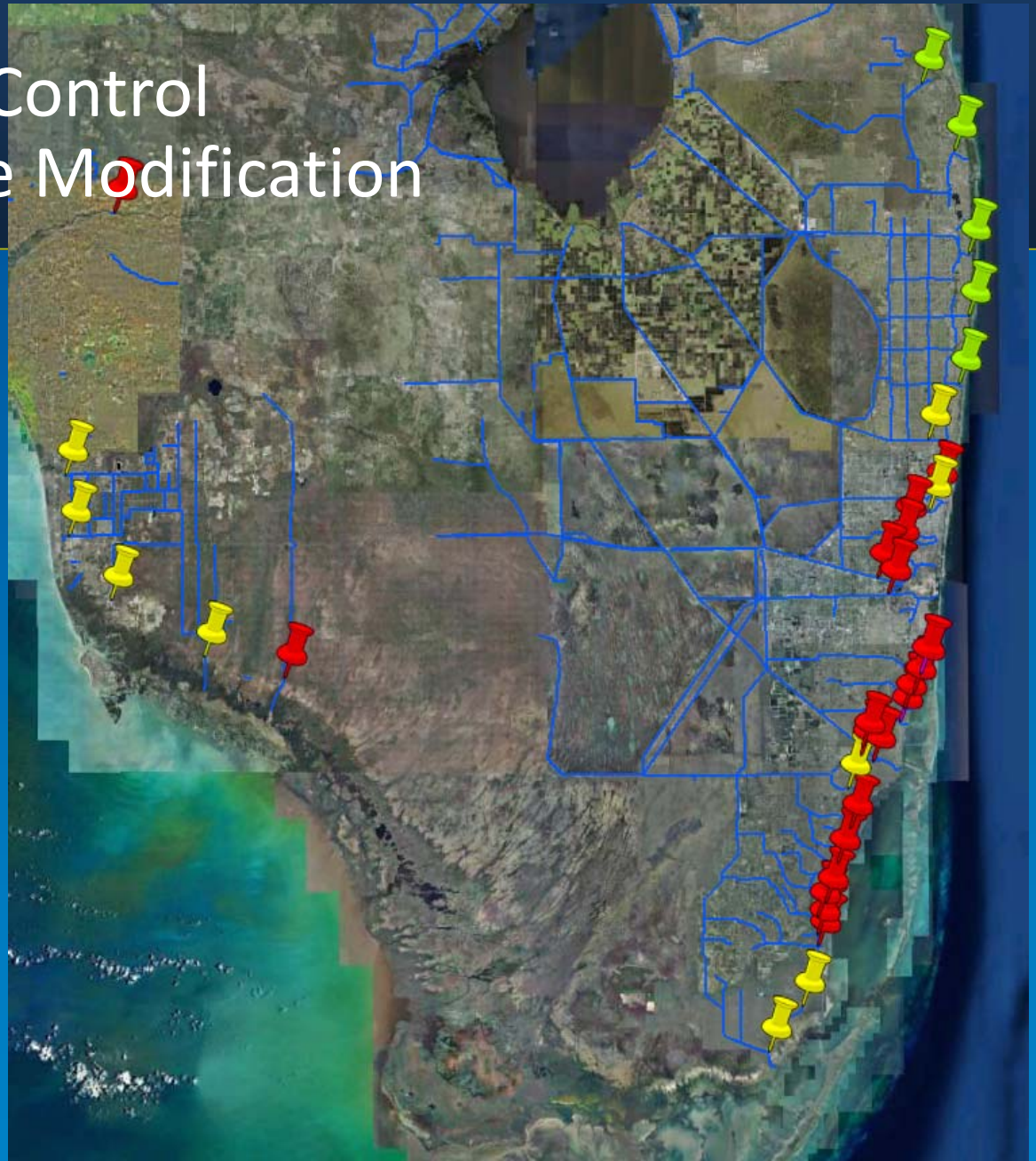
Energy Reductions in Water Supply Are Necessary But...We Have a Dilemma

- New water supply technologies use more energy
 - Nanofiltration – 3 kwh/1,000 gallons
 - LPRO (Floridan) – 5 kwh/1,000 gallons
 - Seawater RO – 15 kwh/1,000 gallons
- Advanced technologies make water conservation critical for GHG emission reductions



Vulnerable Flood Control Structures Require Modification

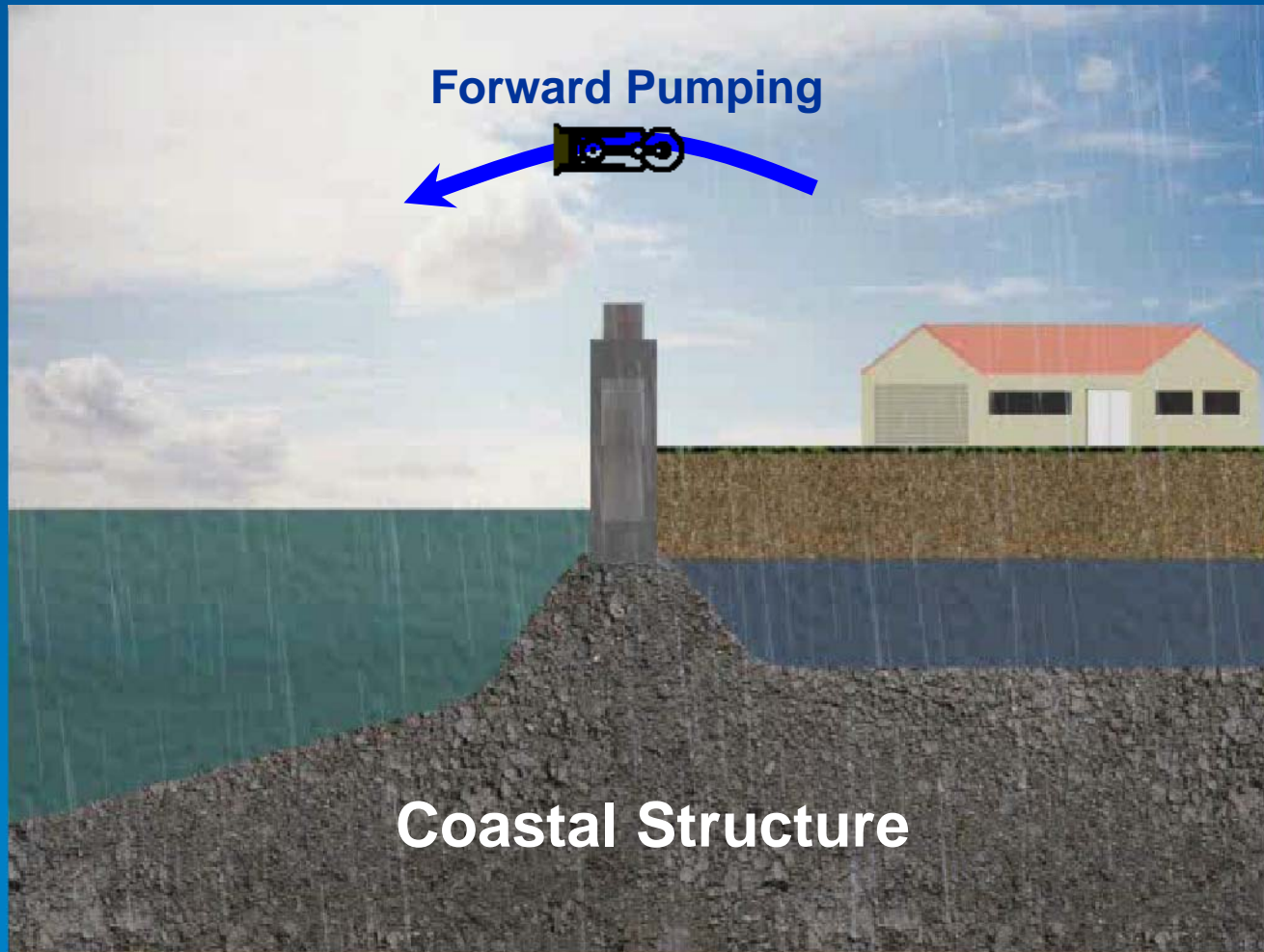
- 28 gravity structures on the East Coast
- Most vulnerable structures are in Miami-Dade and Broward Counties



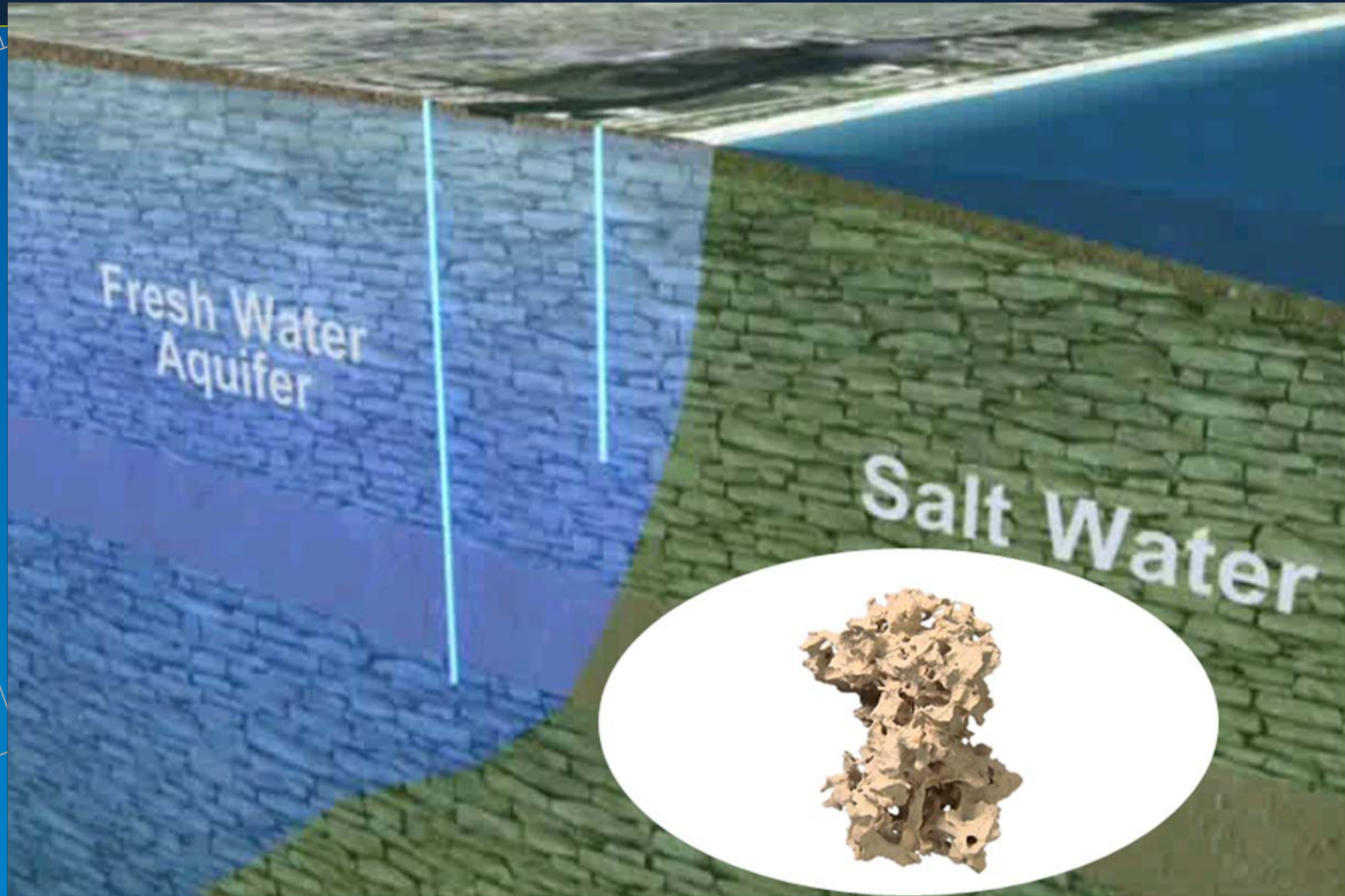
Flood Control Requires Improvements



Forward Pumping Necessary to Adapt to Rising Seas



Water Supplies Damaged by Saltwater Intrusion Require Replacement/New Technology



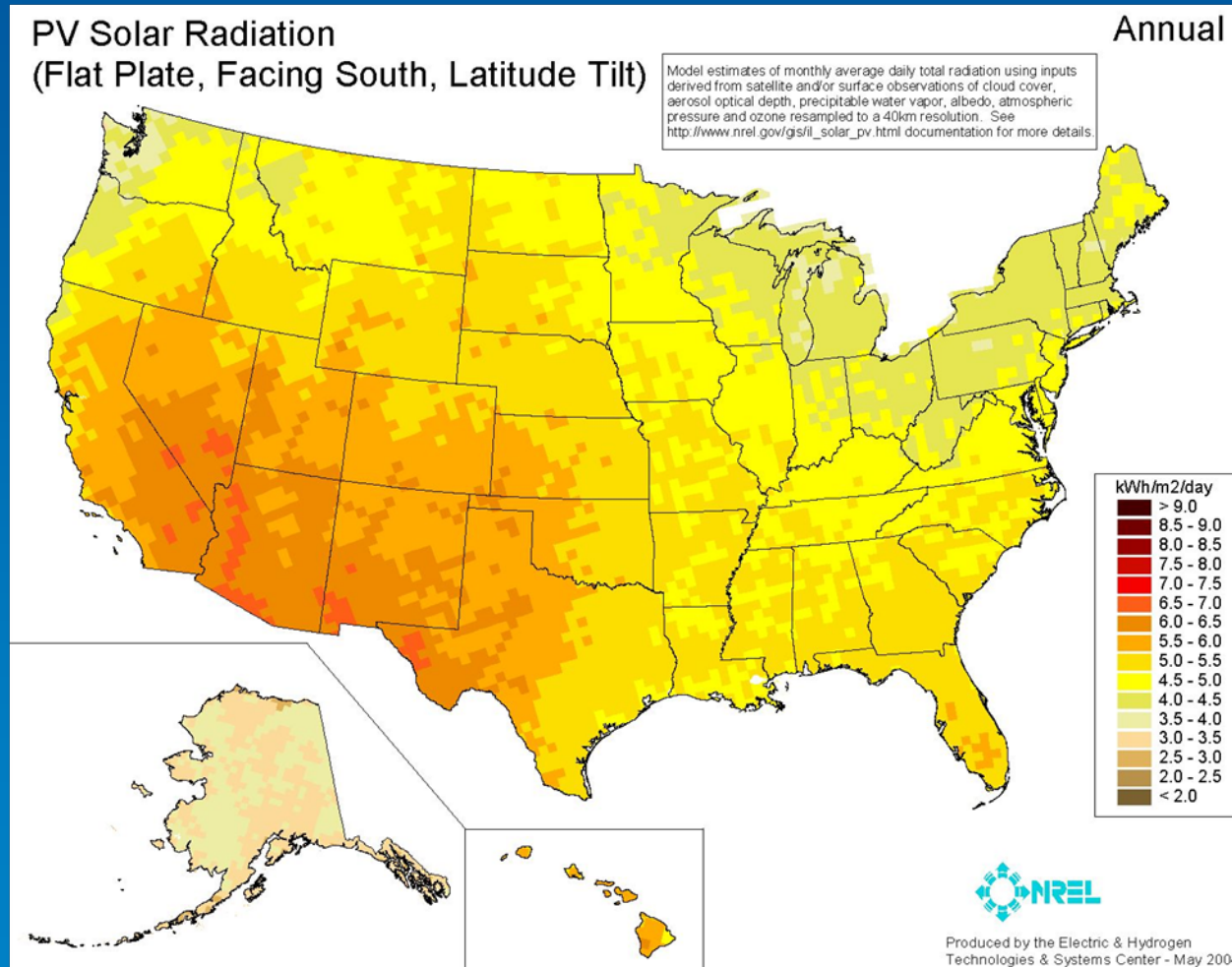
New Policies Needed to Reduce Energy Consumption

- Greater efficiency in energy usage by buildings and transportation
- Incorporation of alternative energies
 - Solar , Photovoltaic
 - Digester gas
 - Landfill gas
 - Waste-to-Energy
 - Net metering

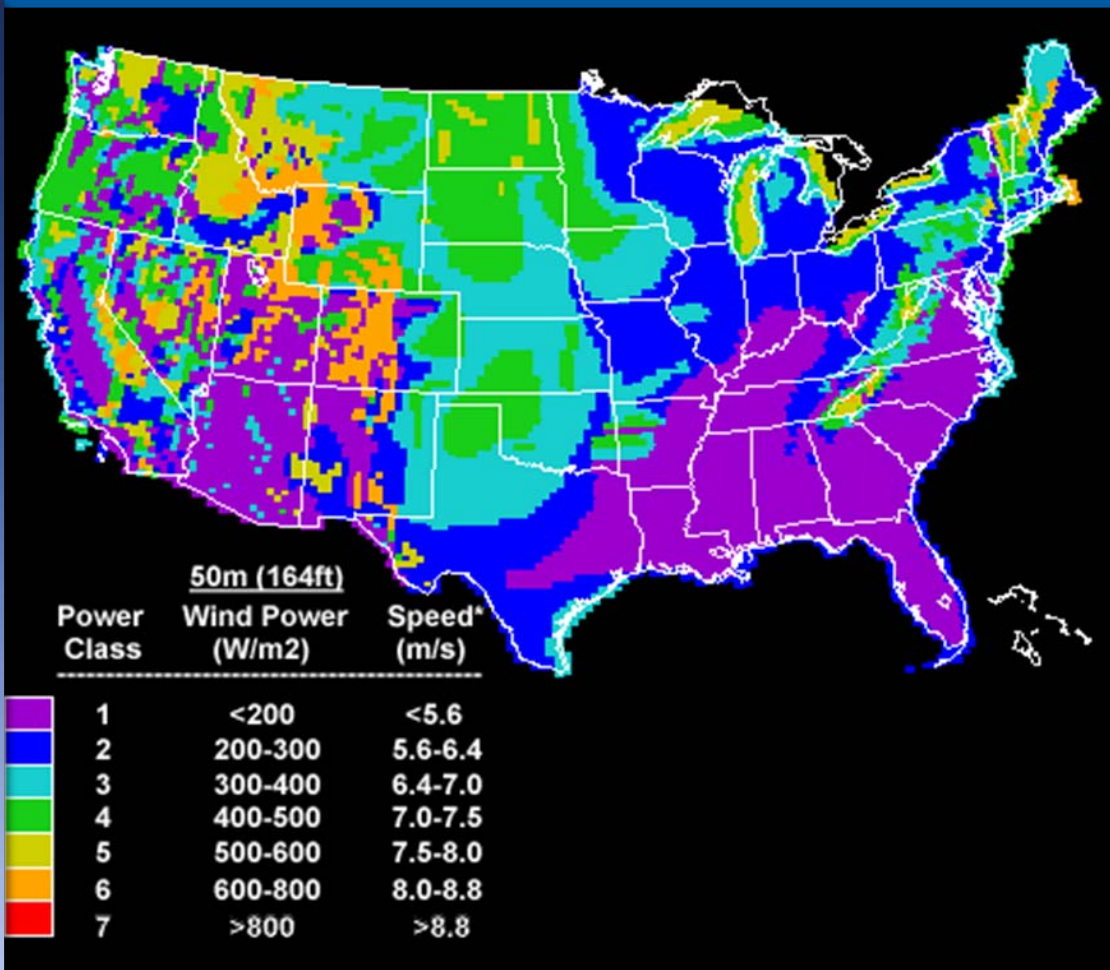


Florida Holds Tremendous Opportunities for Solar Hot Water and Photovoltaic Solar Energy Development

- 5 kWh/meter squared /day



Wind Resources in Florida Are Likely Greatest Off Shore



Green Energy, Green Fuels, and Nuclear Power Are Major Solutions to Greenhouse Gas Emissions

- Government's role is key in promoting solutions



QUESTIONS?

