Delaware River Basin Commission

Long Term Planning and Climate Considerations

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Executive Director

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WMAC

Photo courtesy of U.S. Army Corps of Engineers

Photo: http://pariveroftheyear.org/wp-content/uploads/2014/01/cody20102.jpg

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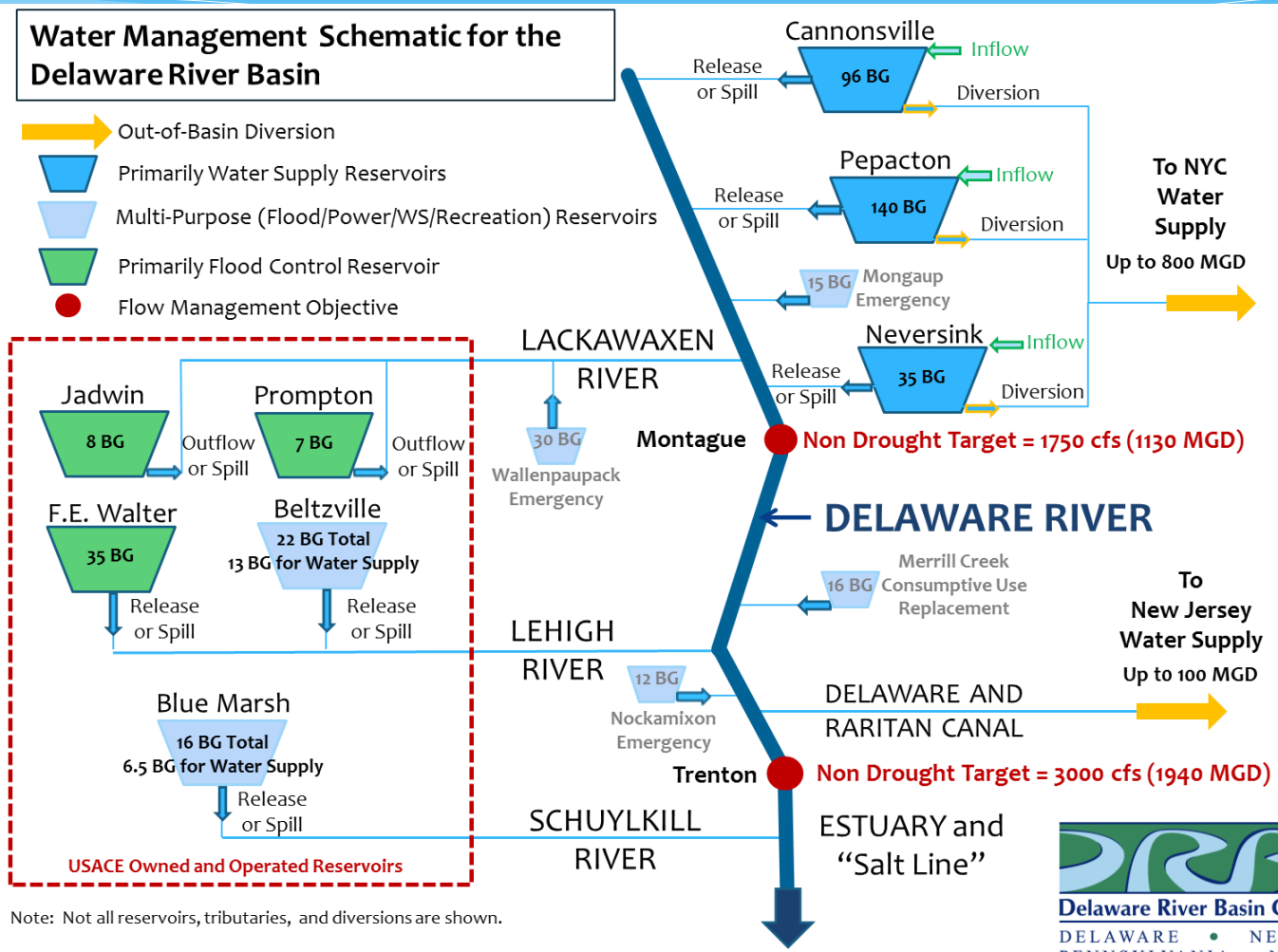
2060 Planning Questions
Water Availability

- Adequacy of available storage?
- Adequacy of emergency storage?
- Number of "drought days"?
- Water budget in major sub basins:
  - Will the available Water Supply meet the anticipated Water Demand?



Note: Not all reservoirs, tributaries, and diversions are shown.

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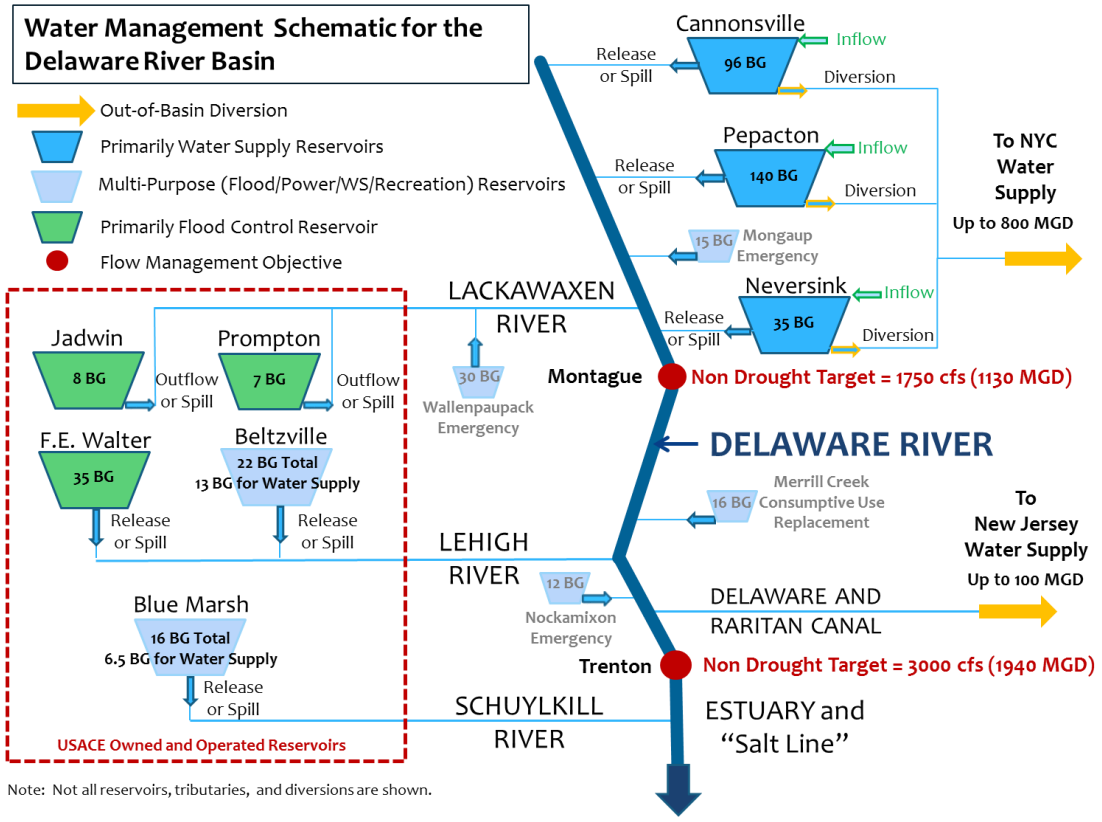
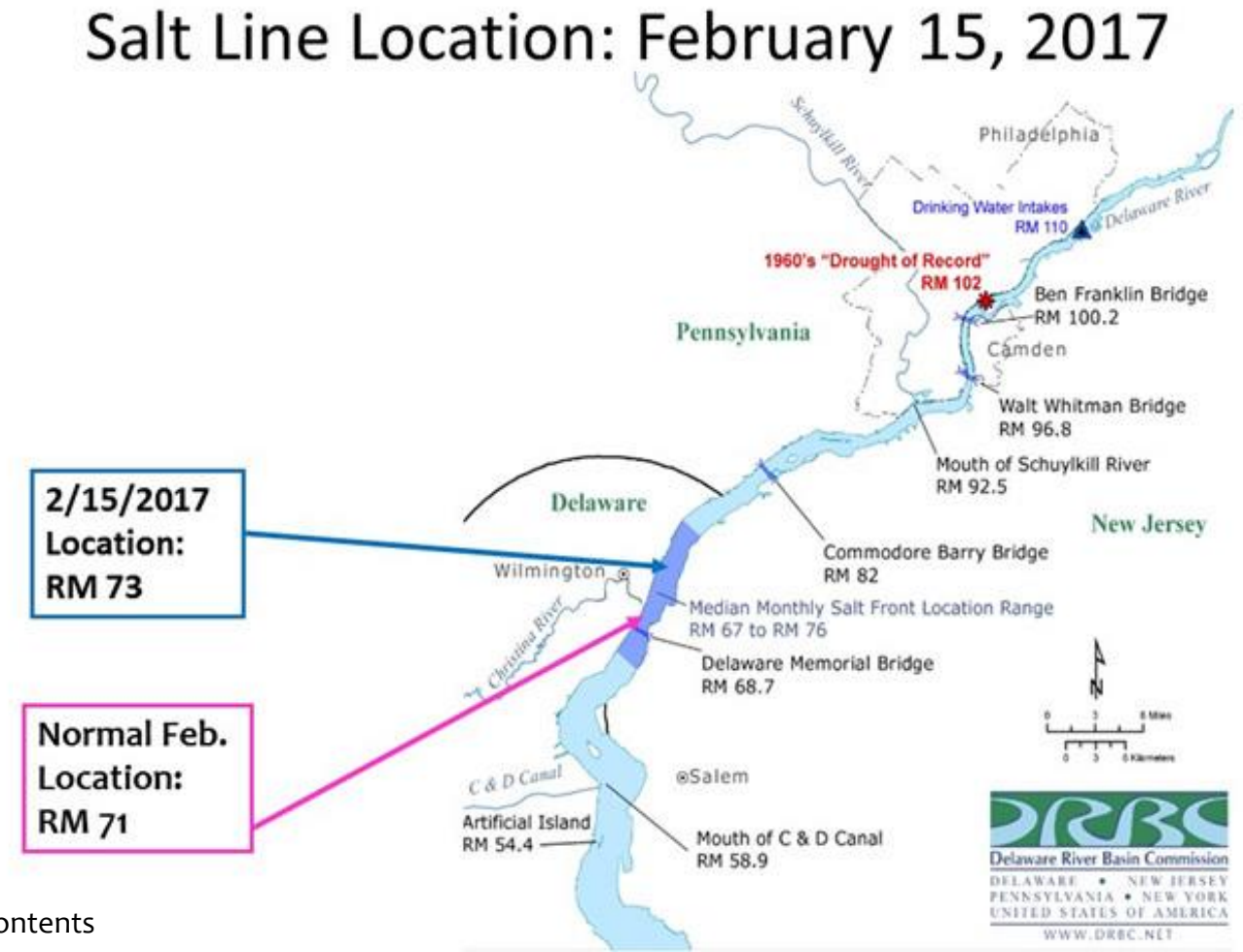
2060 Planning Questions
Water Availability



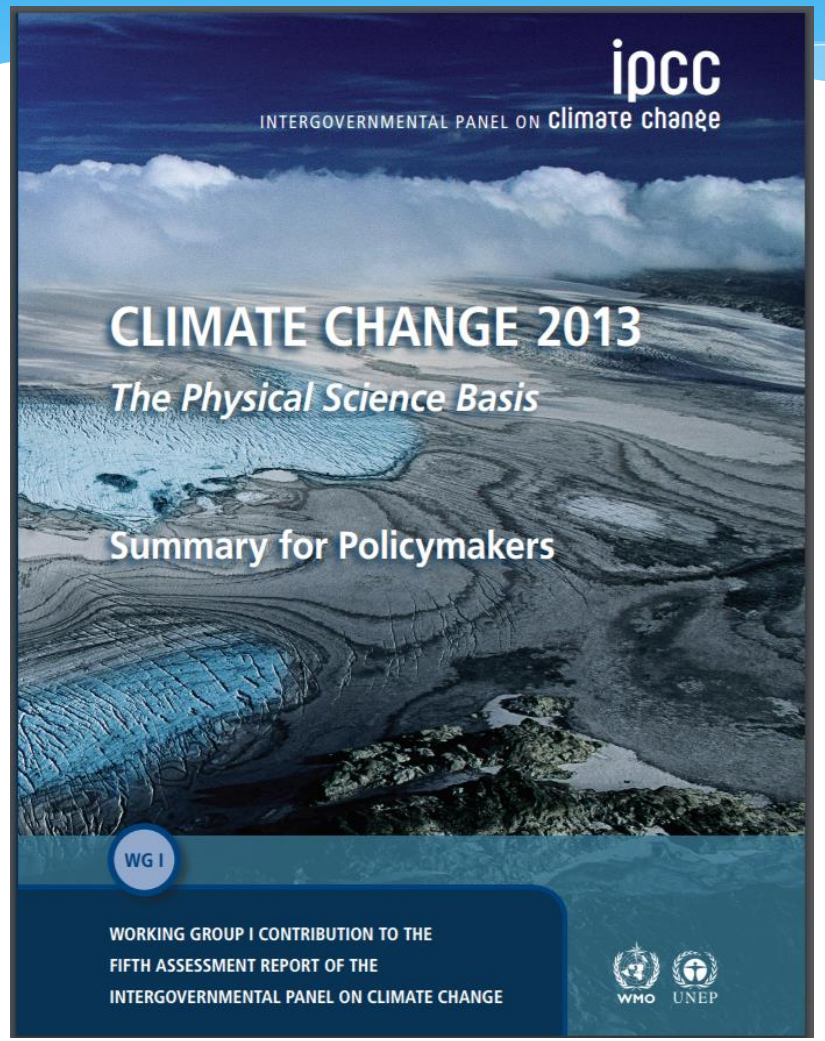


2030 / 2060 Planning Scenarios

	Baseline	2030 / 2060
Water Demands	Existing	Projected
Water Efficiency	Existing	Higher Standards
Climate: Precipitation/ Runoff/ and Use	**Drought of Record (1960's)**	**IPCC / USGS Scenarios**
Climate: Sea Level Rise	**Existing Trends**	**IPCC + Regional Studies**
Pass-by flows and Conservation Releases	Existing	EcoFlow Scenarios
Consumptive Use Make Up Water	Existing	EcoFlow Scenarios
Drought Operating Rules	FFMP / DRBC Water Code	FFMP / DRBC Water Code

IPCC = Intergovernmental Panel on Climate Change

IPCC 2013 Summary for Policymakers



Water Cycle:

"Changes in the global water cycle in response to the warming over the 21st century will not be uniform. The **contrast in precipitation** between wet and dry regions and **between wet and dry seasons will increase, although there may be regional exceptions."**

Sea Level Rise:

"Global mean sea level will continue to rise during the 21st century. Under all RCP scenarios, **the rate of sea level rise will very likely exceed that observed during 1971 to 2010** due to increased ocean warming and increased loss of mass from glaciers and ice sheets."

IPCC = Intergovernmental Panel on Climate Change

Climate Scenarios
Temperature and Precipitation

IPCC Emissions
- RCP 2.6
- RCP 4.5
- RCP 6.0
- RCP 8.5

USGS Hydrology
- Precipitation
- Temperature
- Land Use
- Runoff

DRBC Modeling
- Future Water Demands
- Water Availability
- Drought Resiliency

IPCC = Intergovernmental Panel on Climate Change

RCP = Representative Concentration Pathways (Carbon Dioxide Emissions)

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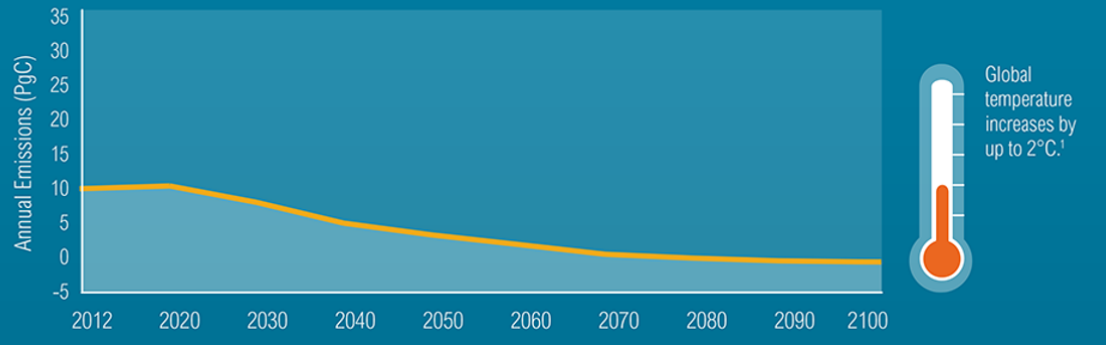
Representative Concentration Pathways (RCPs)

http://www.wri.org/ipcc-infographics

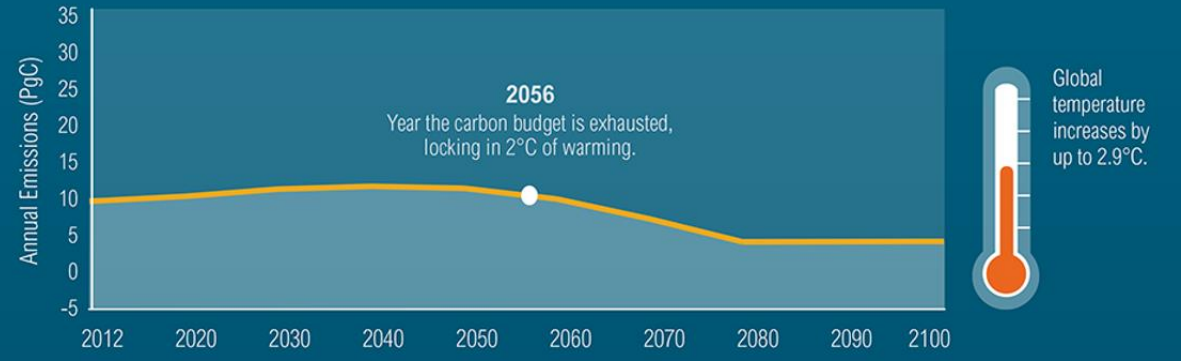
LOW EMISSIONS PATHWAY RCP 2.6

Carbon dioxide emissions peak by 2020 and then drop 66 percent below 2010 levels by 2050. While the world will still experience some climate impacts under this pathway, they grow exponentially worse under higher emissions scenarios.



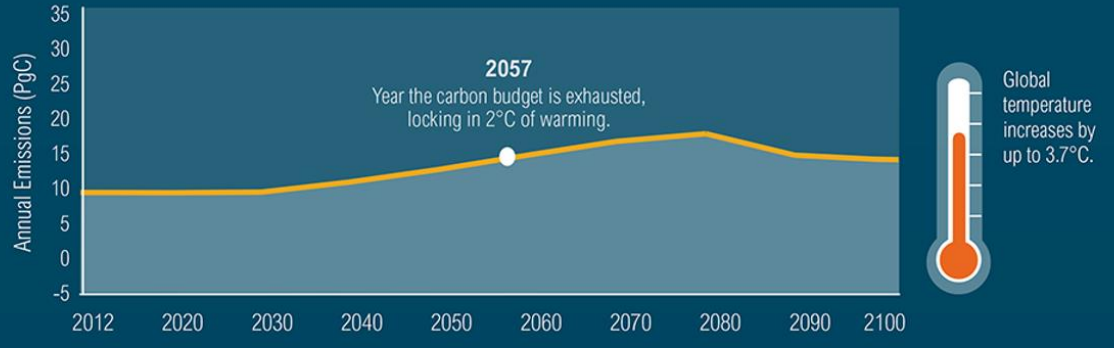
MEDIUM EMISSIONS PATHWAY RCP 4.5

Carbon dioxide emissions peak by 2040, but still rise 19 percent above 2010 levels by 2050.



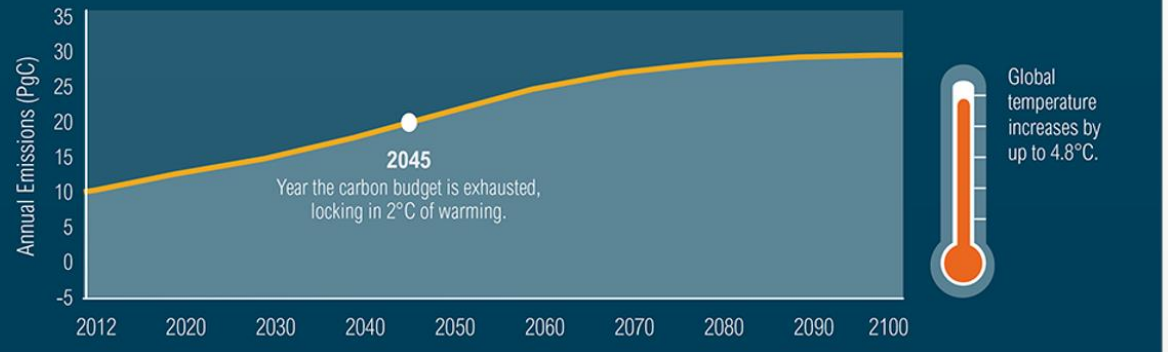
HIGH EMISSIONS PATHWAY RCP 6.0

Carbon dioxide emissions peak by 2080, but still rise 34 percent above 2010 levels by 2050.

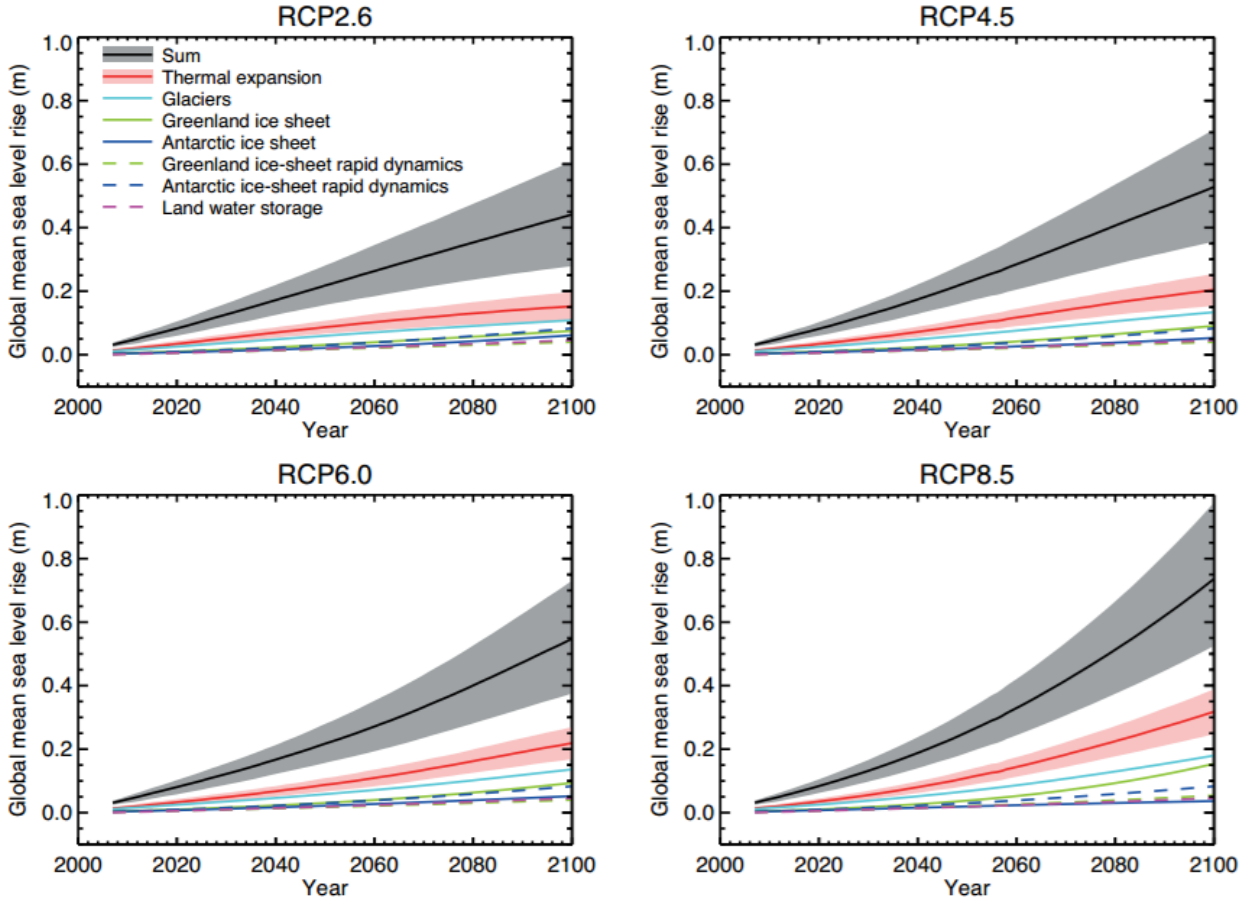


HIGHEST EMISSIONS SCENARIO RCP 8.5

Annual carbon dioxide emissions continue to rise through 2100, rising 108 percent above 2010 levels by 2050.



IPCC Global Sea Level Rise Projections 2007 to 2100

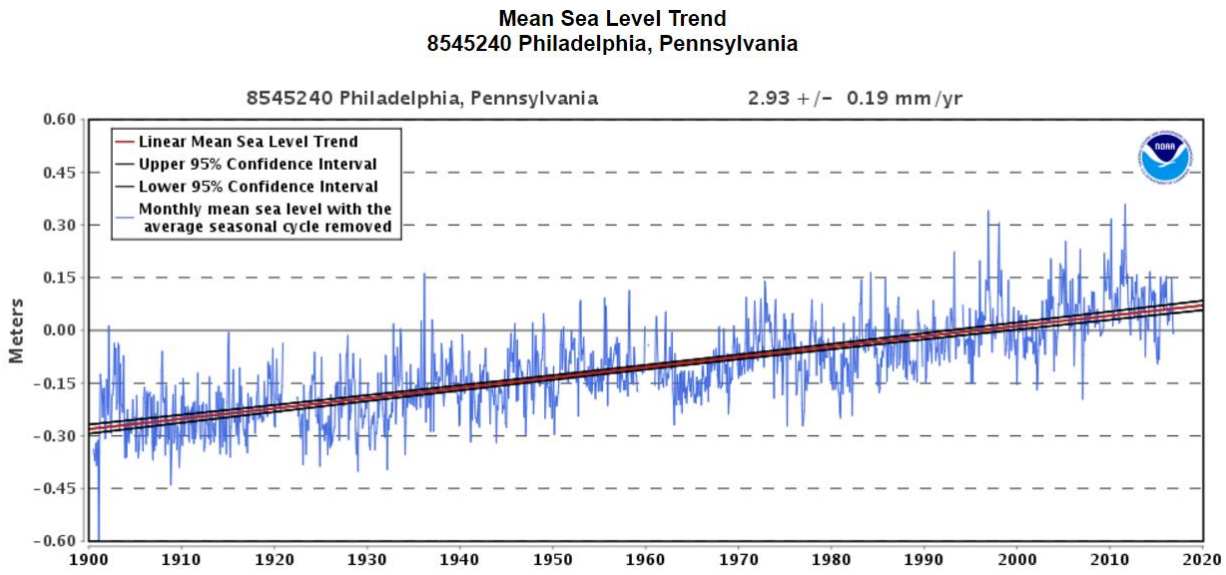


	2007 to 2100 mm/ year	2007 to 2100 ft./ 100 yrs	Total Rise @ 2100 meters	Total Rise @ 2100 feet
RCP 2.6 Low	**3.01**	**0.99**	**0.28**	**0.92**
RCP 2.6 High	6.45	2.12	0.60	1.97
RCP 4.5 Low	3.33	1.09	0.31	1.02
RCP 4.5 High	7.53	2.47	0.70	2.30
RCP 6 Low	3.98	1.31	0.37	1.21
RCP 6 High	7.85	2.58	0.73	2.40
RCP 8.5 Low	5.59	1.84	0.52	1.71
RCP 8.5 High	**10.54**	**3.46**	**0.98**	**3.22**

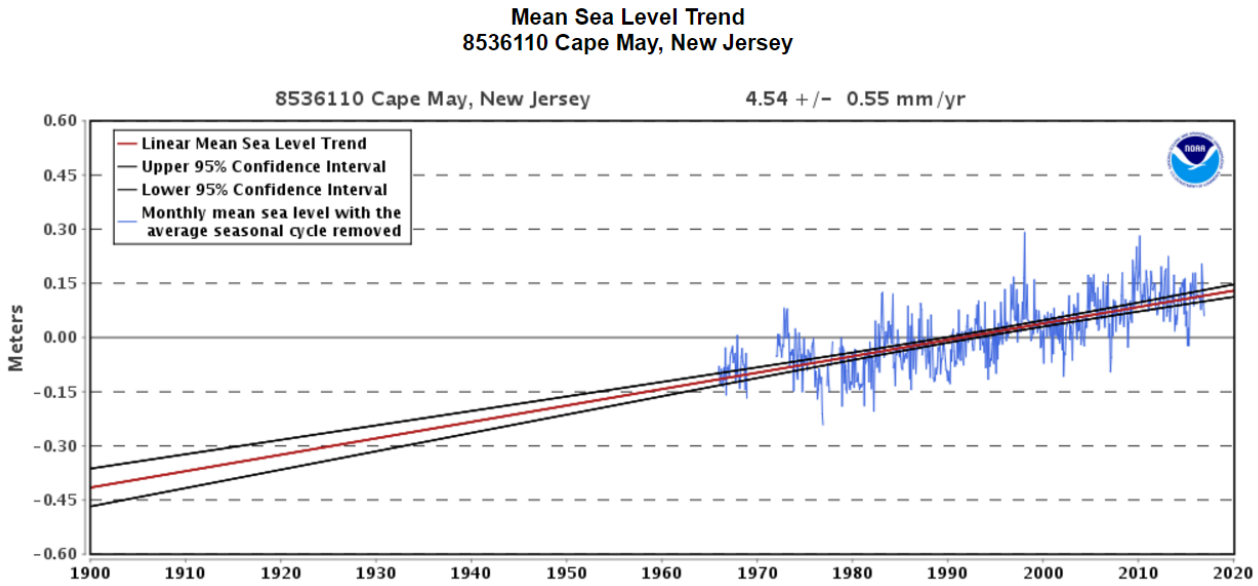
Historical Sea Level Rise - NOAA

"**Regional Sea Level Change Projections:** It is very likely that in the 21st century and beyond, **sea level change will have a strong regional pattern**, with some places experiencing significant deviations of local and regional sea level change from the global mean change."

-IPCC 2013

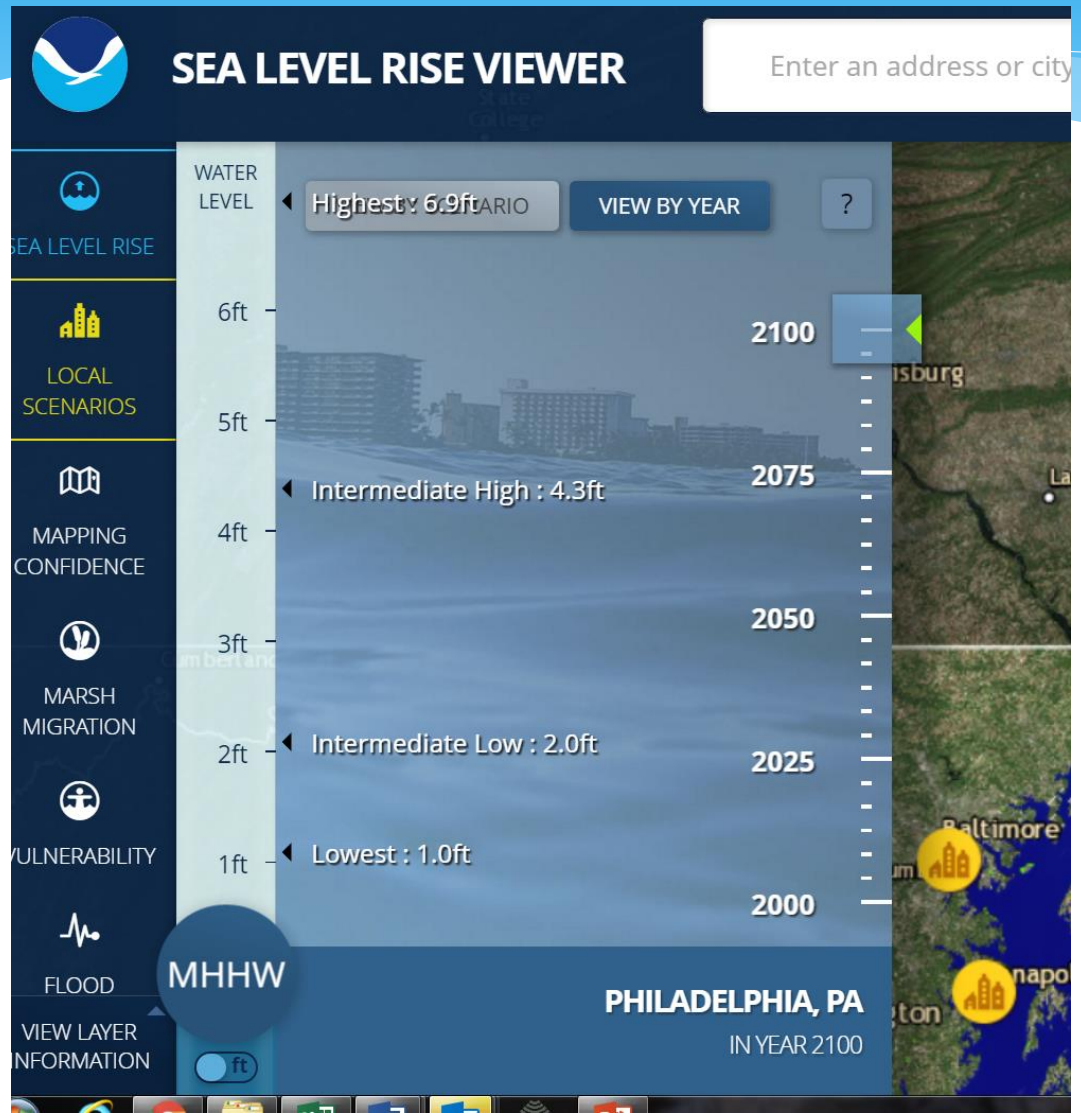


Philadelphia, PA
2.93 mm / year
0.96 ft. / 100 years



Cape May, NJ
4.54 mm / year
1.49 ft. / 100 years

Regional Sea Level Rise Projections – NOAA for Philadelphia



Potential Regional Projection Sources:

- Rutgers University
- Columbia University
- University of Delaware
- US Army Corps of Engineers
- Climate and Urban Systems Partnership
- NYDEC
- Others?

Understanding the Scenarios

The four sea level rise scenarios are from Parris et. al, 2012 global scenarios and corrected to include local ground motion data from long-term NOAA tide gauges. This tab displays the scenarios using the methods and data provided by the USACE Sea Level Rise Calculator and NOAA Tides and Currents. These scenarios served as input into to the 3rd 3rd National Climate Assessment. Rounding to the nearest 1FT mapping increment to view potential impacts is appropriate based on the accuracy of the elevation and tidal surface data used as mapping inputs.

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Managing Our Shared Water Resources since 1961