



# Partnerships for Building Capacity to Advance Science- Informed Resilience Planning in New Jersey

US CLIVAR Summit

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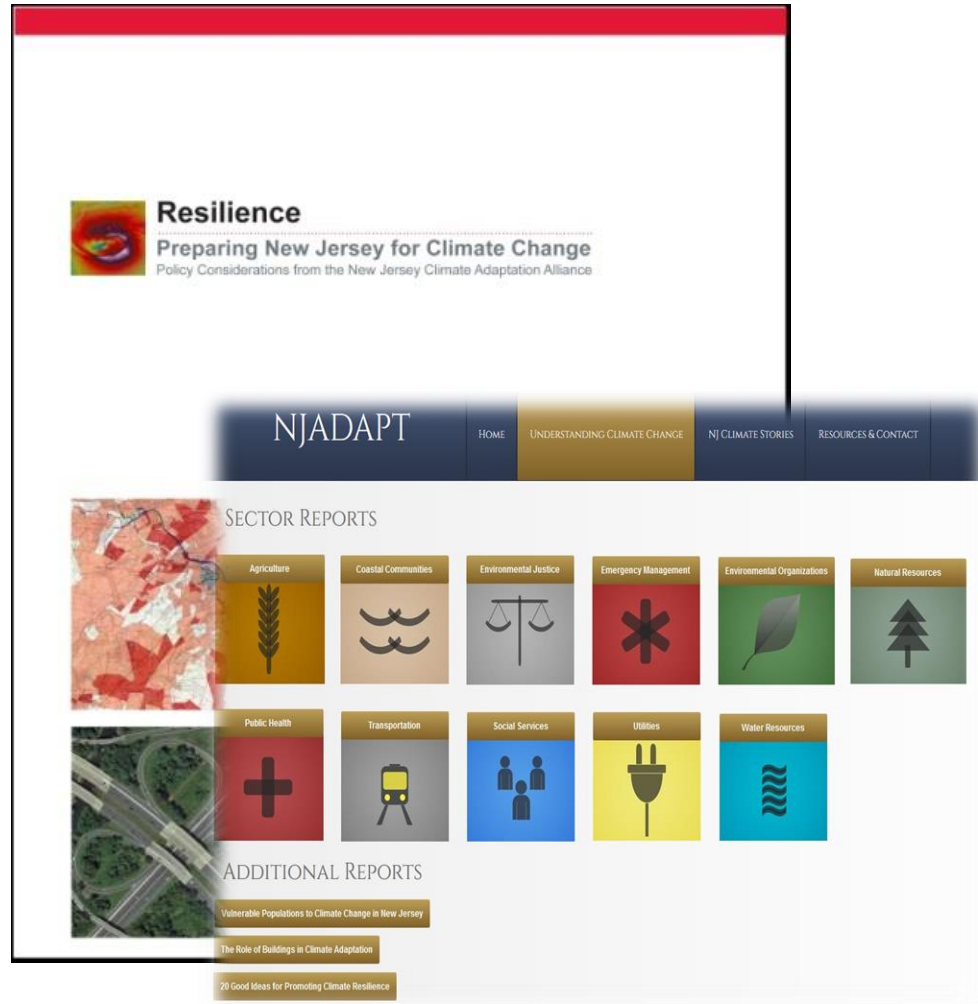
## Overview

- What type of information (in terms of forecasts or observations (nowcasts)) would be most useful for stakeholders in terms of inputs for decision making?
- What should be the favored communication channels between scientists and coastal stakeholders?
- What are the best practices from the stakeholder perspective so that the scientific community can learn about how to collaborate more effectively?
- Illustrated through past project experience and ongoing initiatives

# New Jersey Climate Adaptation Alliance

(<http://njadapt.rutgers.edu/> and <http://www.njadapt.org/> )

- Stakeholder Engagement
- Gap Analyses
- Policy Considerations
- Analyses and Reports
- Working Briefs
- Best Practices guides
- Tools/Story Maps/Videos
- Science and Technical Advisory Panel



## New Jersey Science and Technical Advisory Panel (STAP)

- What are the estimates of SLR and changing coastal storm hazards in New Jersey?
- How probable are different levels of SLR and changes in coastal storm hazards?
- How can stakeholders consider SLR and changes in coastal storms in light of different planning horizons, project types, and risk tolerances?



<http://dx.doi.org/doi:10.7282/T3ZP48CF>

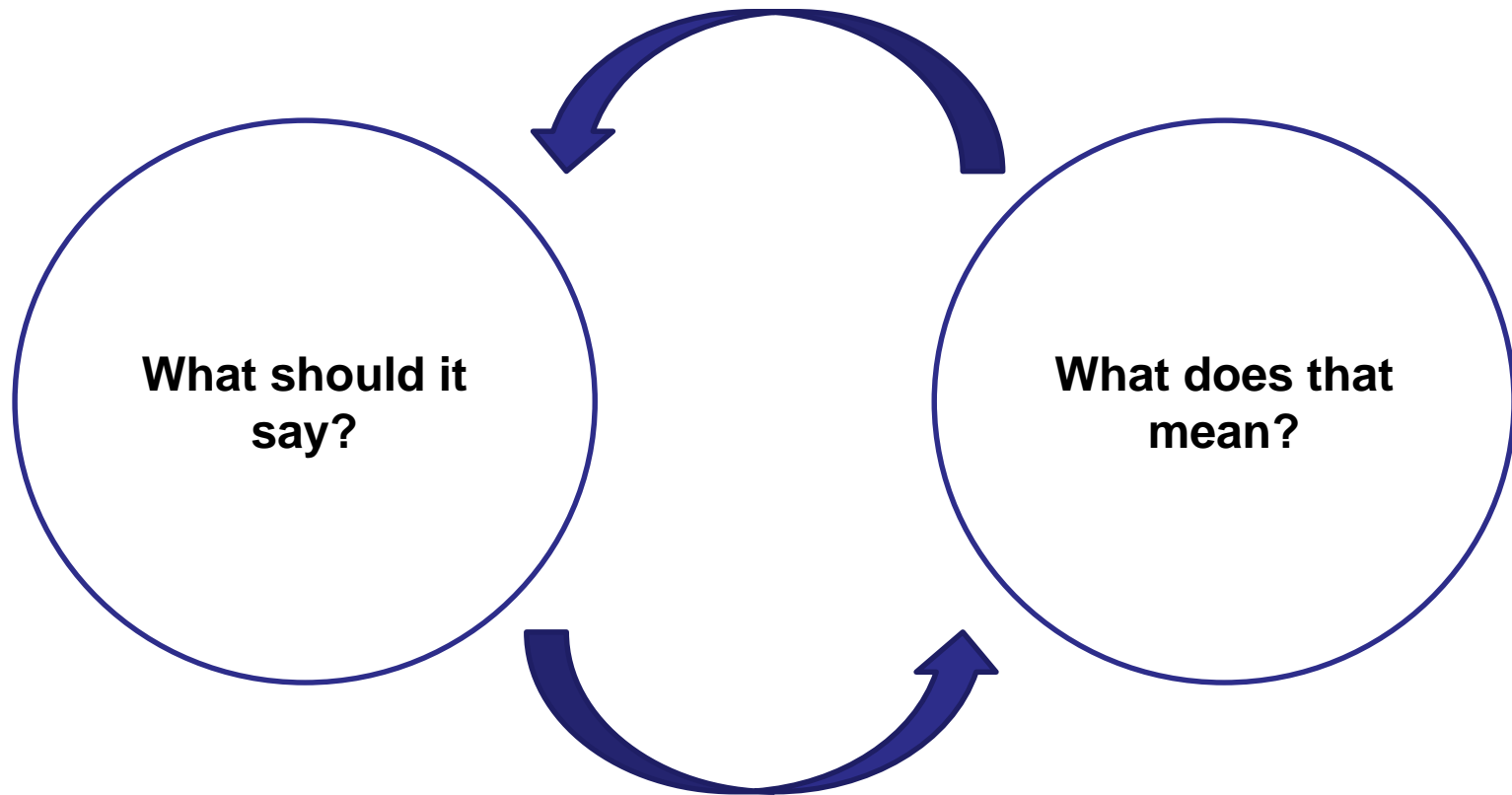
## New Jersey Science and Technical Advisory Panel (STAP)

- How can efforts to apply current science recognize scientific uncertainties and the ongoing nature of scientific learning, and how often should stakeholders reassess advances in scientific information for purposes of applying the latest science into practice?
- Are there special considerations that stakeholders should address, including but not limited to uniquely vulnerable people, places, and assets when evaluating options for incorporating estimates for SLR and changes in coastal storms?



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## Why Scientists AND Practitioners?



## Coastal Storms: No clear basis for NJ guidance to deviate from IPCC

- By increasing the baseline for flooding, higher sea levels will increase the impact of coastal storms on New Jersey.
- Changes in the frequency, intensity and tracks of coastal storms may also affect the impact of coastal storms in New Jersey. This is an area of active research.
- For now, planning and decision-making in New Jersey should be guided by the Intergovernmental Panel on Climate Change (IPCC)'s conclusions regarding changes in future storms, including:
  - The global frequency of tropical cyclones is not likely to increase, while maximum wind speeds are likely to increase;
  - Precipitation intensity during tropical cyclones is likely to increase; and
  - The global frequency of extratropical cyclones is not likely to change substantially.

## Projected SLR Estimates for New Jersey (ft.)

	<b>Central Estimate</b>	<b>Likely Range</b>	<b>1-in-20 Chance</b>	<b>1-in-200 Chance</b>	<b>1-in-1000 Chance</b>
<b>Year</b>	<i>50% probability SLR meets or exceeds...</i>	<i>67% probability SLR is between...</i>	<i>5% probability SLR meets or exceeds...</i>	<i>0.5% probability SLR meets or exceeds...</i>	<i>0.1% probability SLR meets or exceeds...</i>
<b>2030</b>	0.8 ft	0.6 – 1.0 ft	1.1 ft	1.3 ft	1.5 ft
<b>2050</b>	1.4 ft	1.0 – 1.8 ft	2.0 ft	2.4 ft	2.8 ft
<b>2100 Low emissions</b>	2.3 ft	1.7 – 3.1 ft	3.8 ft	5.9 ft	8.3 ft
<b>2100 High emissions</b>	3.4 ft	2.4 – 4.5 ft	5.3 ft	7.2 ft	10 ft

*Estimates are based on Kopp et al. (2014). Columns correspond to different projection probabilities. For example, the 'Likely Range' column corresponds to the range between the 17<sup>th</sup> and 83<sup>rd</sup> percentile; consistent with the terms used by the Intergovernmental Panel on Climate Change (Mastrandrea et al., 2010). All values are with respect to a 1991-2009 baseline. Note that these results represent a single way of estimating the probability of different levels of SLR; alternative methods may yield higher or lower estimates of the probability of high-end outcomes.*

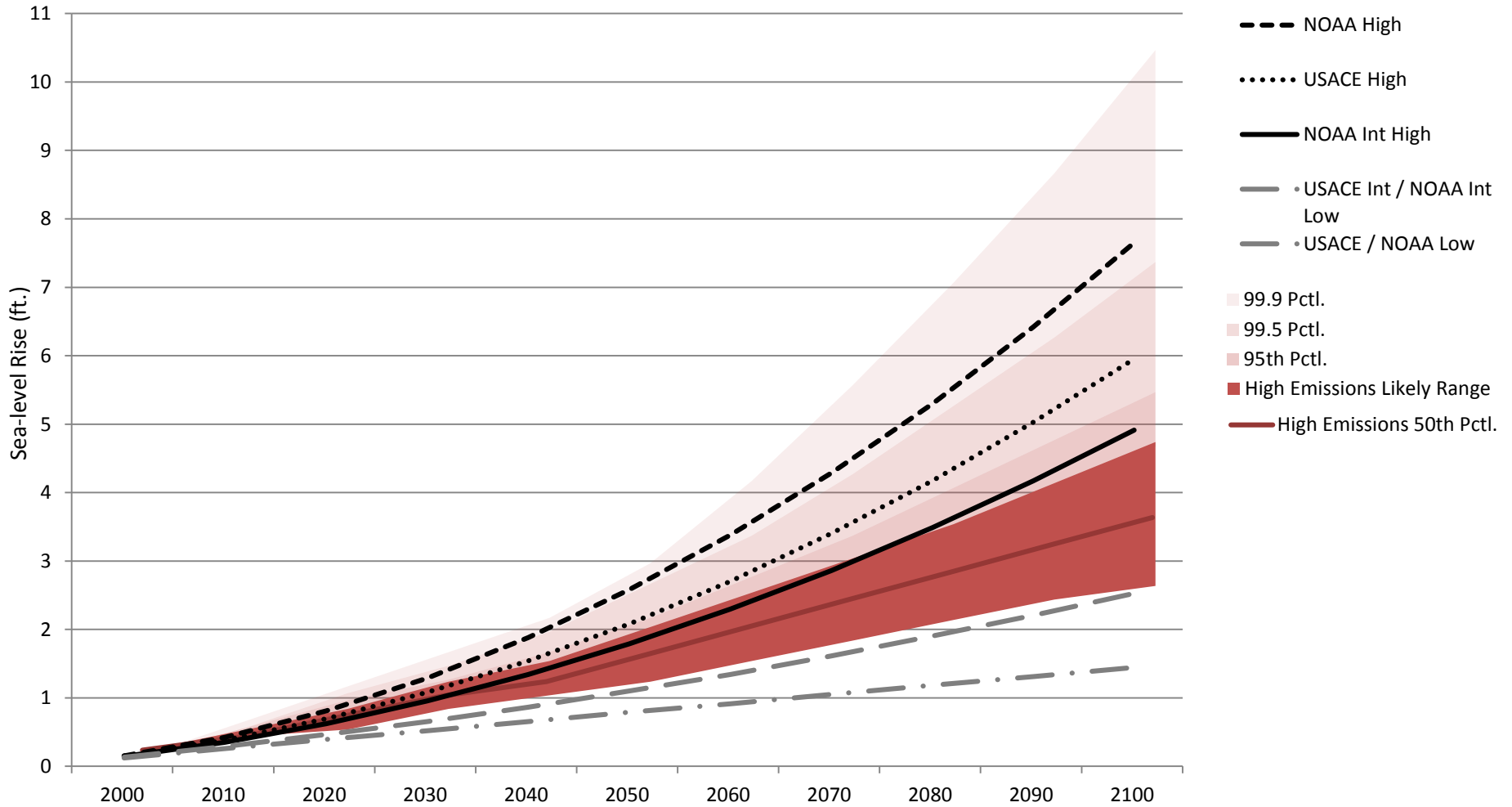


## Projected SLR RATE Estimates for New Jersey (ft.)

	Likely Range	1-in-20 Chance
Year	<i>67% probability SLR RATE is between...</i>	<i>5% probability SLR RATE meets or exceeds...</i>
<b>2030</b>	0.2 to 0.4 in/yr	0.5 in/yr
<b>2030 - 2050 Low Emissions</b>	0.2 to 0.4 in/yr	0.5 in/yr
<b>2030 - 2050 High Emissions</b>	0.3 to 0.5 in/yr	0.6 in/yr
<b>2050 - 2100 Low emissions</b>	0.2 to 0.4 in/yr	0.5 in/ yr
<b>2050 - 2100 High emissions</b>	0.3 to 0.7 in/yr	0.8 in/yr.

*Estimates are based on Kopp et al. (2014). Twenty-year average rates of SLR. Columns correspond to different projection probabilities. For example, the 'Likely Range' column corresponds to the range between the 17<sup>th</sup> and 83<sup>rd</sup> percentile; consistent with the terms used by the Intergovernmental Panel on Climate Change (Mastrandrea et al., 2010). All values are with respect to a 1991-2009 baseline.*

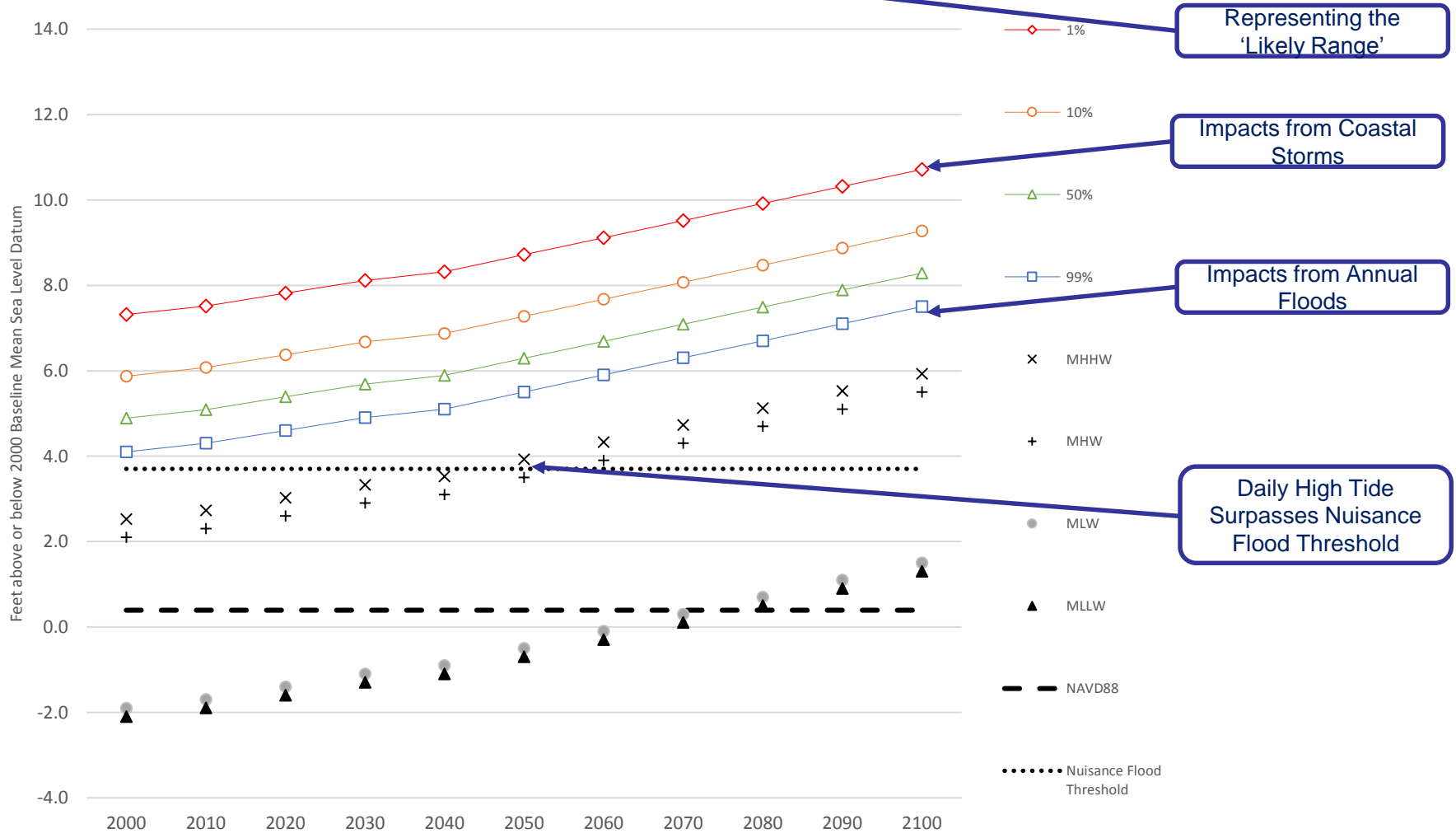
## High Emissions [RCP 8.5] SLR Projections for New Jersey (Atlantic City) Compared to Federal SLR Projections



## When conducting assessments, practitioners should:

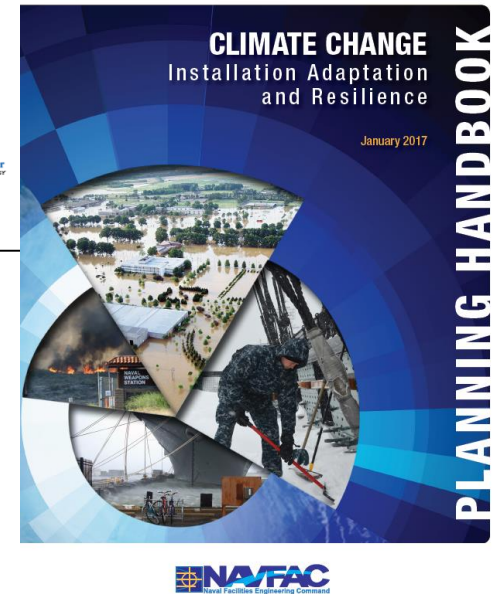
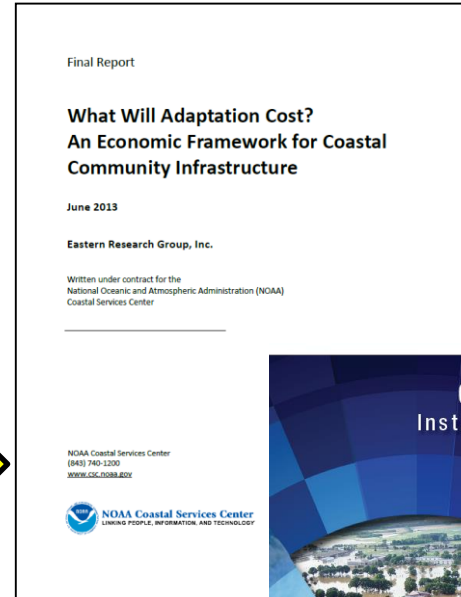
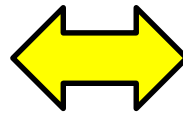
- Evaluate at **least two SLR scenarios**
  - 1 in ‘Likely Range’
  - 1 above ‘Likely Range’
- Two needed to consider exposures of people, places and assets that are particularly vulnerable to flooding, or for which the consequences of damage and failure have significant magnitude.
- Evaluate at least **three flood conditions** representing
  - Inundation
  - Tidal / Nuisance Flooding
  - Extreme Coastal Flooding (Storms)
- Three needed to represent conditions that occur with varying frequency and last for varying amounts of time

## High Emissions Central Estimate SLR Projections For Flood Levels and Tidal Datums (Atlantic City, NJ)



# What Will Adaptation Cost?

- Evaluate **at least two SLR scenarios**
  - 1 in ‘Likely Range’
  - 1 above ‘Likely Range’
- Two needed to consider exposures of people, places and assets that are particularly vulnerable to flooding, or for which the consequences of damage and failure have significant magnitude.
- Evaluate **at least three flood conditions** representing
  - Inundation
  - Tidal / Nuisance Flooding
  - Extreme Coastal Flooding (Storms)
- Three needed to represent conditions that occur with varying frequency and last for varying amounts of time



# How NJ FRAMES levels were chosen

## Task 1: Select Appropriate Local Sea Level Rise Scenarios

- **Three SLR Scenarios**
  - Low Emissions Central Estimate - 2.3 Ft. SLR by 2100
  - High Emissions Central Estimate - 3.4 Ft. SLR by 2100
  - High Emissions 1-in-20 Chance Estimate - 5.3 Ft. SLR by 2100

## Task 2: Develop High-Water-Level Event Scenarios

- **Three flood conditions**
  - Inundation
  - Tidal / Nuisance Flooding
  - Extreme Coastal Flooding (Storms)
- Use NOAA Extreme Water Levels and Historic Storms
- Add sea level rise to water levels for chosen years

## Task 3: Choose Water Levels for Assessment

- Select 3-4 water-levels that represent a low, medium, high, and perhaps catastrophic water-level.
- Project team consensus on 3 water levels based on group discussion and preliminary exposure assessment

# Projected Water Levels Relative to MHHW (ft.)

	2000	2030	2050	2100
<b>1 Low Emissions Central Estimate - 2.3 Ft. SLR by 2100</b>				
Hurricane Sandy	8.3	9.1	9.7	10.6
1% Chance Flood (100-year flood)	6.7	7.5	8.1	9
10% Chance Flood (10-year flood)	3.9	4.7	5.3	6.2
99% Chance Flood(Annual flood)	1.6	2.4	3	3.9
Permanent Inundation (MHHW)	0	0.8	1.4	2.3
<b>2 High Emissions Central Estimate - 3.4 Ft. SLR by 2100</b>				
Hurricane Sandy	8.3	9.1	9.7	11.7
1% Chance Flood (100-year flood)	6.7	7.5	8.1	10.1
10% Chance Flood (10-year flood)	3.9	4.7	5.3	7.3
99% Chance Flood(Annual flood)	1.6	2.4	3	5
Permanent Inundation (MHHW)	0	0.8	1.4	3.4
<b>3 High Emissions 1-in-20 Chance Estimate - 5.3 Ft. SLR by 2100</b>				
Hurricane Sandy	8.3	9.4	10.3	13.6
1% Chance Flood (100-year flood)	6.7	7.8	8.7	12
10% Chance Flood (10-year flood)	3.9	5	5.9	9.2
99% Chance Flood(Annual flood)	1.6	2.7	3.6	6.9
Permanent Inundation (MHHW)	0	1.1	2	5.3

# Summary of Water Levels for NJ FRAMES

		Rounded Water Level	What High Water Level Condition Does This Height Represent?
Permanent Inundation	Coastal Flooding	3 ft.	<ul style="list-style-type: none"> <li>• 2030 Annual Flood - 1-in-20 chance HE – 2.7ft</li> <li>• 2050 Annual Flood - LE/HE - 3.0ft</li> <li>• 2100 Permanent Inundation – HE - 3.4ft</li> </ul>
	Coastal Storm Flooding	7 ft.	<ul style="list-style-type: none"> <li>• Current 100 Year Flood – 6.7ft</li> <li>• 2100 10% Chance Flood – HE - 7.3ft</li> <li>• 2100 Annual Flood - 1-in-20 chance HE – 6.9ft</li> </ul>
		12 ft.	<ul style="list-style-type: none"> <li>• 2100 1% Chance Flood - 1-in-20 chance HE – 12ft.</li> <li>• 2100 Hurricane Sandy water level - HE – 11.7ft</li> </ul>



- What type of information (in terms of forecasts or observations (nowcasts)) would be most useful for stakeholders in terms of inputs for decision making?
  - Comparative
  - Flexible
  - Ready-to-use
- What should be the favored communication channels between scientists and coastal stakeholders?
  - Collaborative development
  - Trusted advisors
- What are the best practices from the stakeholder perspective so that the scientific community can learn about how to collaborate more effectively?
  - Know your audience (and their audience)

## Contact Us:

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<http://njadapt.rutgers.edu/>

New Jersey Climate Adaptation Alliance

[www.njadapt.org](http://www.njadapt.org)

NJADAPT Mapping, videos and Reports

<http://climatechange.rutgers.edu/>

Rutgers Climate Institute

<http://www.prepareyourcommunitynj.org/>

Getting to Resilience

<http://slrviewer.rutgers.edu/>

NJFloodmapper