

Changing Climate in the Boston Region

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*CLIMATE
READY
BOSTON*



BOSTON
GreenRibbon
COMMISSION



Massachusetts Office of
Coastal Zone Management

HRA
Regional Action Act

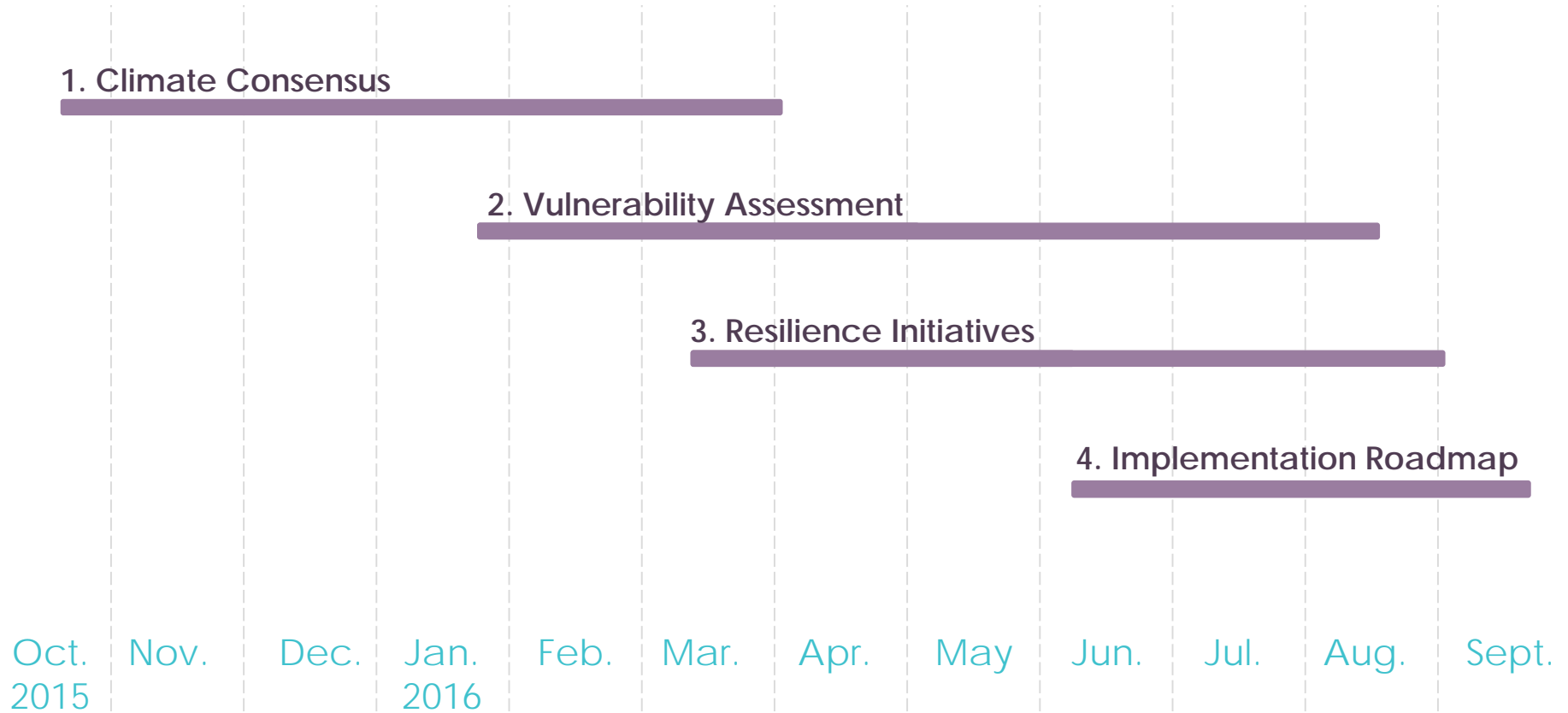
ARCADIS



S A S A K I

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PROJECT COMPONENTS



CLIMATE PROJECTION CONSENSUS

Boston Research Advisory Group Climate Factors



Sea Level
Rise



Coastal Storms

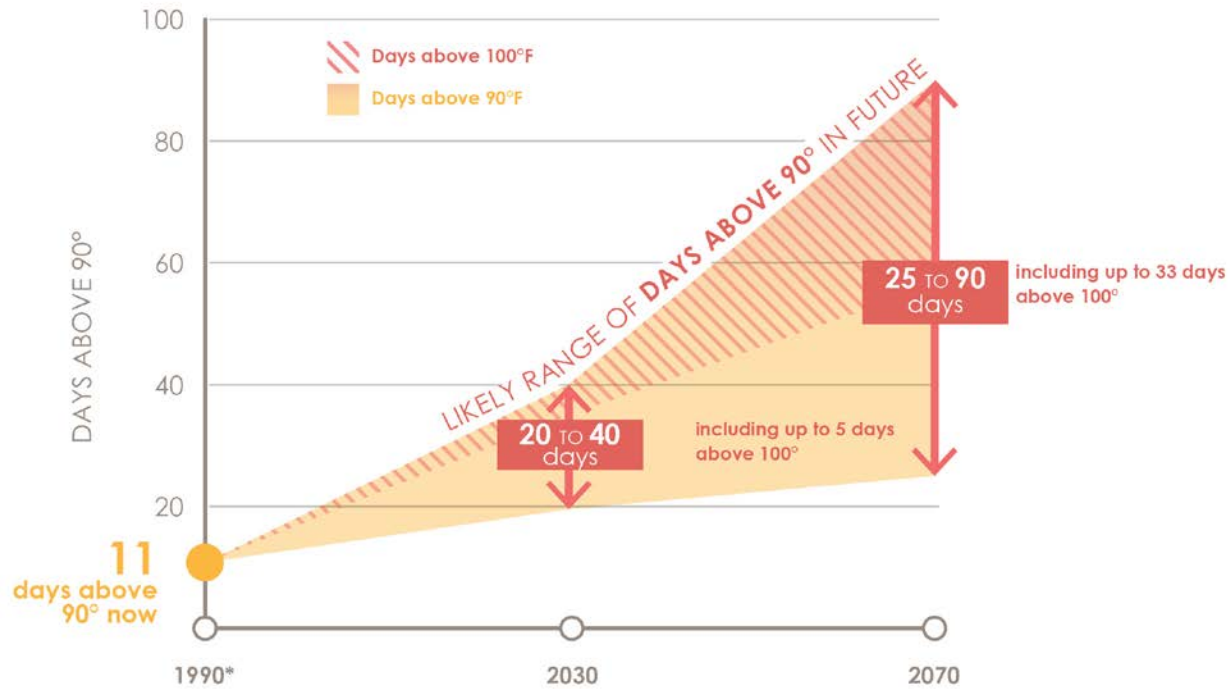


Extreme
Precipitation



Extreme
Temperatures

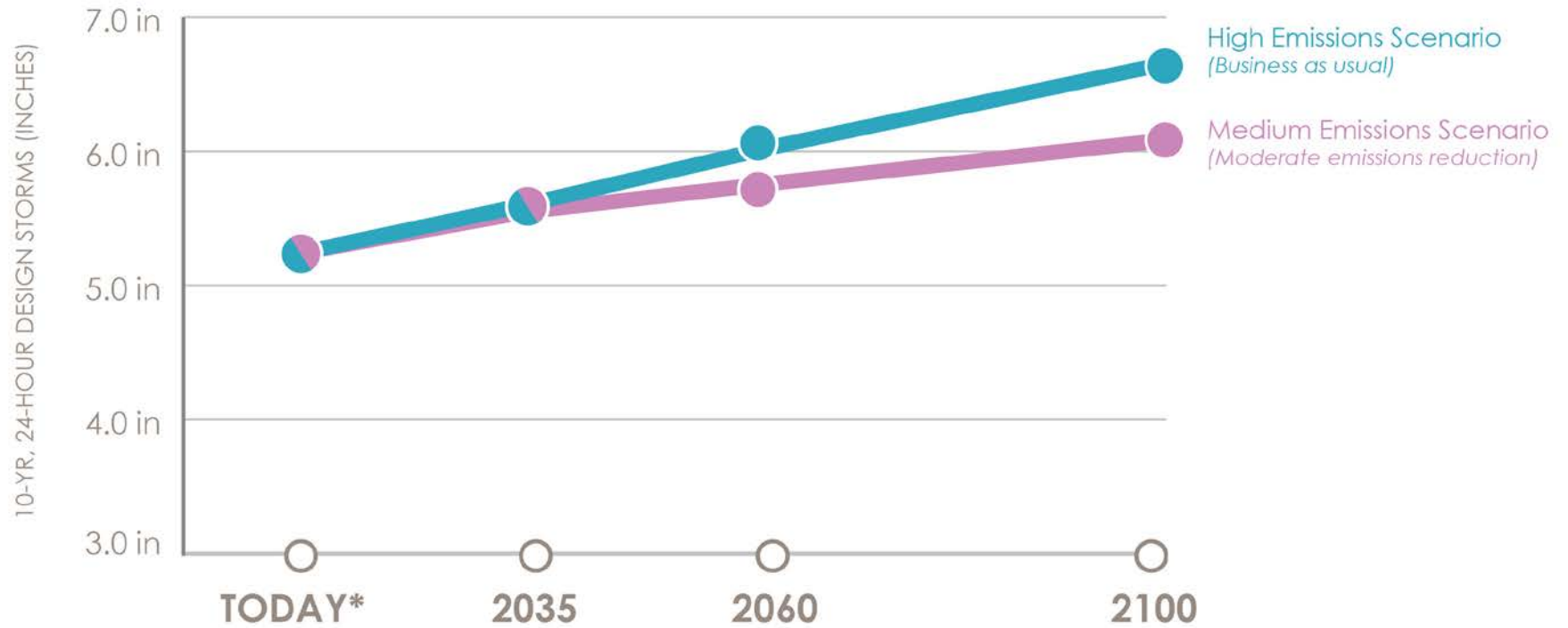
THE NUMBER OF VERY HOT DAYS WILL INCREASE



* Baseline represents historical average from 1971-2000
Upper values from high emissions scenario. Lower values from low emissions scenario.

Data source: Rossi et al. 2015

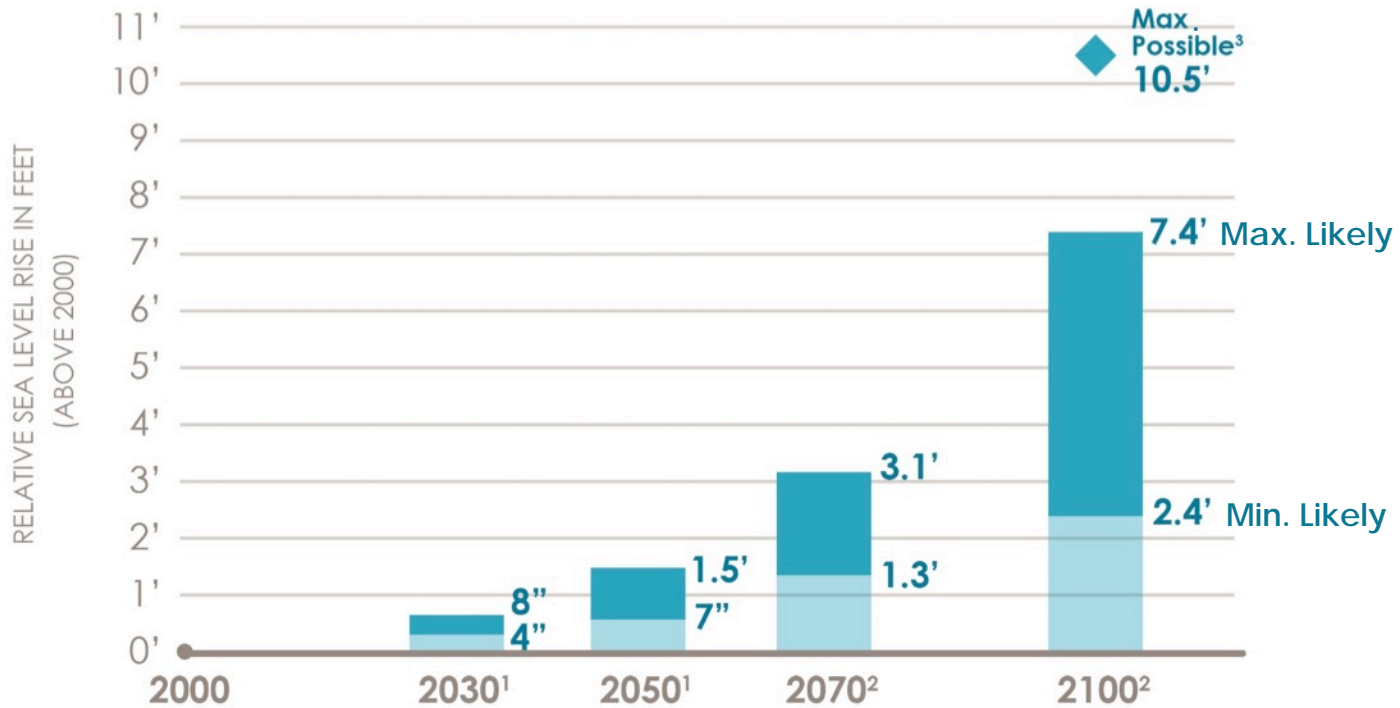
RAINFALL FROM STORMS WILL INCREASE



* "Today" baseline represents historical average from 1948-2012
Confidence intervals are not available for these projections but are likely large, so these numbers should be considered as the middle of a large range

Data Source:
Boston Water & Sewer Commission

RELATIVE SEA LEVEL IN BOSTON WILL RISE

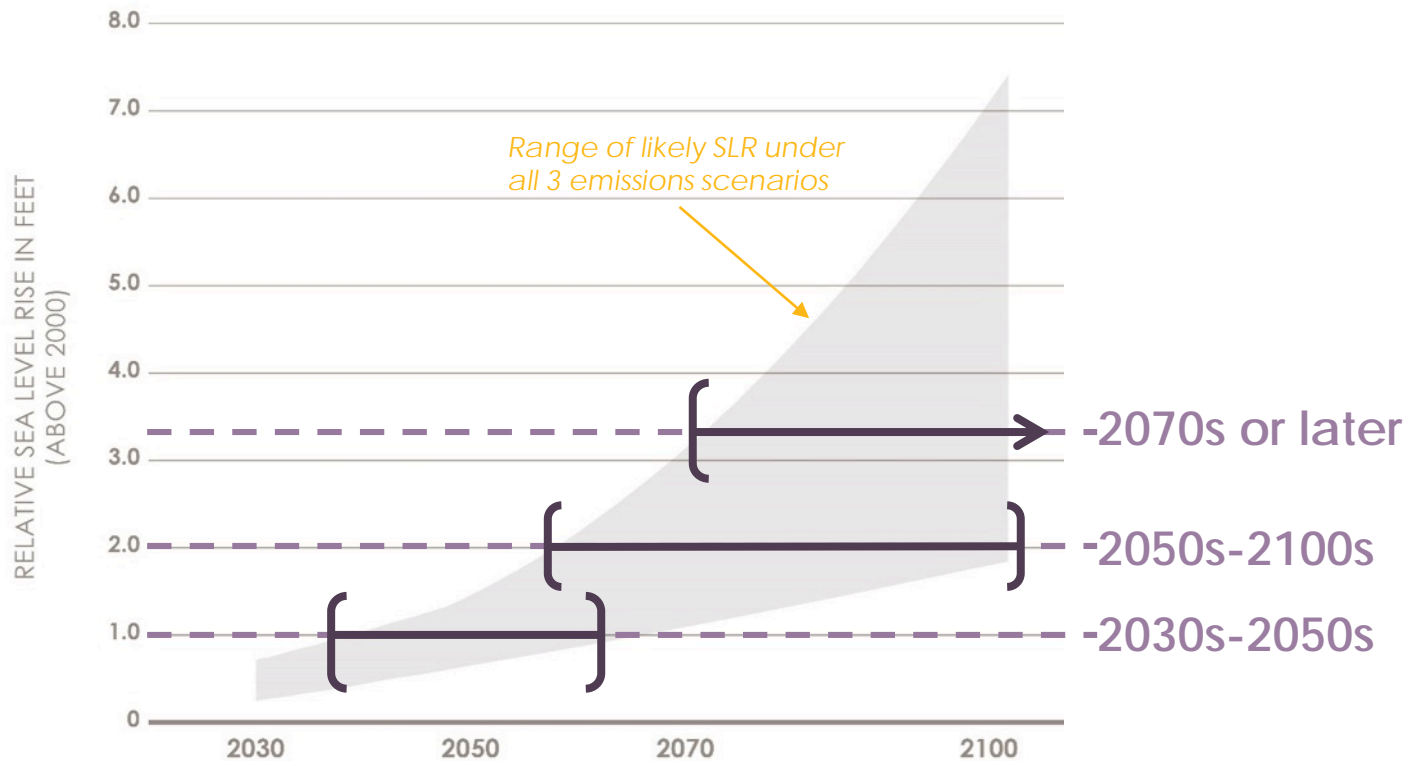


1 - Likely under all emission scenarios
2 - Likely under moderate to high emission scenarios
3 - Low probability under high emission scenario

Data Source: BRAG Report

CLIMATE READY BOSTON SEA LEVEL RISE SCENARIOS

COASTAL & RIVERINE FLOODING



Data Source: BRAG Report

HAZARD: COASTAL STORMS

Background & History

- In Boston, tidal range (~10 ft) is typically larger than storm surge itself.
- Extratropical storms, which are more common in the Northeast, have longer durations, and follow tracks more favorable for flooding, currently produce most storm-induced flooding events in the Boston metro region.

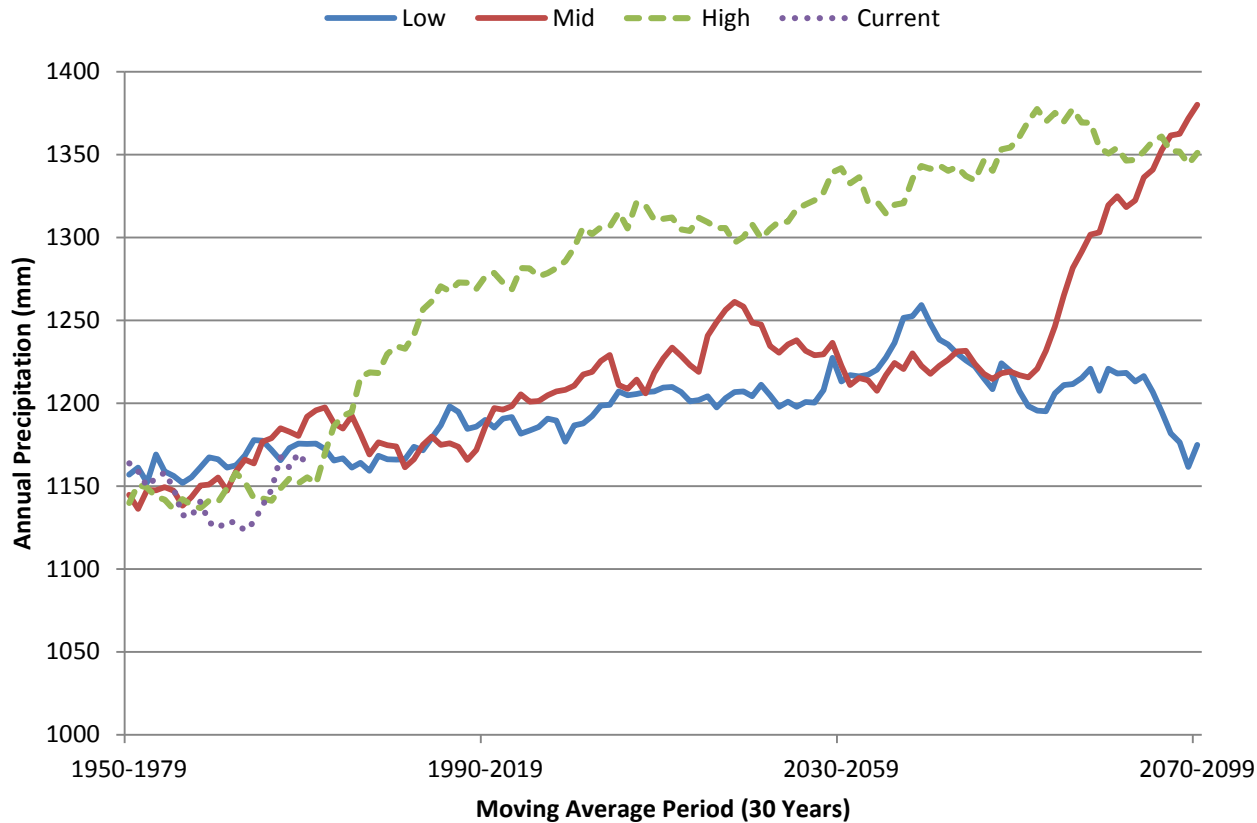
Projections

- Tropical storm intensity is likely to increase with a northward shift in track, resulting in an increase in the frequency of major hurricanes (Category 3 and greater).
- Even if the intensity, frequency, and trajectory of tropical and extra-tropical storms do not change, storm-induced flooding will still be greater in the future due to rising sea levels, producing not only higher levels of inundation, but also longer durations of inundation.

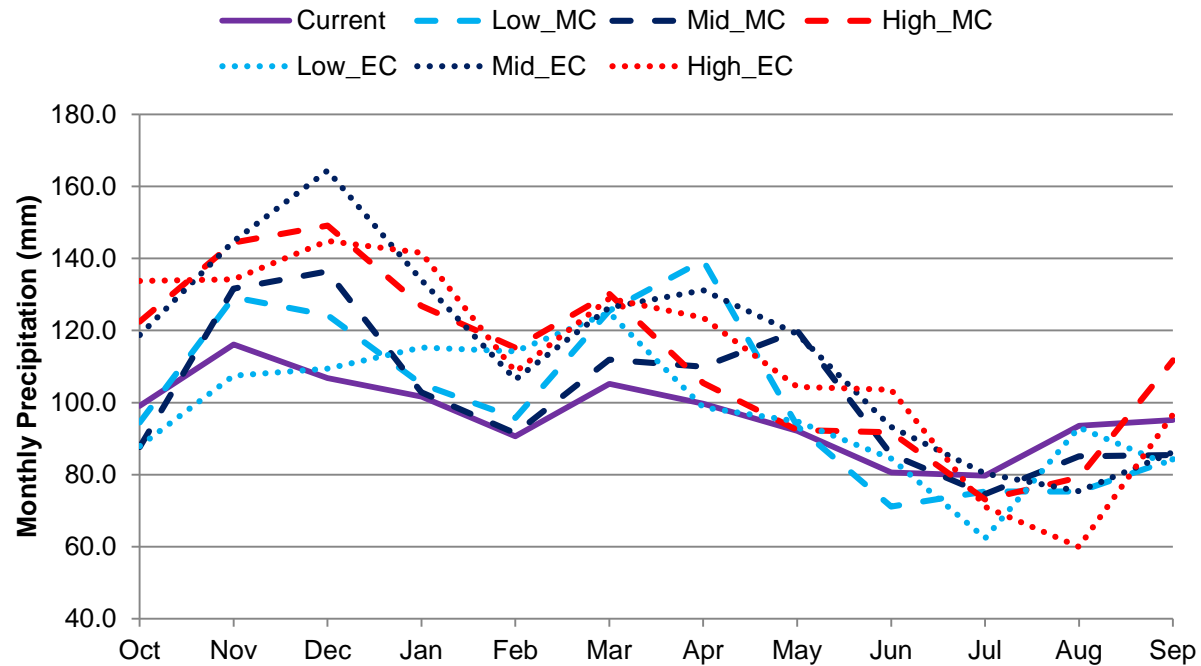
Level of Projection Consensus

- There are large uncertainties in the response of future storm characteristics to human-induced climate change.
- There are no robust projections for changes in tropical or extratropical storm intensity, frequency, or trajectory.

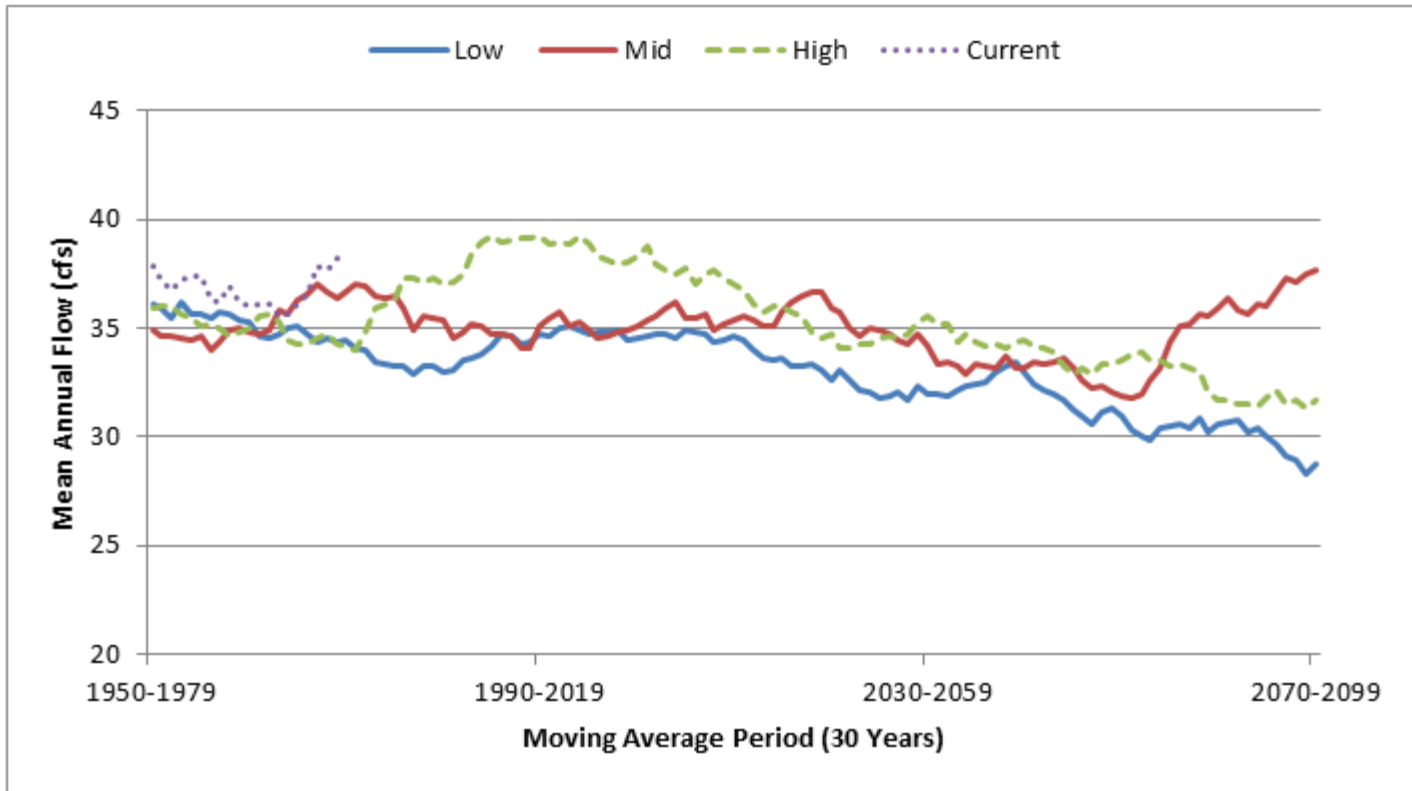
Precipitation Changes in NE (Zhao, 2013)



Monthly Precipitation Changes

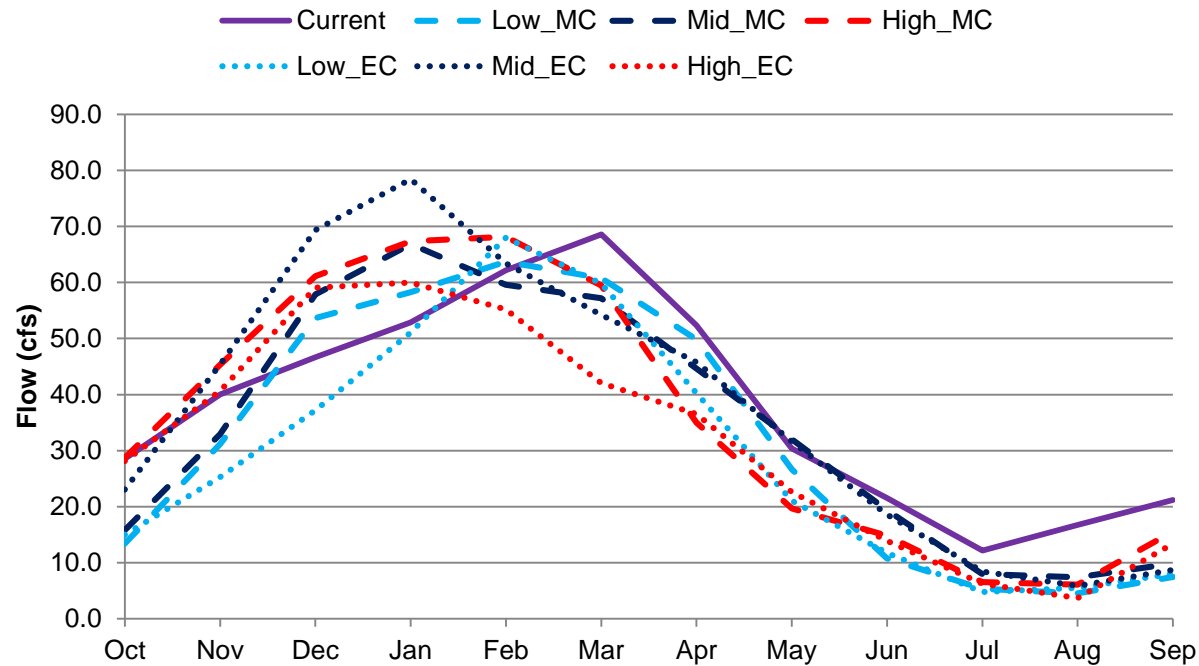


Streamflow Changes

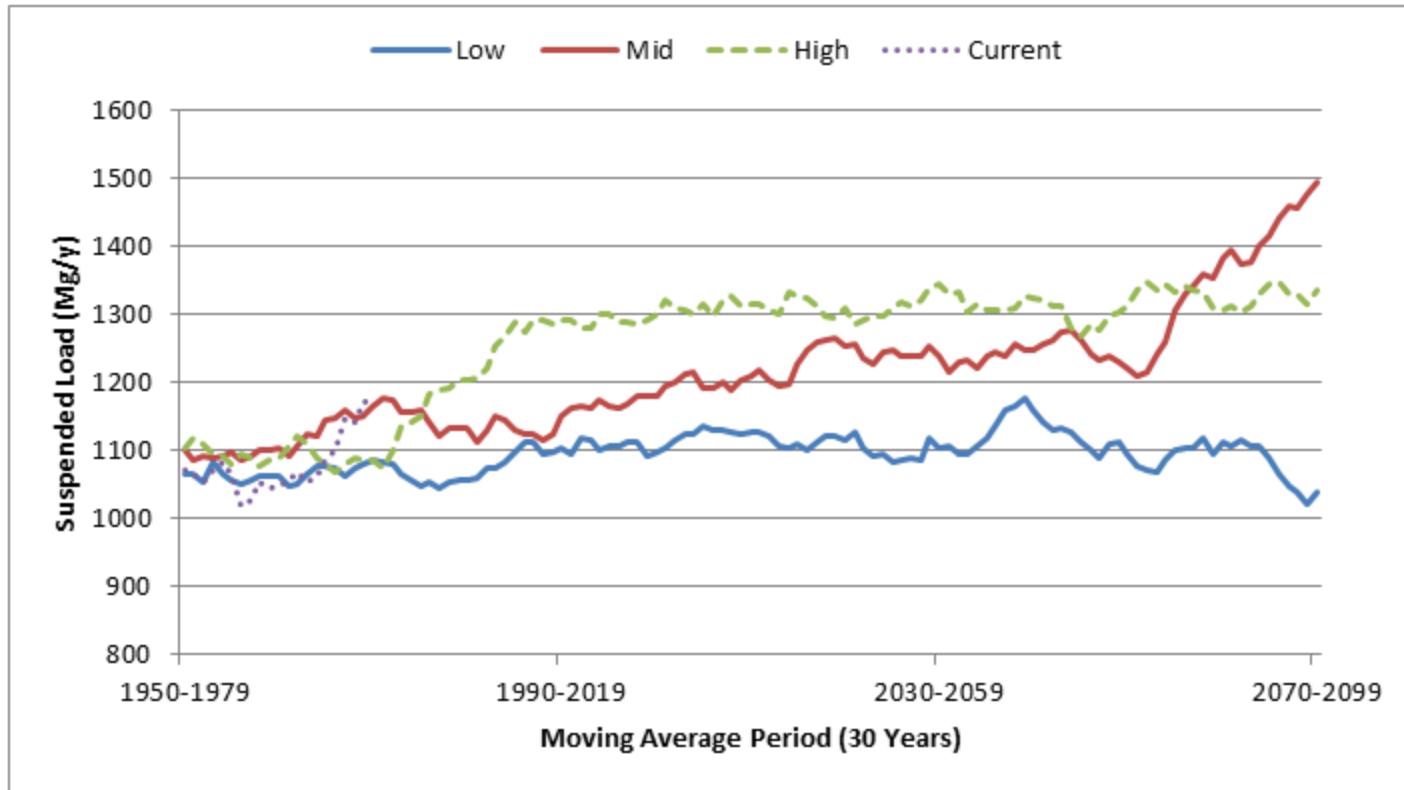


Monthly Streamflow Change

(groundwater elevation changes may be similar unless impacted by salt water intrusion)



Water Quality Changes (Sediment)



Seasonal snow

- ▶ Based on regional results, snow accumulation may decrease 31-48% by 2100
- ▶ Start of snow season progressively delayed
- ▶ Individual heavy snow storms may continue
- ▶ Ice storm results still pending

Drought

- ▶ Increased frequency of medium to short term droughts
- ▶ Extended low flow seasons

Projected River Flooding (best estimates)

- ▶ small, more frequent floods (e.g., 1 to 5-year recurrence intervals) will increase in magnitude from about **0 to 20%** or **conservatively 10-35%**
- ▶ larger floods commonly used for design and planning (e.g., 10 to 100-year recurrence intervals) will have climate-induced increases in the range of **-10 to 35%** or more conservatively **10-40%**

Thank you