

INCORPORATING CLIMATE CHANGE AND ADAPTATION INTO MITIGATION STRATEGIES

- Climate Change vs. Hazard Mitigation Terminology
- Connecticut Hazard Mitigation Plan Update (2014)
- State Water Plan (2017) Projections – *Courtesy of the CT Water Planning Council*
- National Weather Service Observations – *Courtesy of the NWS*
- CIRCA Sea Level Rise Projections (2017) – *Courtesy of CIRCA*
- What Does This Mean?
- Opportunities to Address Climate Change

TERMINOLOGY



- **Hazard Mitigation:** *Sustained actions taken to reduce or eliminate long-term risk to life and property from hazards.*
- **Mitigation:** *An anthropogenic intervention to reduce the forcing of the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks.*
- **Adaptation:** *Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.*



FEMA

ipcc
INTERGOVERNMENTAL PANEL ON
climate change

CONNECTICUT HAZARD MITIGATION PLAN

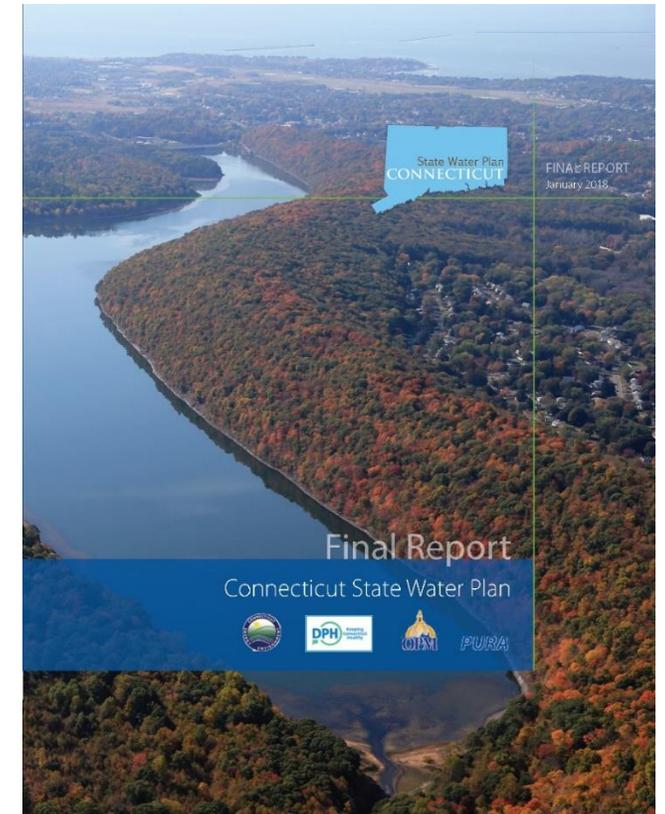
- Both summer and winter temperatures are projected to increase
- Hurricanes may become more intense
- Thunderstorms may become more frequent or intense
- Precipitation intensities and amounts may increase
- Climate models have indicated that fewer but more intense precipitation events will occur during the winter with more precipitation falling as rain rather than snow
- This change in winter precipitation could result in less frequent but more intense snow storms with heavier snow
- Wildfire risk harder to project; forests will shift northward and vegetation will change



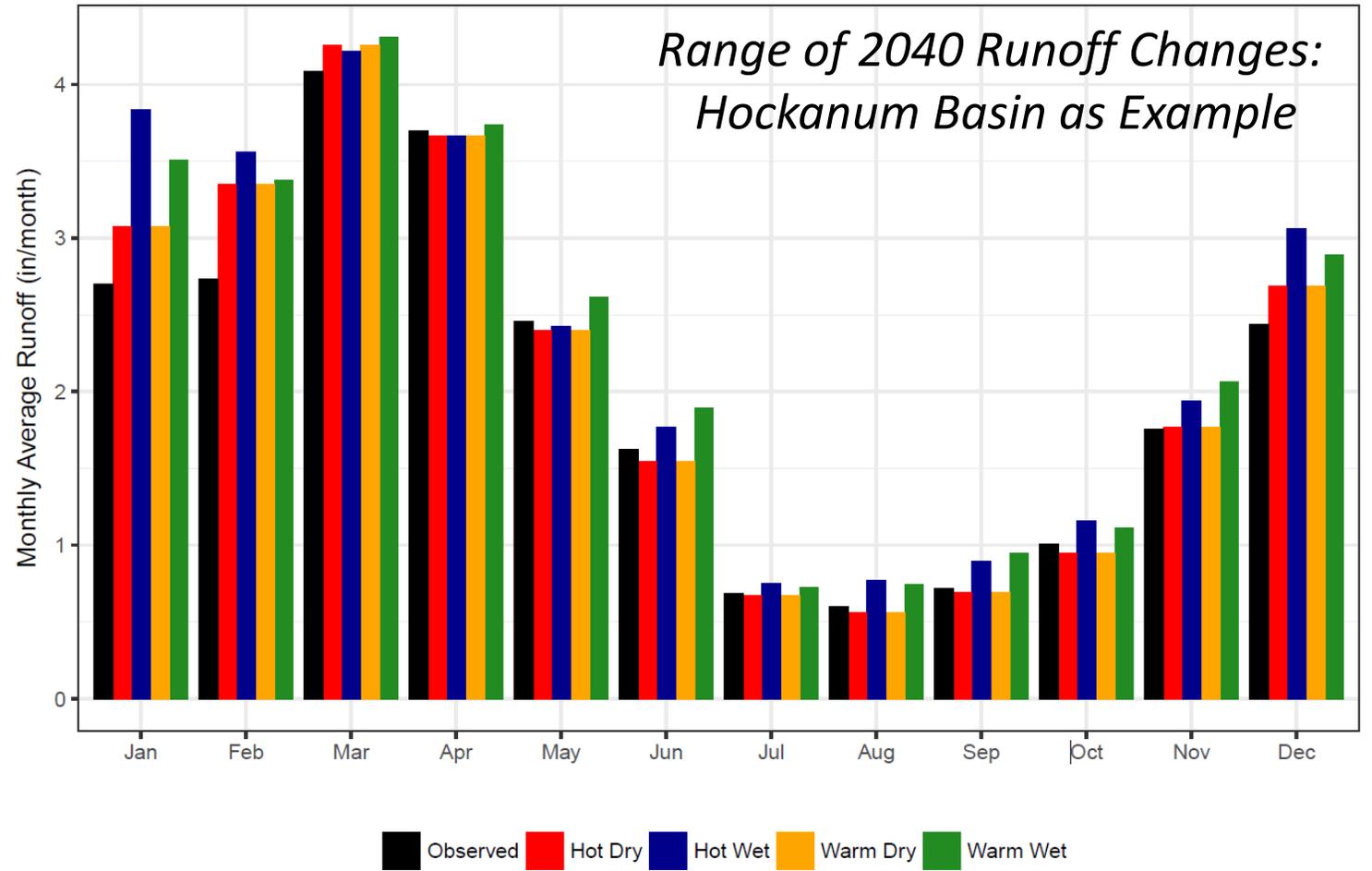
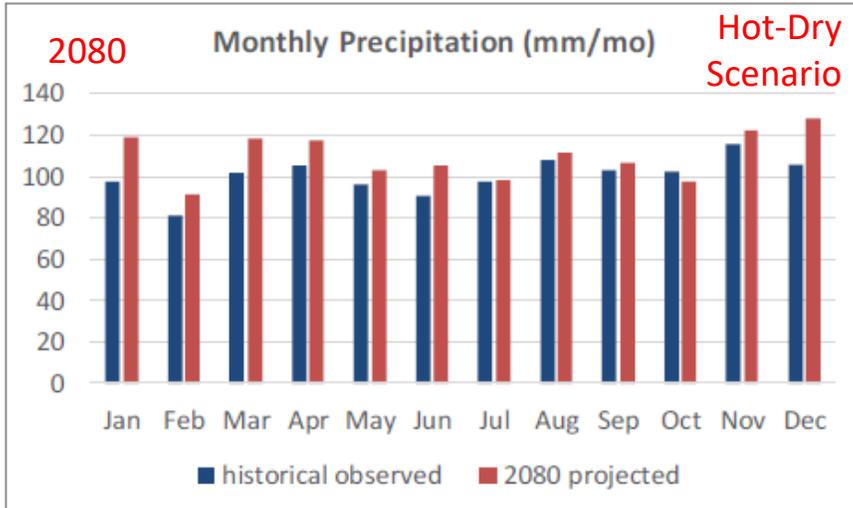
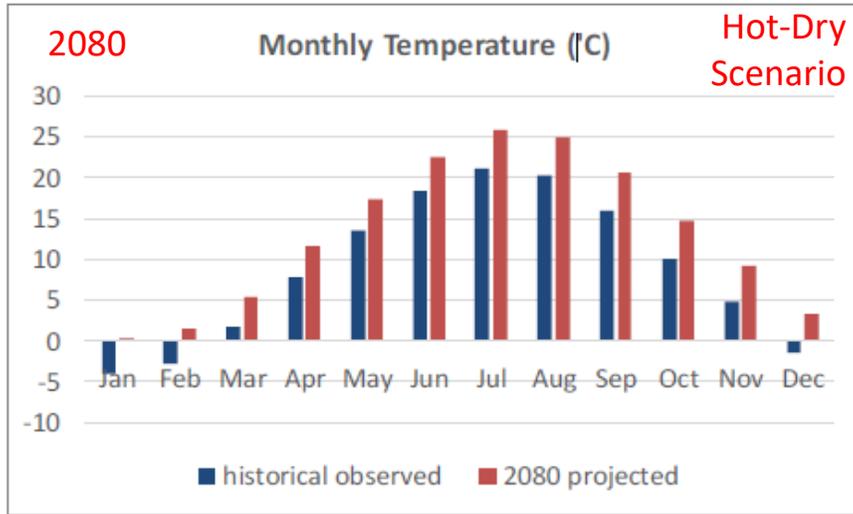
STATE WATER PLAN

Climate Change Analysis Scenarios

- Warm/dry, hot/dry, warm/wet, hot/wet (all are warmer than present conditions).
- Both summer and winter temperatures are projected to increase.
- Precipitation projections are more variable, although consistently projecting a generally wetter future for all four scenarios.
- Largest precipitation increases are projected for the wetter months, including extreme wet months.
- Winter and spring precipitation changes are projected to be larger than summer and autumn changes.
- Flashy droughts may increase in frequency.



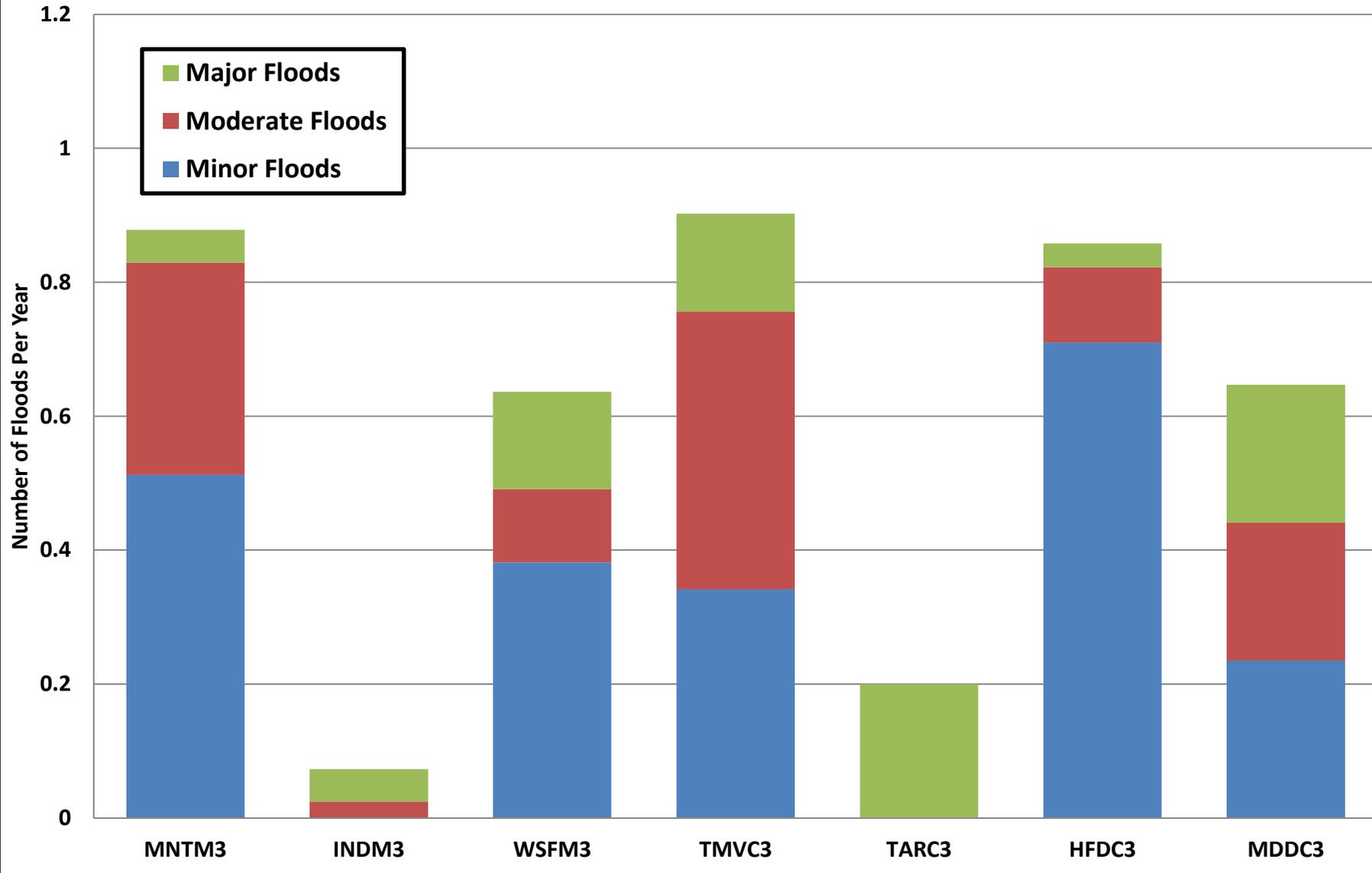
STATE WATER PLAN



Climate Change Streamflow Projections for Hockanum Regional Basin



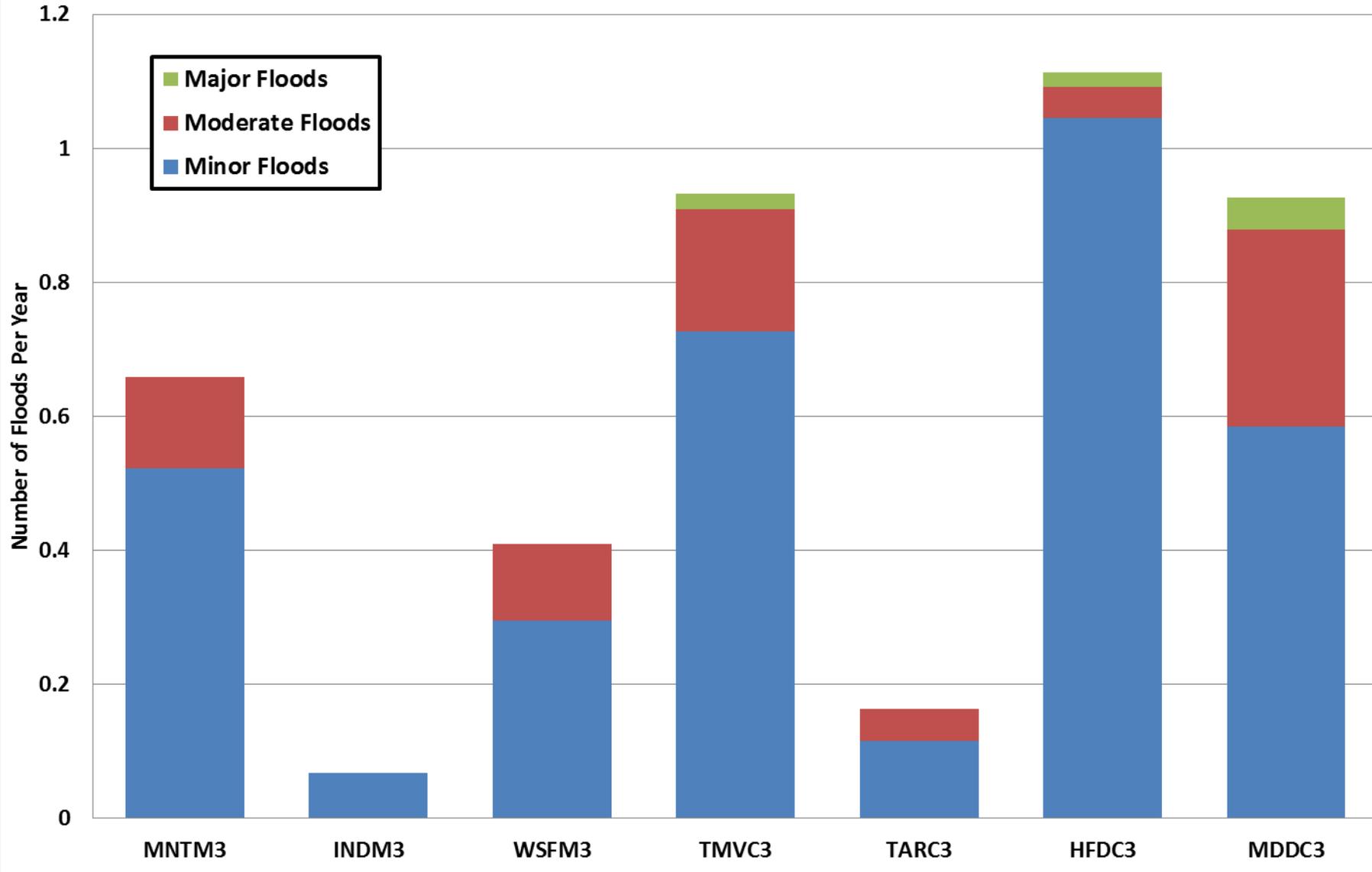
Lower Connecticut Basin Normalized Number Of Minor, Moderate, & Major Floods Per Year Prior to 1970





Lower Connecticut Basin Normalized Number Of Minor, Moderate, & Major Floods Per Year from 1970 - 2013

Data provided by
USGS
science for a changing world



NATIONAL WEATHER SERVICE OBSERVATIONS

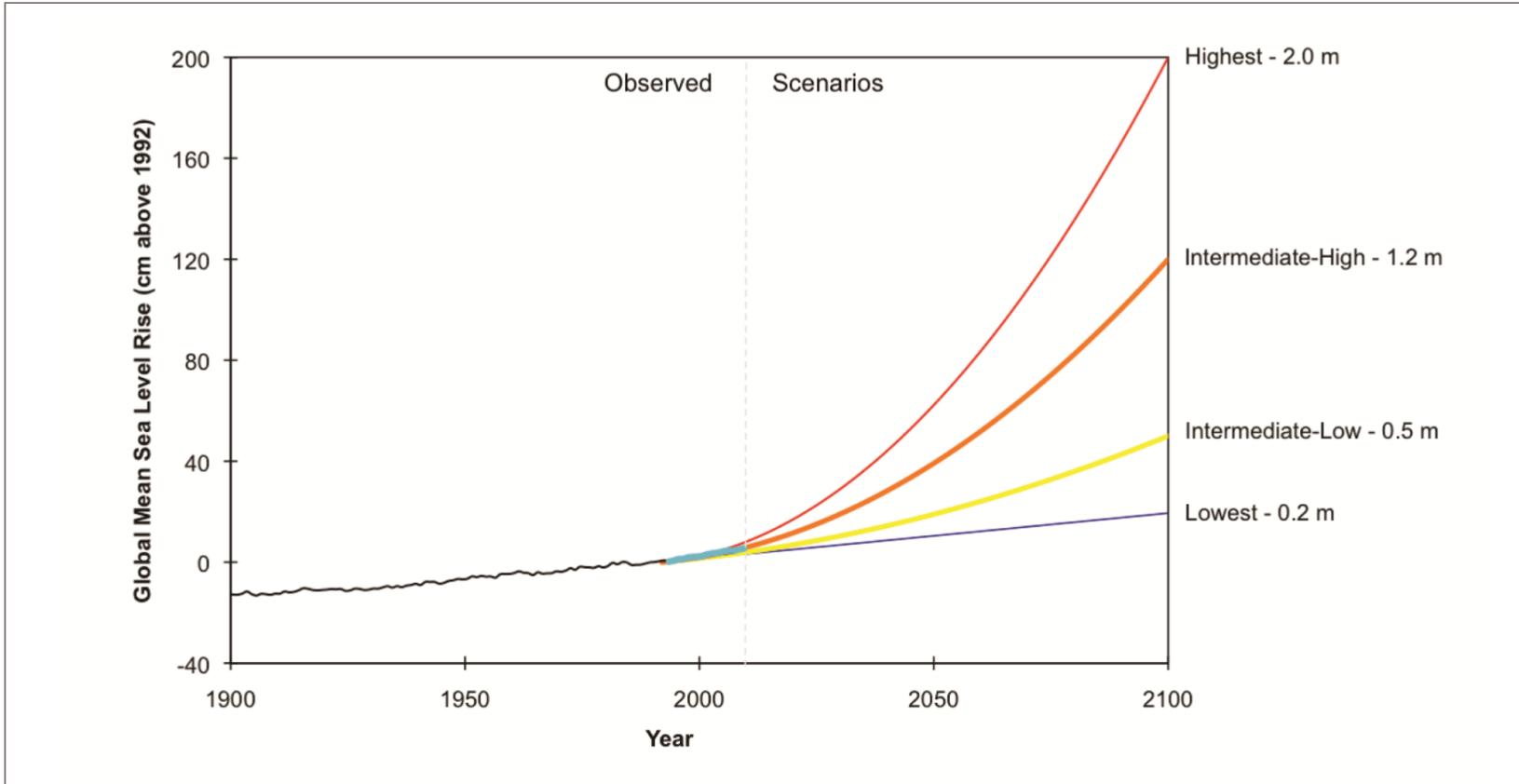
- Common themes across New England and Connecticut:
 - Increasing annual precipitation
 - Increasing frequency of heavy rains
 - Warming annual temperatures
 - Shift in precipitation frequency
- Trend toward increased flood magnitude and/or frequency
 - Most pronounced where significant land use change and/or urbanization has occurred
 - More pronounced in smaller river basins



Residents are rescued from their homes by boat along flooded Pawcatuck River , Westerly RI, on March 30, 2010. Photo: www.theday.com



Major flooding along Route 7 from the Housatonic River in New Milford, CT on March 11, 2011. Source: Ctcameraeye.com



Intermediate Low

In IPCC AR4 scenario A2 the continued emission of GHGs was expected to lead to a concentration of 870 PPM by 2100 (more than twice the 2016 level) and a warming of the global average surface air temperature of 3.5 C between 2000 and 2100 (IPCC, 2007). **The 5-95% range of the predicted rise in global mean sea level between the decades 1980 to 1999 and 2090 to 2099 was 0.23 to 0.51 m (or 0.75 to 1.67 ft).**

Figure 10. Global mean sea level rise scenarios. Present Mean Sea Level (MSL) for the US coasts is determined from the National Tidal Datum Epoch (NTDE) provided by NOAA. The NTDE is calculated using tide gauge observations from 1983 – 2001. Therefore, we use 1992, the mid-point of the NTDE, as a starting point for the projected curves. The Intermediate High Scenario is an average of the high end of ranges of global mean SLR reported by several studies using semi-empirical approaches. The Intermediate Low Scenario is the global mean SLR projection from the IPCC AR4 at 95% confidence interval.

Uconn's Updates

- Review of Observations in CT up to 2016
- Review of IPCC (2013) Model Predictions near CT
- Model of Mean Sea Level variations in LIS
- Summary

Uconn's Findings

- CT is special (location and oceanography, weather, geology). Consequently,
- We will get more SLR than other areas, and the predictions have prediction intervals.
- We should plan for 50 cm (2 feet) increase by 2050 and alert people that in the future higher thresholds may be required.
- The increase in the area impacted will not be very large because of the geology of CT.
- We should institute a decadal review and update to ensure new science is incorporated in the planning to minimize costs and maximize safety.
- Since the coastal areas are flat small increases in MSL will cause a large increase in flood risk.

WHAT DOES THIS MEAN FOR CRCOG COMMUNITIES?

- Heat-related hazards will increase in intensity
- Flashy droughts will become more frequent
- Riverine flood risks will increase, even where we have flood control that prevents the largest floods
- Nuisance flood risks and drainage-related flood risks will increase
- Connecticut River mainstem base level will increase very slightly, which may affect flood levels in several decades
- More atmospheric heat energy may lead to more intense hurricanes, tornadoes, and other wind events
- Snow may be heavier, although the snow season will become shorter

OPPORTUNITIES TO ADDRESS CLIMATE CHANGE

- Consider the effects of climate change on the location, frequency, severity, and impact of natural hazards
- Apply future conditions to risk modeling – do not rely solely on historical data, or static mapping products
- Integrate adaptation into traditional hazard mitigation actions
- Risk management choices are largely the same
 - Build higher and stronger; utilize methods like the Federal Flood Risk Management Standard and the Connecticut floodplain management standards
 - Exceed the building code when possible
 - Set aside more open space and retreat from areas of high risk