USACE: Connecting Science to Action

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Lead, Climate Preparedness and Resilience Community of Practice

Silver Jackets Panel: USACE Policies and Frameworks that Support Flood Risk Management | 3 Nov2015

BLUF

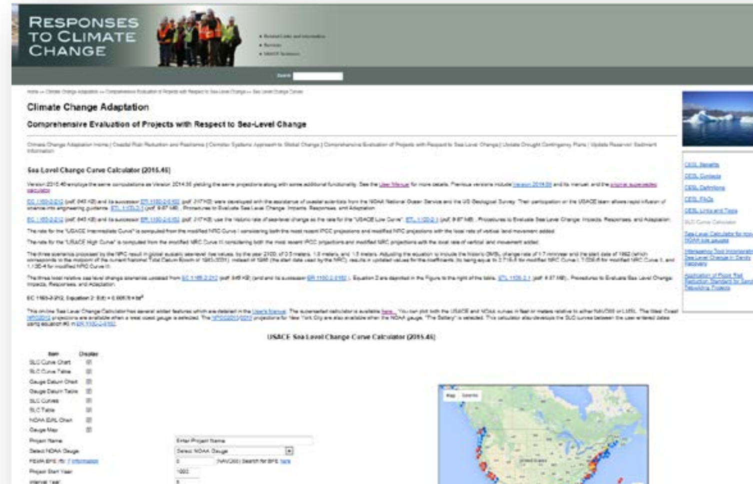
- Climate science is complex and data-intensive
- Climate preparedness and resilience actions require translation of science to actionable information for decision-makers
- Science translation for changing sea levels is fairly mature
- Science translation for hydrologic impacts is dependent on evolving science and is making progress

Coastal Climate Change Impacts

- Strong evidence basis for projected increases in coastal flooding due to changing sea levels
  - Scenario approach can be used to address future uncertainty
  - Reasonable agreement to 2100
  - Can take action now
- Less evidence for projected changes in tropical and extra-tropical events
  - Wait for science to evolve
- Compute local relative sea level change from global (eustatic) sea level rise accounting for regional and local vertical land movement
- For tide gauges with >40 years of record this is relatively straightforward
- Tools:
  - USACE Sea Level Calculator
  - NOAA Sea Level Rise Viewer

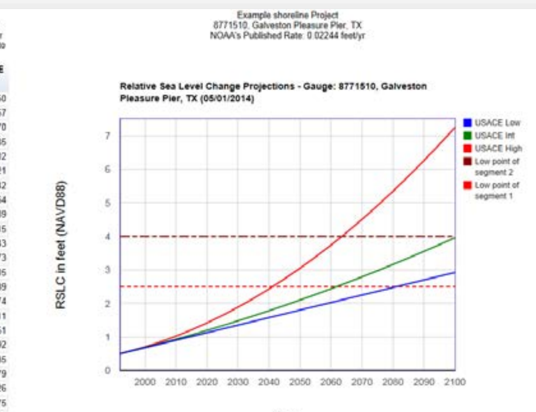
Tools: Coastal Climate Change

- Sea level change calculator
  - Supports repeatable results
  - Relies on NOAA tide gauge data
  - Includes some long-term non-NOAA tide gauges in the Louisiana Gulf Coast area
  - Publicly available
  - Part of Interagency Sandy Sea Level Rise tool
  - Supports comparisons to
    - NOAA 2012 scenarios
    - New York City Panel on Climate Change
    - NRC 2012 Pacific Coast
  - Includes extreme water levels
- Reference: ER 1100-2-8162 and ETL 1100-2-1

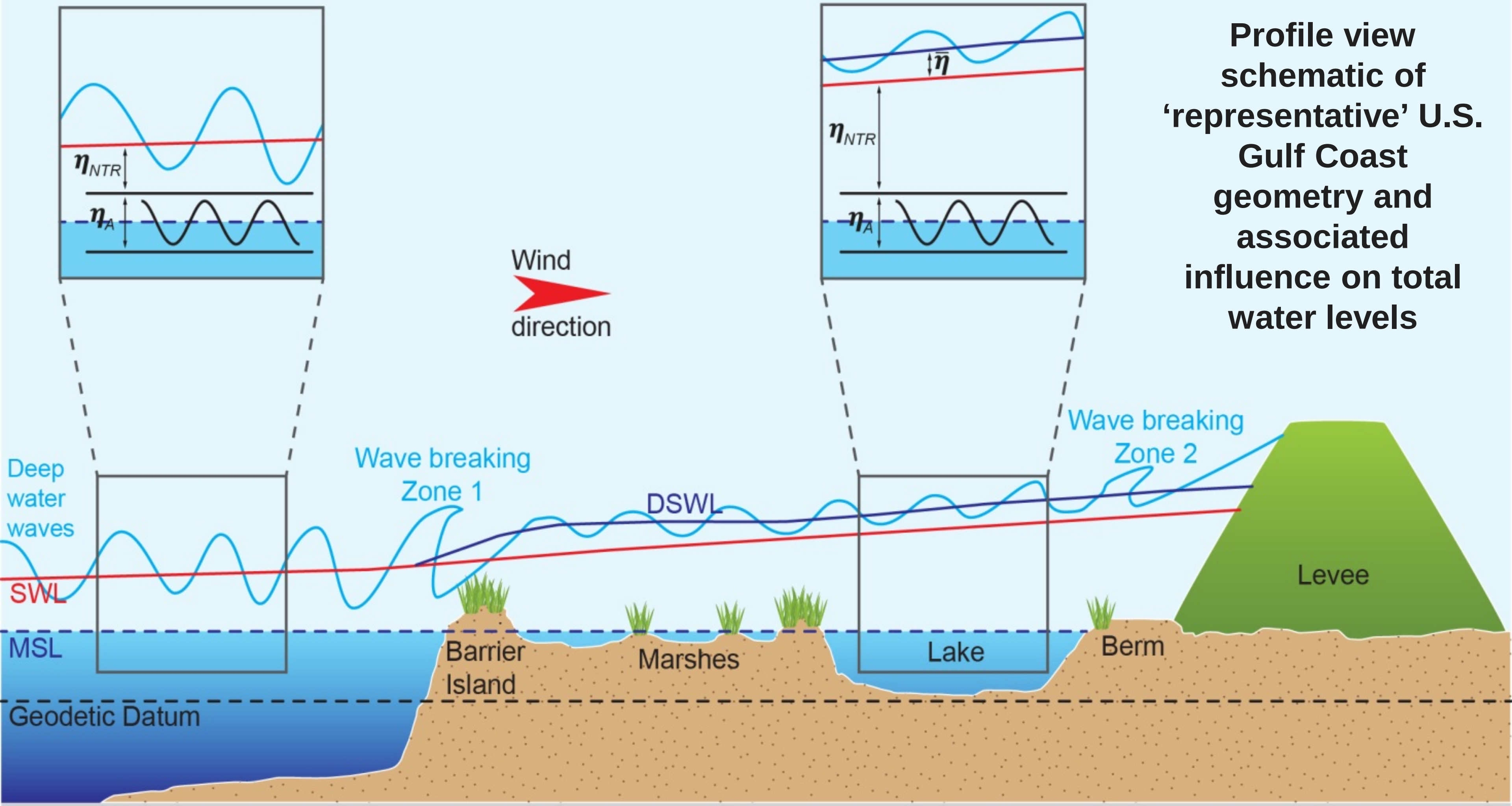


Example shoreline Project
8771510, Galveston Pleasure Pier, TX
NOAA's Published Rate: 0.02244 feet/yr
All values are expressed in feet relative to NAVD88

Year	USACE Low	USACE Int	USACE High
1992	0.50	0.50	0.50
1995	0.57	0.57	0.57
2000	0.68	0.69	0.70
2005	0.79	0.81	0.85
2010	0.90	0.93	1.02
2015	1.02	1.06	1.21
2020	1.13	1.20	1.42
2025	1.24	1.34	1.64
2030	1.35	1.48	1.89
2035	1.47	1.63	2.15
2040	1.58	1.78	2.43
2045	1.69	1.94	2.73
2050	1.80	2.10	3.05
2055	1.91	2.27	3.39
2060	2.03	2.44	3.74
2065	2.14	2.61	4.11
2070	2.25	2.79	4.51
2075	2.36	2.98	4.92
2080	2.48	3.16	5.35
2085	2.59	3.36	5.79
2090	2.70	3.55	6.26
2095	2.81	3.76	6.75
2100	2.92	3.96	7.25



Profile view schematic of ‘representative’ U.S. Gulf Coast geometry and associated influence on total water levels



Key

η_{NTR}	non tidal residual	*MSL*	mean sea level	*DSWL*	dynamic still water level
η_A	astronomical tide	*SWL*	still water level	*R*	wave runup
$\bar{\eta}$	wave setup	*S*	swash	*TWL*	total water level

Progress: Hydrologic Nonstationarity

From this…….

POLICYFORUM

CLIMATE CHANGE

Stationarity Is Dead: Whither Water Management?

P. C. D. Milly, Julio Betancourt, Malin Falkenmark, Robert M. Hirsch, Zbigniew W. Kundzewicz, Dennis P. Lettenmaier, Ronald J. Stouffer

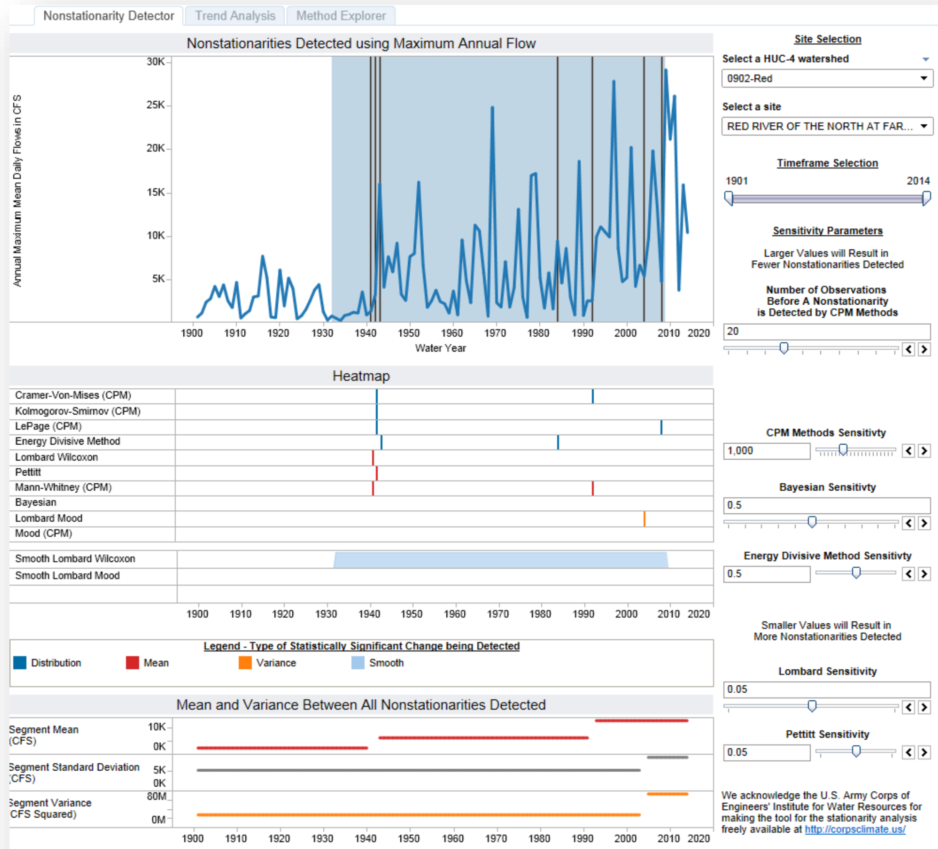
Climate change undermines a basic assumption that historically has facilitated management of water supplies, demands, and risks.

An uncertain future challenges water planners.

www.sciencemag.org SCIENCE VOL 319 1 FEBRUARY 2008 573

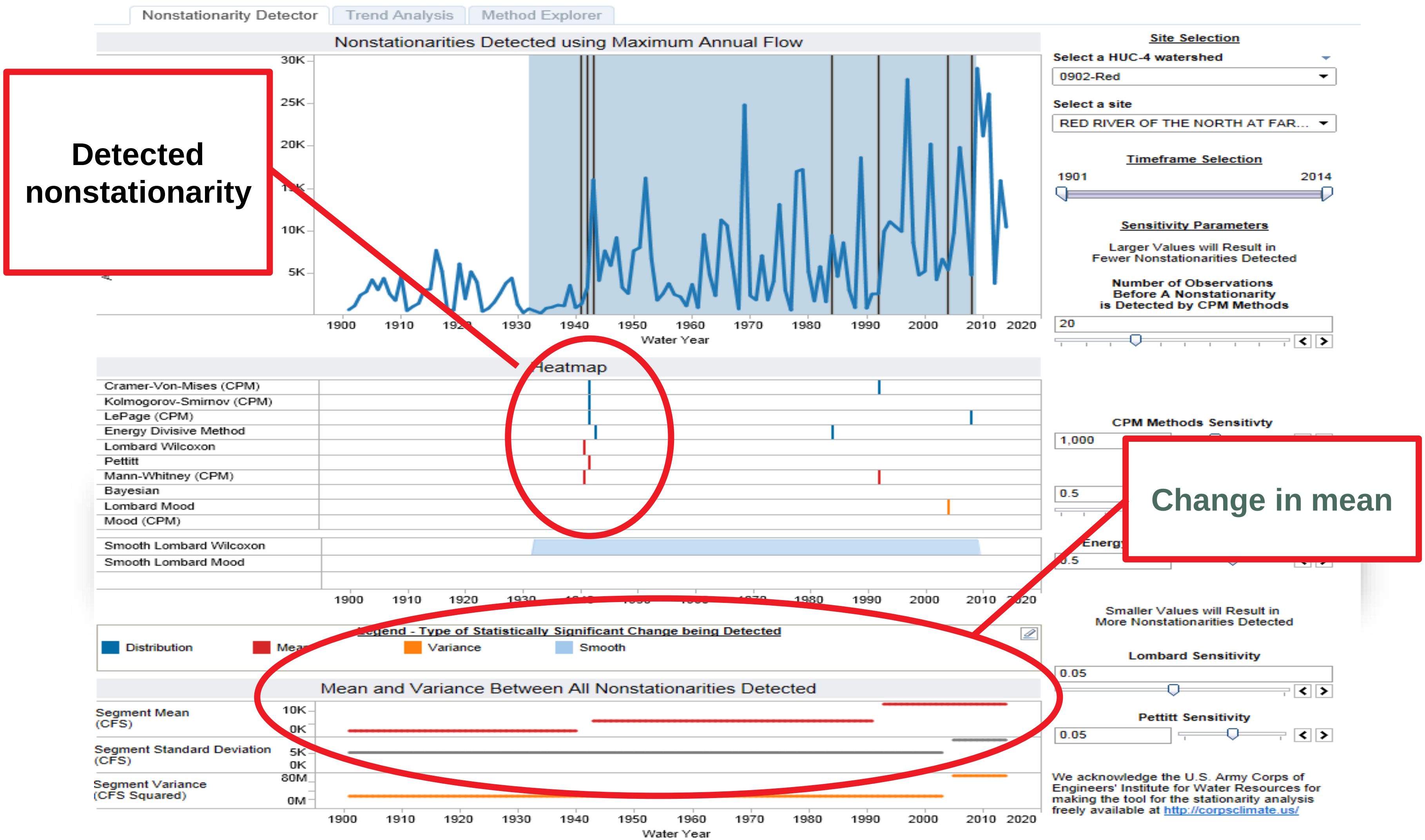
Science

To this……

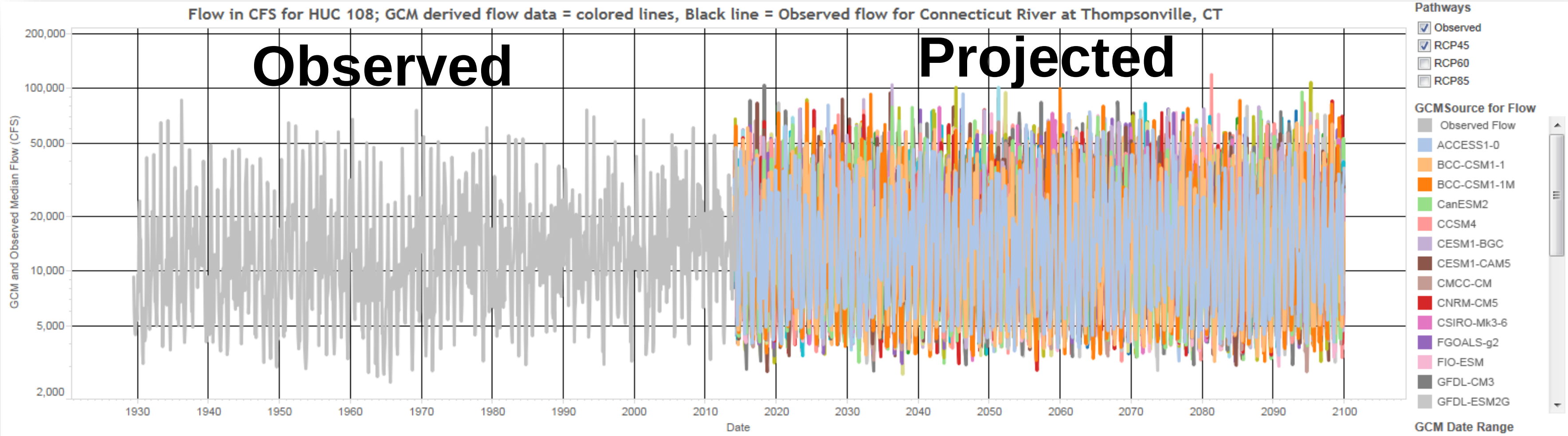


Tool

Tools: Detection of Hydrologic Nonstationarity

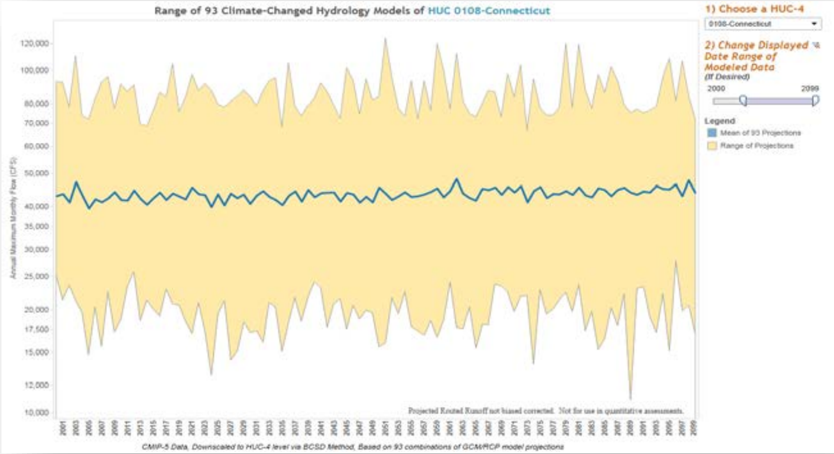


Projected Climate Hydrology



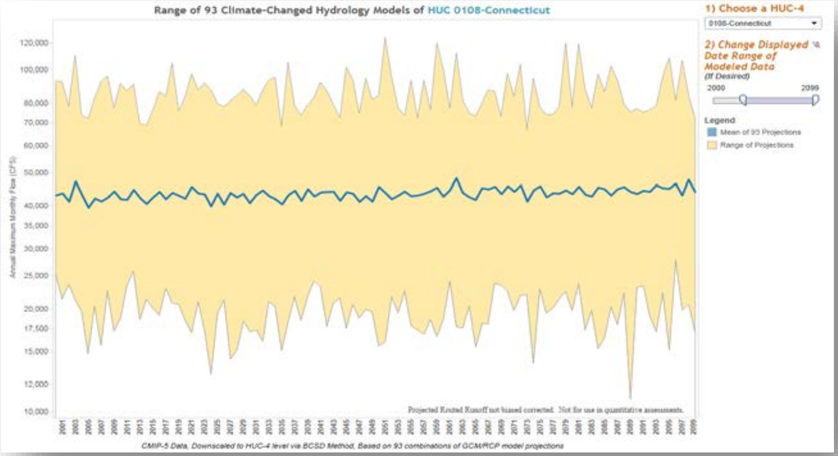
From this…..

To this…..



Projected Climate Hydrology

And from this…..



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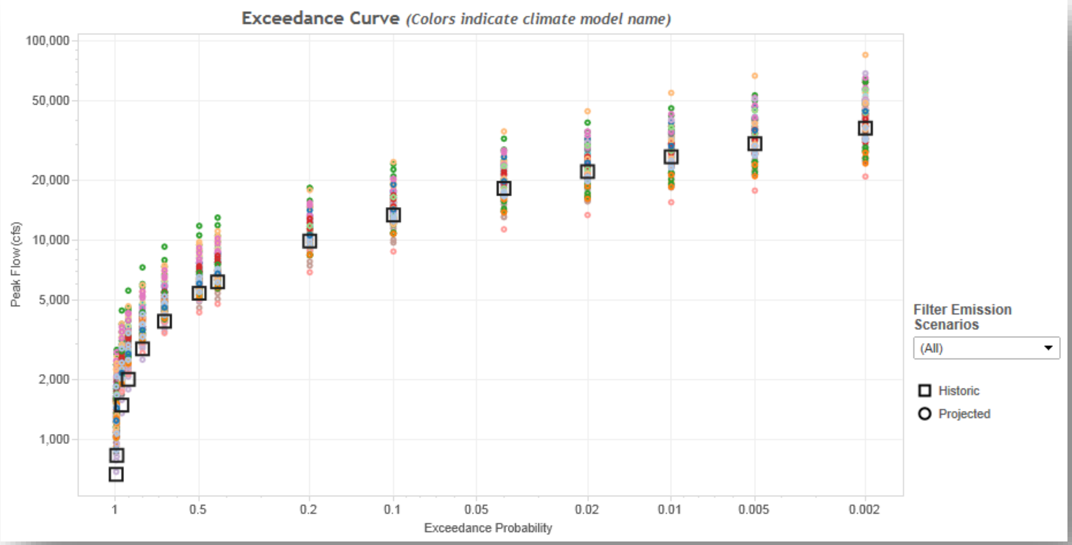

Status Check

- Do we have all the answers?
  - No
- Are we getting there?
  - Yes, we have coastal and are moving toward climate hydrology approaches that are supported by actionable science developed in collaboration with our partners and stakeholders, AND will not require major adjustments
  - Next steps: heat waves and supply chain