MAINTAINING RESILIENCY OF STORMWATER AND RESTORATION PRACTICES

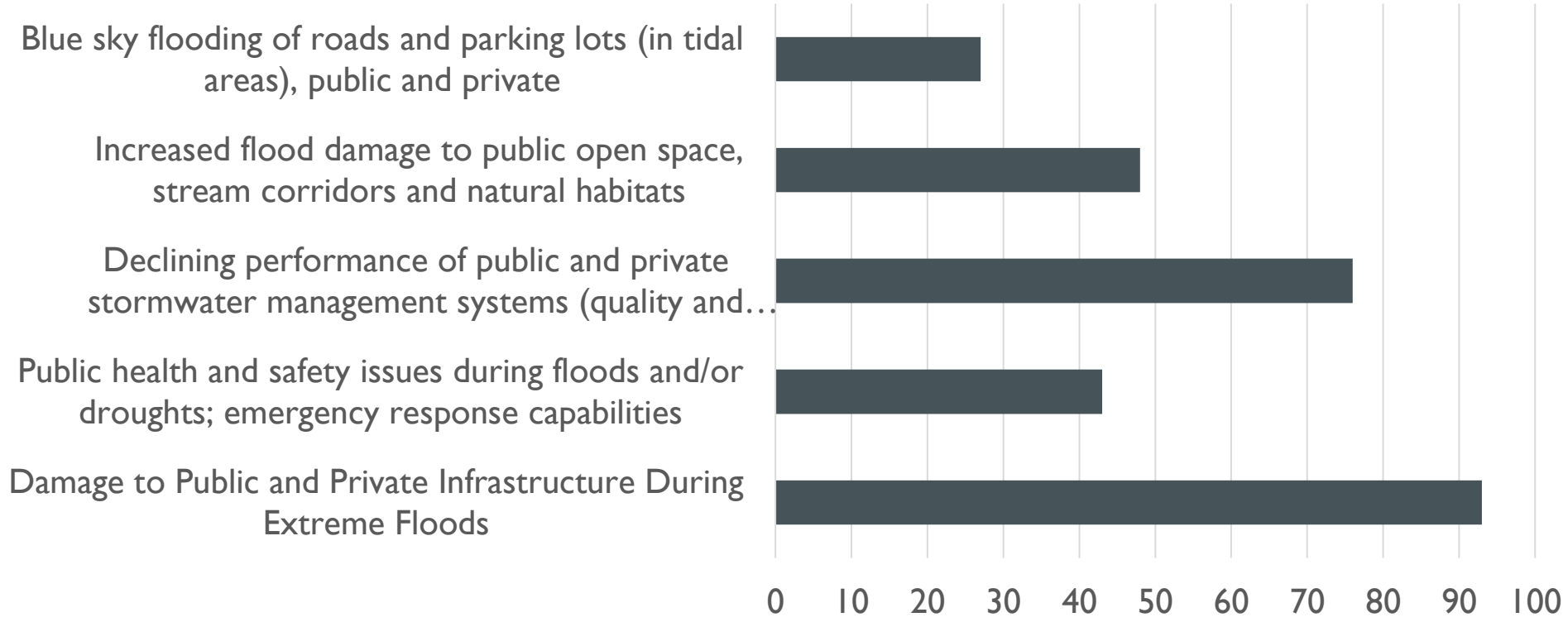
PROGRESS UPDATE

JUNE 2020 USWG MEETING

QUICK REFRESHER

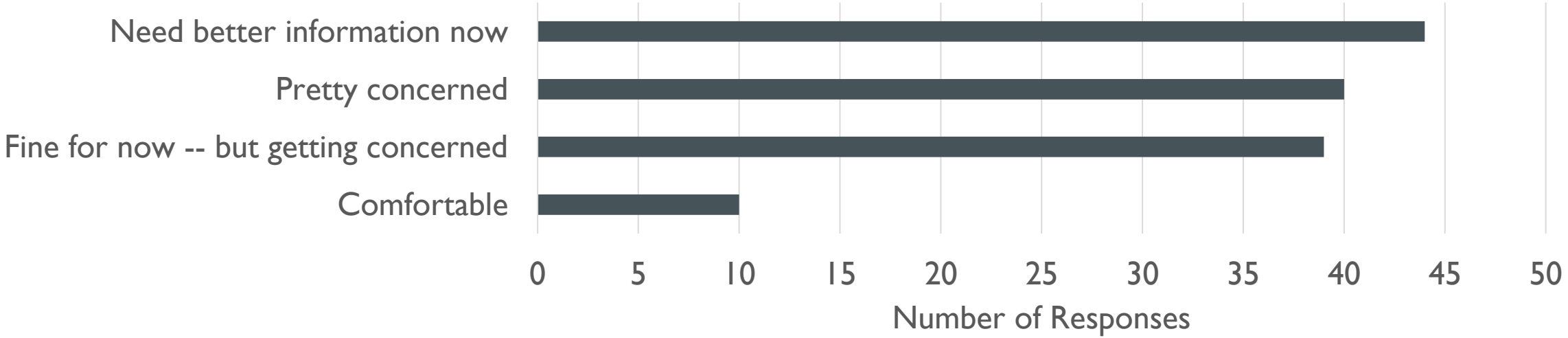
FROM MEMO 1

- Biggest Concern is damage to public and private infrastructure – particularly roads, bridges and culverts – caused by large storm events



FROM MEMO 1:

How comfortable are you with the quality and utility of the engineering design criteria on future rainfall intensity provided to you by state and/or federal authorities in your community?



WHAT'S AT RISK?

Public Infrastructure

- Sewer pipe network
- Roads, streets and storm drains
- Bridges, culverts and crossings
- Water pipe distribution system
- Dams, embankments and flood control practices
- Public stream restoration projects
- Public stream corridor or waterfront
- Wastewater treatment plants and public works yards (floodplain)

Private Property

- Expansion of 100 year floodplain insurance boundaries
- Residential flood damage
- Shoreline engineering to prevent erosion
- Bank erosion/tree canopy loss
- Failure of privately- owned stormwater systems

LOOKING AT THE PROJECTIONS

WHAT'S COMING IN MEMO 3

IT'S ABOUT MORE THAN JUST RAINFALL

- Temperature, Streamflow and Sea Level Rise all affect Stormwater Management

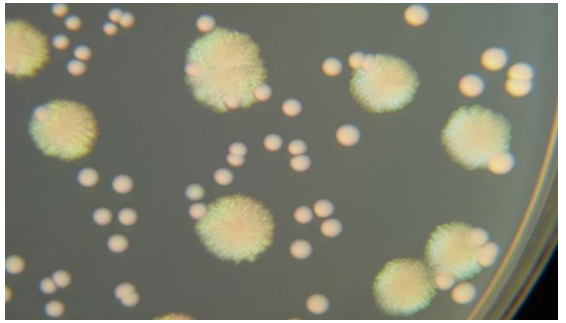
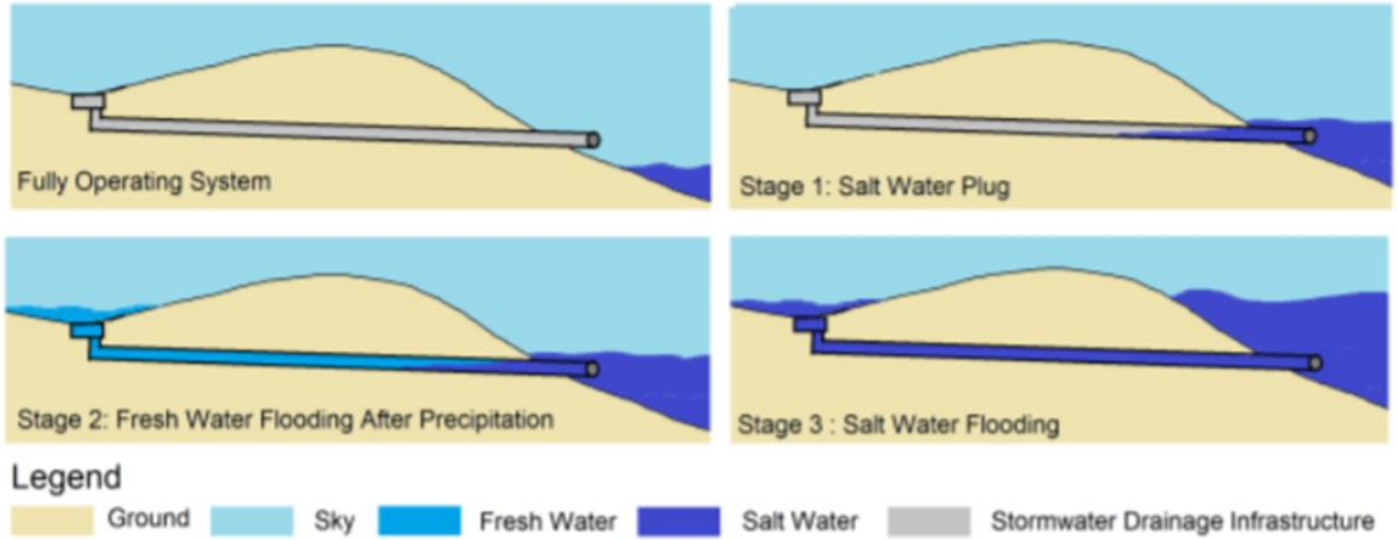


Figure 2.5: Stages of stormwater drainage failure due to sea-level rise. Graphic by Emily Niederman, Stetson University.



TEMPERATURE

Table 2. Change in temperature (°C) as compared to 1995

Geography	**Year 2025**	**Year 2035**	**Year 2045**	**Year 2055**
Delaware	1.03	1.36	1.65	1.93
Maryland	1.09	1.43	1.74	2.01
Virginia	1.07	1.41	1.73	1.97
Pennsylvania	1.17	1.51	1.89	2.12
District of Columbia	1.10	1.44	1.76	2.03
West Virginia	1.13	1.48	1.82	2.07
New York	1.19	1.54	1.93	2.18
CB Watershed	1.12	1.47	1.81	2.06

Source: CBP 2019 Climate Change Assessment

SEA LEVEL RISE

Table: Sea Level Rise (ft) compared to 1995, used in the 2019 CBP Climate Assessment

Geography	**Year 2025**	**Year 2035**	**Year 2045**	**Year 2055**
Chesapeake Bay	0.72	1.01	1.38	1.74

Source: CBP 2019 Climate Change Assessment

PRECIPITATION GETS A LITTLE TRICKIER

Table 3. Percent change in annual rainfall volume as compared to 1995

Geography	**Year 2025**	**Year 2035**	**Year 2045**	**Year 2055**
Delaware	2.06%	3.10%	4.14%	6.23%
Maryland	3.09%	4.13%	4.92%	6.70%
Virginia	2.56%	3.68%	5.23%	6.50%
Pennsylvania	3.28%	4.46%	5.07%	6.32%
District of Columbia	3.14%	4.11%	5.07%	6.83%
West Virginia	2.72%	3.73%	5.23%	6.53%
New York	5.00%	6.09%	5.99%	6.24%
CB Watershed	3.11%	4.23%	5.19%	6.44%

Source: CBP 2019 Climate Change Assessment

PRECIPITATION GETS A LITTLE TRICKIER

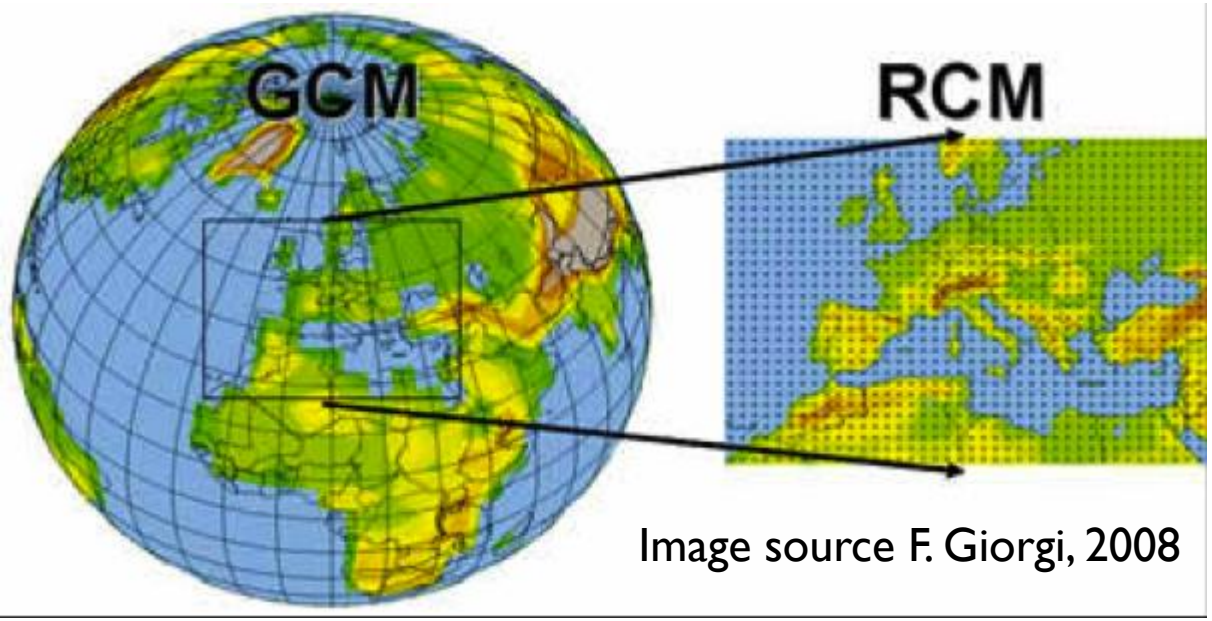
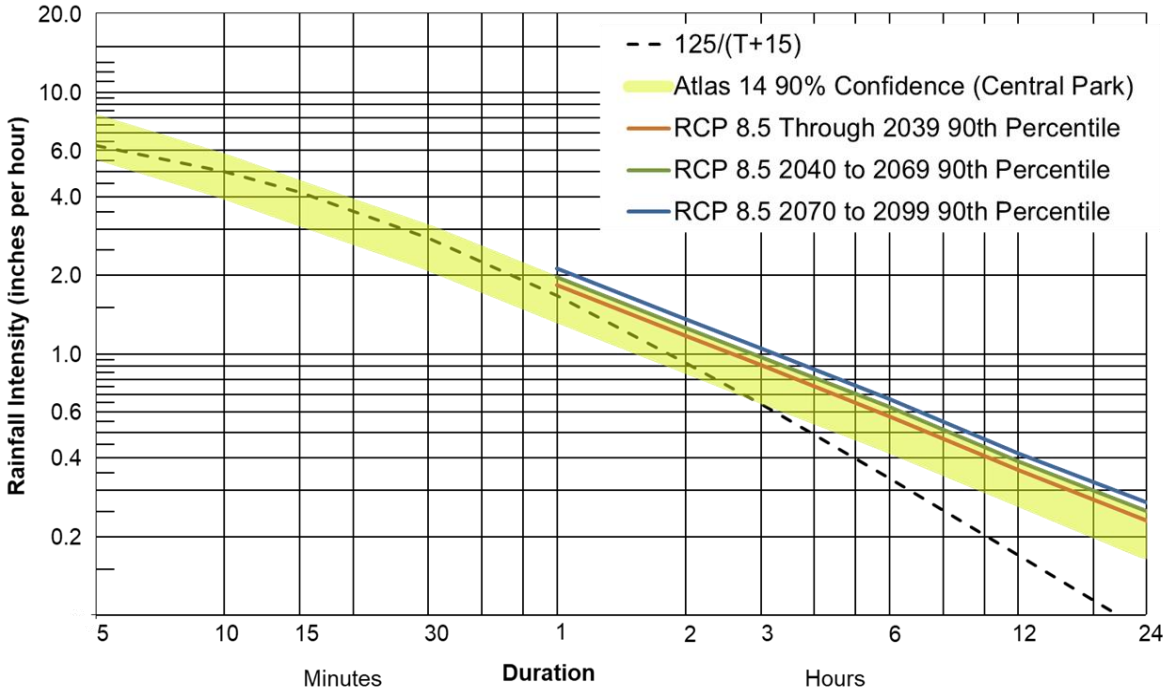


Image source F. Giorgi, 2008



Courtesy: Alan Cohn (NYC DEP)

DRAFT Precipitation Downscaling Studies in the Mid-Atlantic

Study Location	Downscaling Method	RCPs Analyzed	Temporal and Geographic Scale
New York	Dynamical Delta Analogue	RCP4.5 RCP8.5	*Temporal:* 2010-2039, 2040-2069, 2070-2099 *Geographic*: Gauge
Virginia Beach	Dynamical	RCP4.5 RCP8.5	*Temporal:* 2026-2065, 2056-2095 *Geographic:* 11km grid (RCP8.5); 44km grid (RCP4.5)
Maryland Eastern Shore	Delta	RCP8.5	*Temporal:* 2041-2070 *Geographic:* 750m grid
Philadelphia	Stochastic Rainfall Generator + Delta	SRES A2 emissions (Roughly comparable to RCP8.5)	*Temporal:* 2080-2100 *Geographic:* Gauge
Virginia (ODU)	Delta	SRES A2 emissions (Roughly comparable to RCP8.5)	*Temporal:* 2035-2070 *Geographic:* Gauge

GOALS

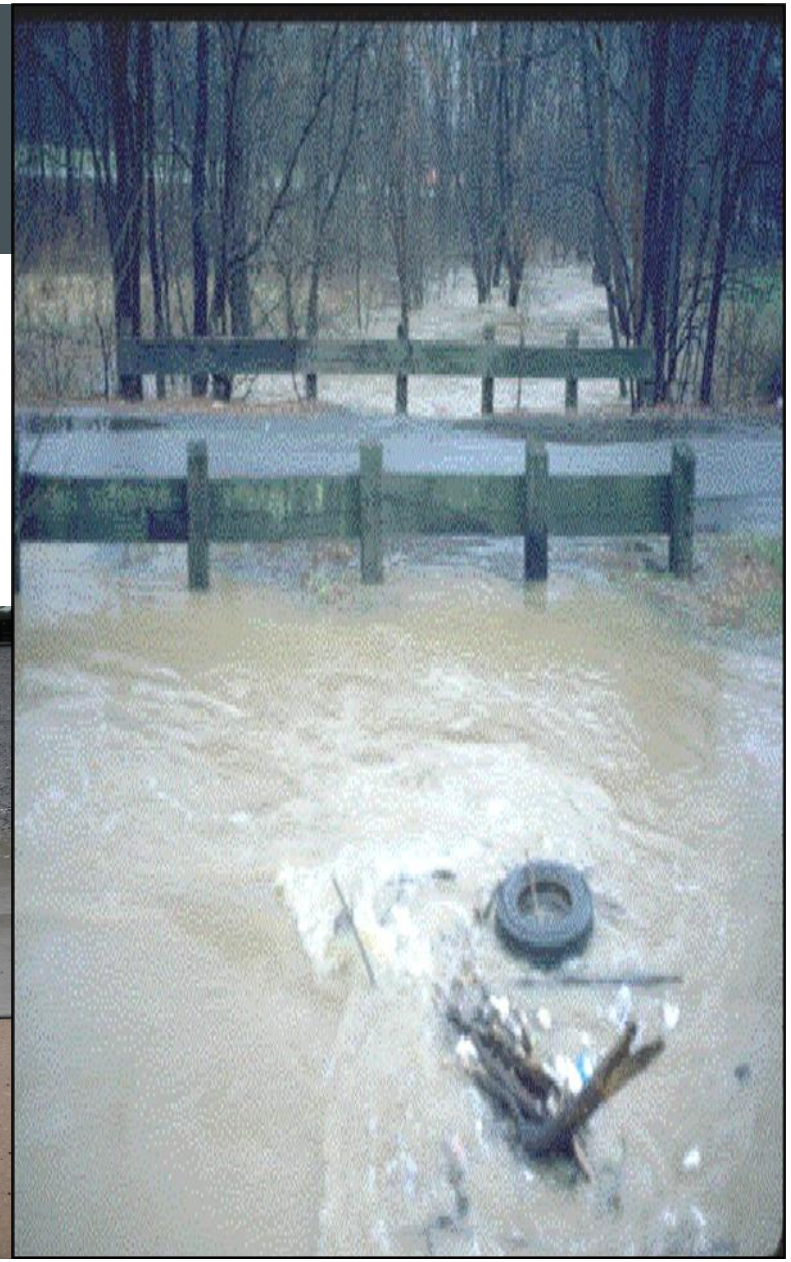
- Review the different efforts across the region to project future precipitation
- Understand considerations when selecting downscaling methods, timescales and resolution
- Identify trends in projected rainfall volume and intensity

BMP VULNERABILITY ANALYSIS

LOOKING AHEAD TO MEMO 4

WHAT BMPS ARE AT RISK

- Upland vs Stream Corridor
- Drainage Area – Distributed LID vs Detention Ponds



WHAT DOES FAILURE LOOK LIKE

https://www.cnn.com/2020/05/20/us/michigan-dam-failure-before-after-photos-trnd/index.html

WHAT ARE POTENTIAL DESIGN ADAPTATIONS

- Shorter practice lifespans?
- Retrofits/makeovers?
- More BMPs "treatment trains"?
- Improved plumbing (bypass/overflows)?
- Providing factor of safety (freeboard)?

QUESTIONS?