MAINTAINING RESILIENCY OF STORMWATER AND RESTORATION PRACTICES

PROGRESS UPDATE

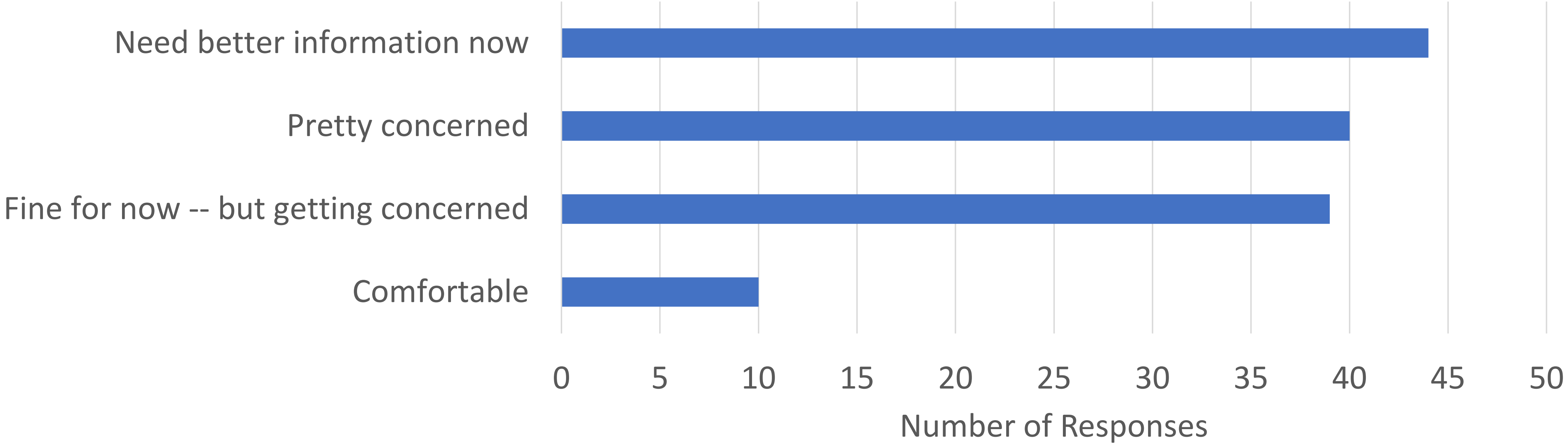
APRIL 2020 MODELING QUARTERLY MEETING

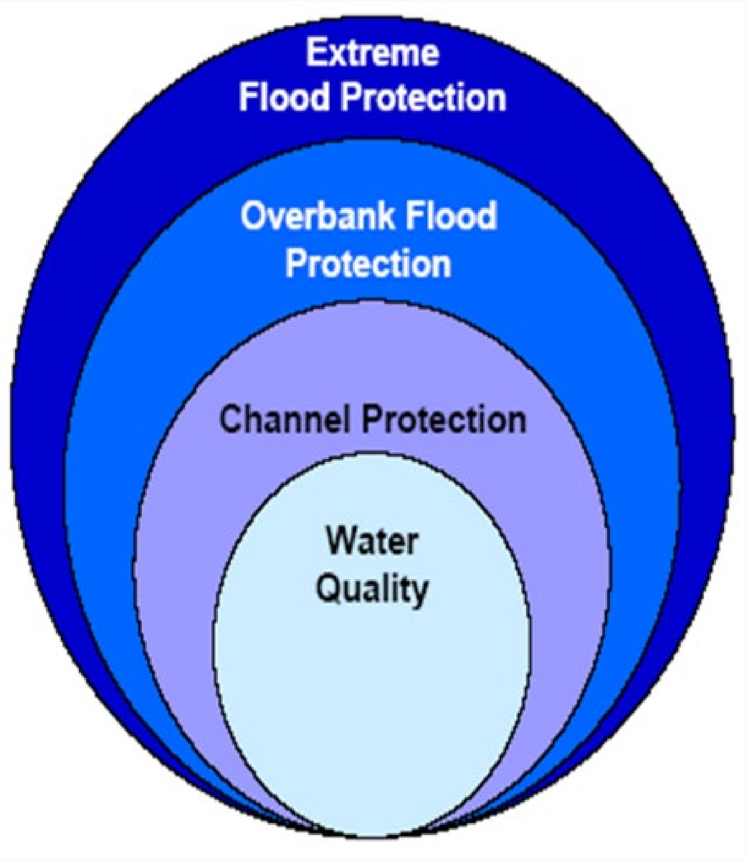
A wide range of municipal stormwater risks to manage through engineering criteria

- Public safety risk – failure puts life at risk (flash flooding)
- Interruption in public utility service (damage to water lines, road closure, etc.)
- Damage to private property, especially in flood zones
- Damage or failure of public or private stormwater infrastructure (BMPs and stormwater conveyance/culverts/crossings etc.)
- Increased long-term cost to maintain stormwater infrastructure
- Loss of BMP function and CBP reduction credit
- Capital cost to relocate, replace or retrofit municipal stormwater infrastructure
- Degradation of public open space and habitat conservation areas
- Increased cost to manage public urban landscaping areas

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?





Water Quality criteria refers to the storage needed to capture and treat the runoff from a set storm event to remove pollutants such as nitrogen, phosphorus and sediment. For most states in the Chesapeake Bay watershed, this means capturing and treating the 90^{th} percentile, or 1”, rainfall event.

Channel protection criteria are set to ensure that runoff can be stored and released in a gradual manner so that storm events will not cause erosion in downstream channels.

Channel Conveyance (Overbank Flood Protection) criteria are designed to prevent an increase in the frequency and magnitude of storm events that overflow the channels, causing flooding.

Extreme Flood Protection criteria is to prevent flood damage from large storm events, maintain the boundaries of the pre development 100-year FEMA floodplain, and protect the physical integrity of BMP control structures.

“Typical” Sizing Criteria*

Objective	Design Storm
Water Quality	90^{th} percentile storm event
Channel Protection	1 or 2 year
Channel Conveyance	10 year
Roads/Bridges/Culverts	Varies by road size, 10 to 100 year
Dam Safety	100 year or PMF
Floodplain Management	100 year

* Varies by jurisdiction, these are provided as most common examples

Floodplain Hazard Boundaries

- Local Scale Mapping and Regulations
- Driven by FEMA's National Flood Insurance Program (NFIP)
- Poor data on total coverage by NFIP
- Maps are older than 10 years in >25% of participating communies

State	Communities in NFIP	Communities in CRS
Delaware	50	11
District of Columbia	1	0
Maryland	147	15
New York	1,506	50
Pennsylvania	2,472	34
Virginia	290	25
West Virginia	278	10

The Data Sources

Summary of Design Rainfall Events in the State of Maryland			
Return Frequency for 24-hr storm event [1]	Mean Rainfall depth (inches)	Range across MD (inches) [2]	% change from TP 40 to Atlas 14[3]
1-year	2.6	2.4 to 3.0	-1%
2-year	3.2	2.9 to 3.6	-2%
10-year	5.0	4.5 to 5.6	-5%
100-year	7.1	6.2 to 8.1	16%

[1] values for a range of MD counties, as reported in MDE (2000) which primarily derived from TP-40 rainfall analysis from 1970's - 1990's. All values are shown approximate, and designers should rely on the most updated versions in their region for actual engineering design .

[2] high end of range usually occurs near coast and lower end of range occurs in the mountains

[3] Based on an average of Frederick, Annapolis, and Salisbury

Focusing on the large events

- Communities are most concerned with large impacts
- Most additional precip is going to the largest 10% of storms
- Floodplain management and dam safety have the most direct impacts on public health and safety

Potential Impacts on Stormwater Design

- Changing Rainfall Distributions

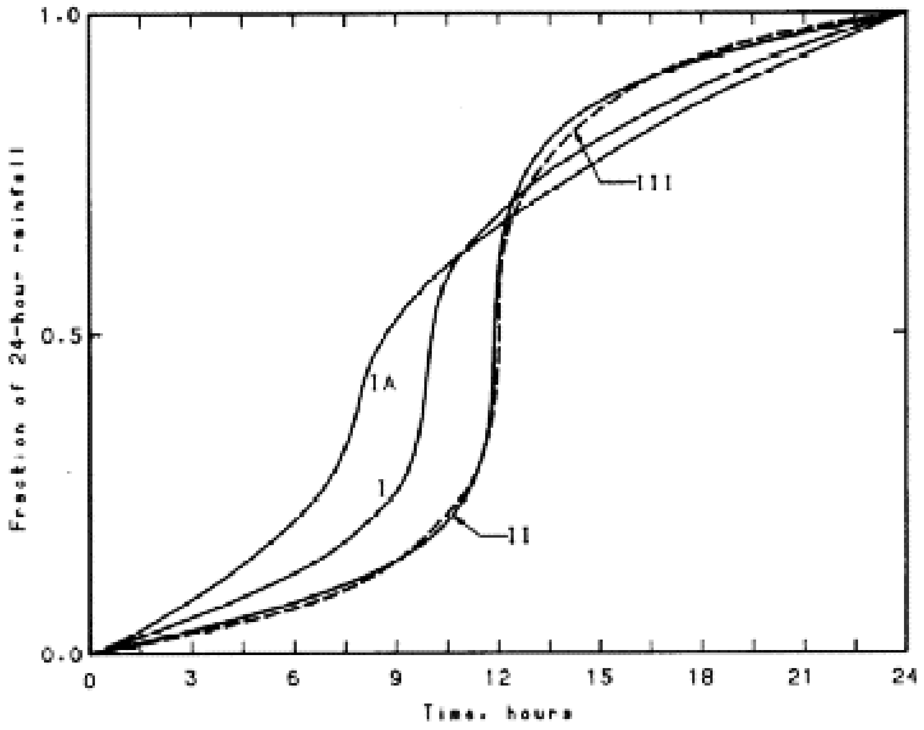
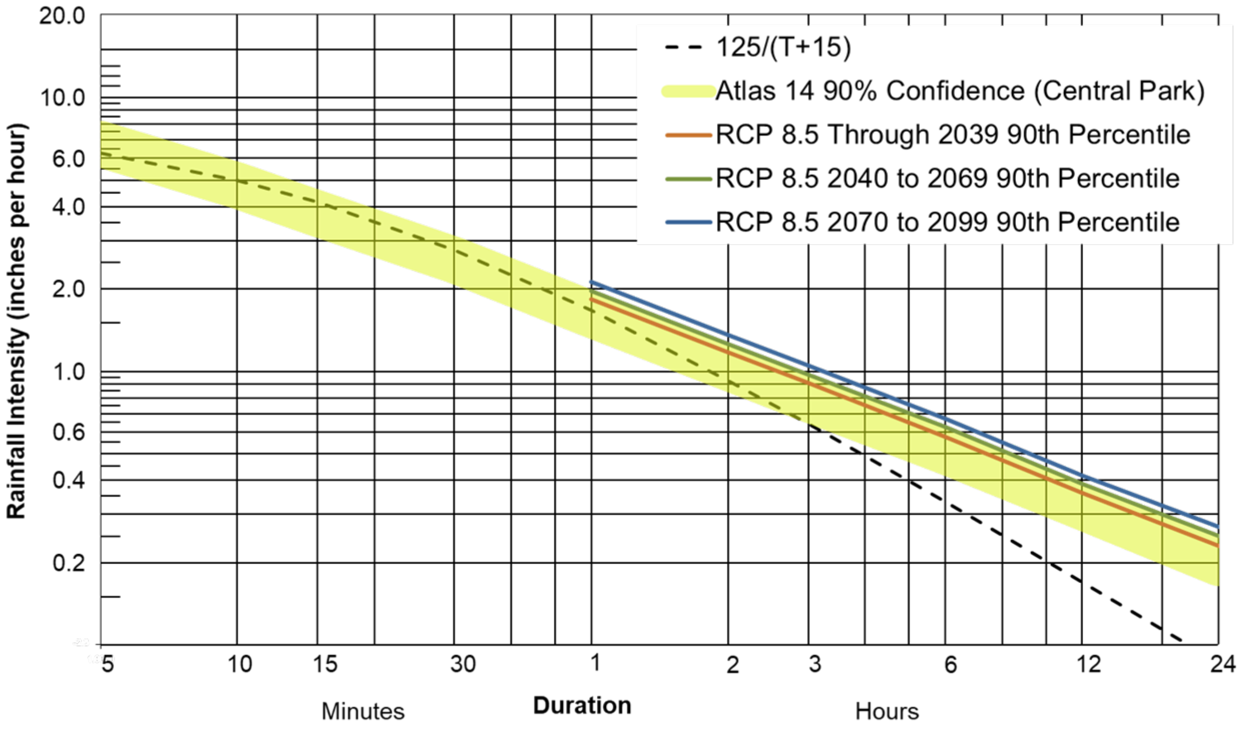


Figure B-1.—SCS 24-hour rainfall distributions.

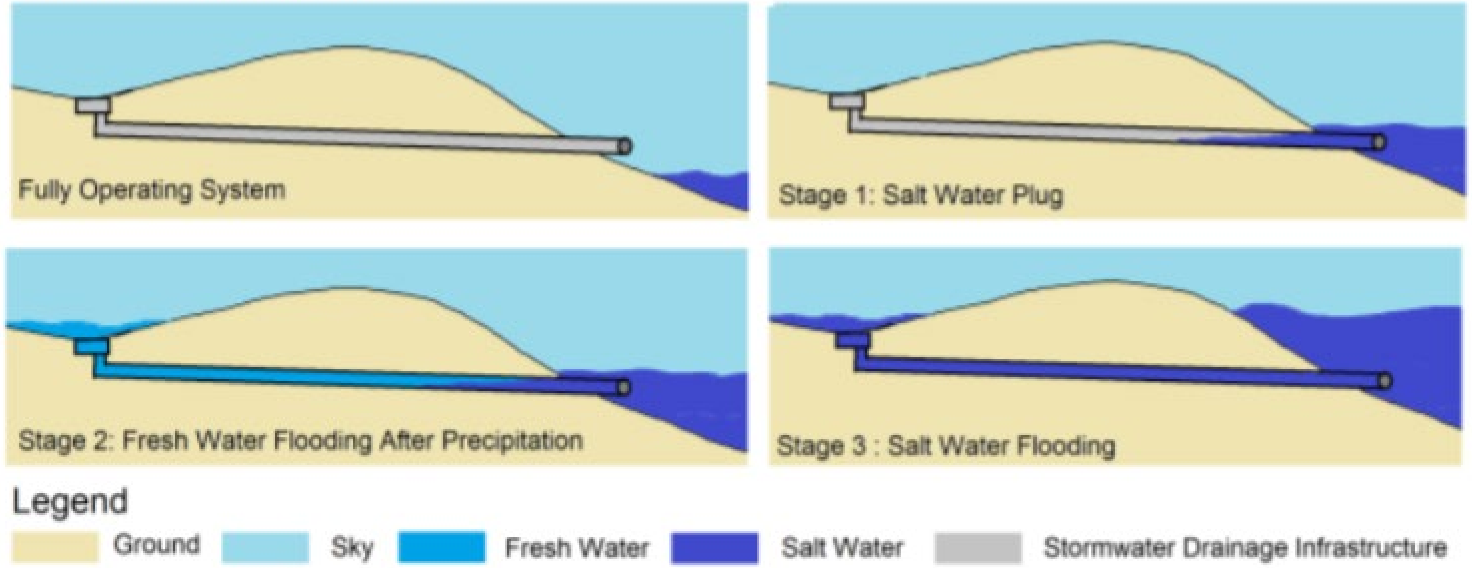


Courtesy: Alan Cohn (NYC DEP)

Potential Impacts on SW Design

- Antecedent Runoff Conditions
- Evapotranspiration/ Soil Water Storage
- Tidal Interactions

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



Memo #2 Status

- Currently in draft
- Will be sharing with state stormwater contacts for review
- Final draft by end of April
- Will be rolled out together with Memo #3

Memo 3: Climate Projections Review

- Overview of CBPO Climate Assessment Findings for Precipitation
- Summary of recent Chesapeake Bay IDF Research
  - Findings from Cornell/VB/ODU/ESCL, etc.
  - Discussion on dealing with uncertainty
- Design and Management Considerations
  - How do projections scale down to local level and shorter timeframes for design.
  - Case studies for how the downscaled IDF work is being used

QUESTIONS?