A Summer of Extremes

Examples of How Water Utilities are Planning for a Hotter and Wetter Future

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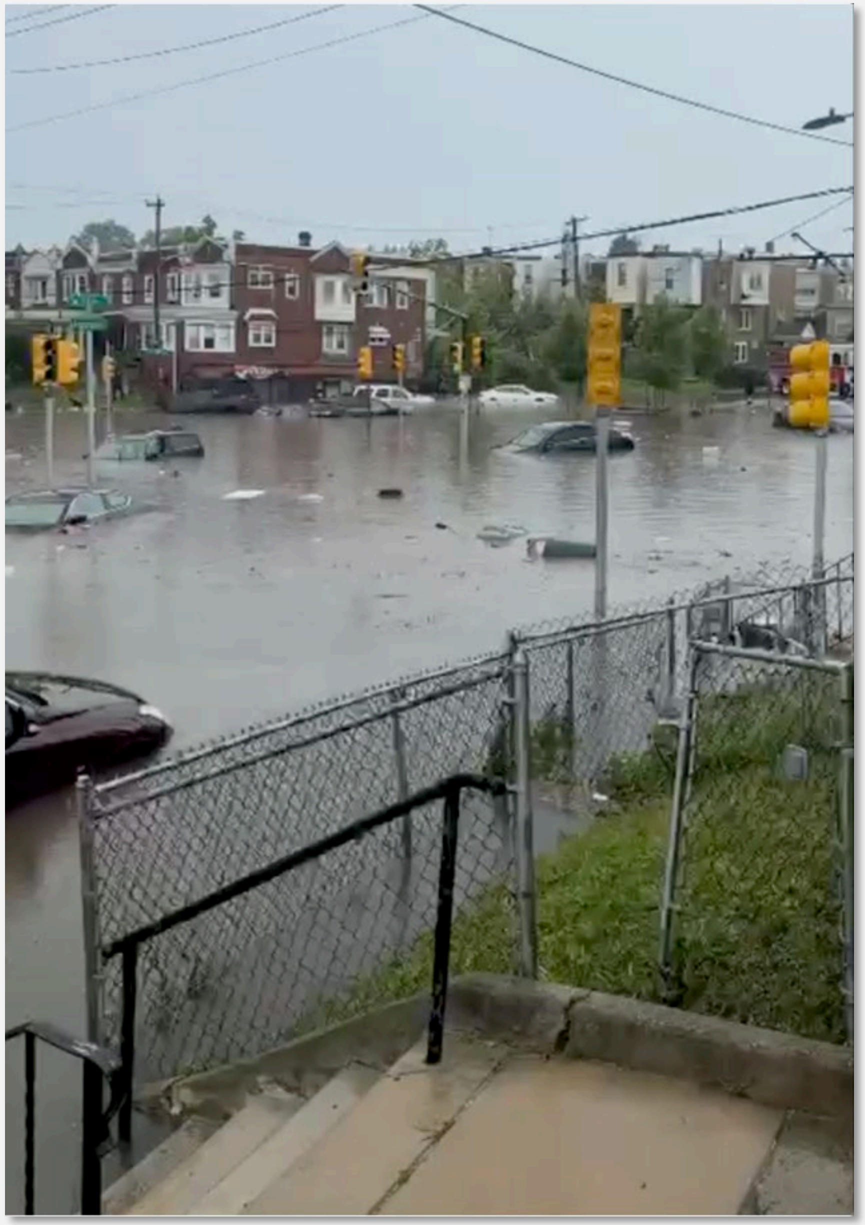
DRBC Advisory Committee on Climate Change

August 26, 2026

PHILADELPHIA WATER DEPARTMENT



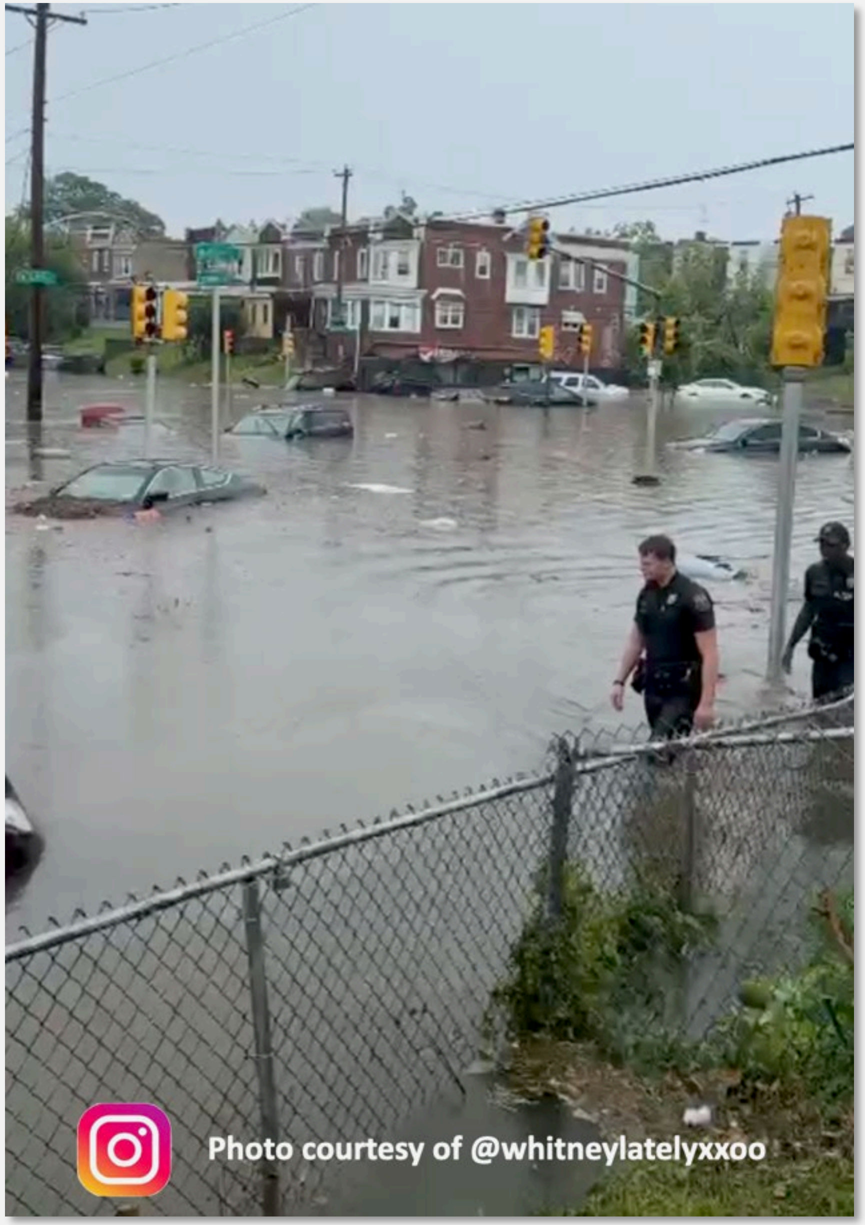


Photo courtesy of @whitneylatelyxxoo

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Extreme Heat, Intense Rainfall, Wildfire Smoke

- **June 22nd**: severe storms brought heavy rain that caused flooding in neighborhoods including Germantown and West Oak Lane
- **July 4th weekend**: temperatures rose above 100^{o}F, leading the City to declare a Heat Health Emergency and Code Red
- **July 11th**: powerful thunderstorms brought heavy rain, strong winds, and flooding to parts of the city (microbursts!)
- **Week of July 13th**: Phila once again experienced extreme heat and wildfire smoke from Canada that lowered air quality across the region

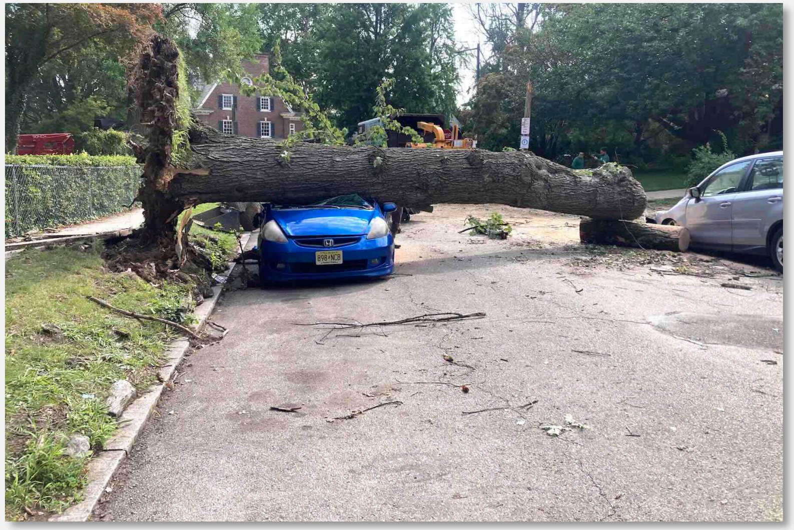
What a string of intense storms, floods, heatwaves and wildfire smoke says about Philadelphia's climate future – Philadelphia Office of Sustainability

July 11th Microbursts

NWS Mount Holly
@NWS_MountHolly · Follow

A series of at least 4 severe microbursts with wind gusts of 60-70 mph impacted far southern Montgomery Co (Lower Merion Twp/Narberth), West Philadelphia, & South Philadelphia between 2:44-3:15 PM. The damage was caused straight line winds from the microbursts, not a tornado.

8:28 PM · Jul 11, 2026



July 11th Microbursts

Photos courtesy of @whitneylatelyxxoo

WEST PHILADELPHIA – COBBS CREEK AREA
RAINFALL HIGHLIGHT

Based on preliminary analyses, the West Philadelphia Cobbs Creek area rain gauge recorded peak rainfall for a

MORE THAN 1,000 YEAR EVENT

for the 5-minute, 10-minute and 15-minute durations.

WHAT DOES "MORE THAN 1,000 YEARS" MEAN?

It doesn't mean this happens only once every 1,000 years.
It means that in any given year, there is less than a 0.1% chance of rainfall this intense happening.
It is extremely rare.

PEAK RAINFALL INCREMENTS FOR GIVEN DURATIONS FROM PWD RAIN GAUGE NETWORK

DURATION	COBBS CREEK AREA RAINFALL	RETURN PERIOD (HOW RARE?)
5 minute	0.88 inches	**> 1,000 YEARS**
10 minute	1.41 inches	**> 1,000 YEARS**
15 minute	1.58 inches	**> 1,000 YEARS**
30 minute	1.82 inches	> 25 YEARS
60 minute	1.90 inches	> 5 YEARS
120 minute	1.91 inches	> 2 YEARS
3 hour	1.91 inches	> 2 YEARS
6 hour	1.91 inches	< 1 YEAR

The most intense rainfall happened in the first **15 minutes** of the storm.

This short, powerful burst of rain overwhelmed drainage systems and led to widespread flooding across parts of West Philadelphia.

Source: PWD Rain Gauge Network | Data is preliminary and subject to change.

Climate Change is increasing the frequency and intensity of extreme events

According to a peer-reviewed method developed by PWD and our consultants, we found that:

The most extreme precipitation events are likely to increase by the largest amounts.

For example, for a 100-year event, increases could be as high as 50-60% depending on the duration (high emissions scenario).

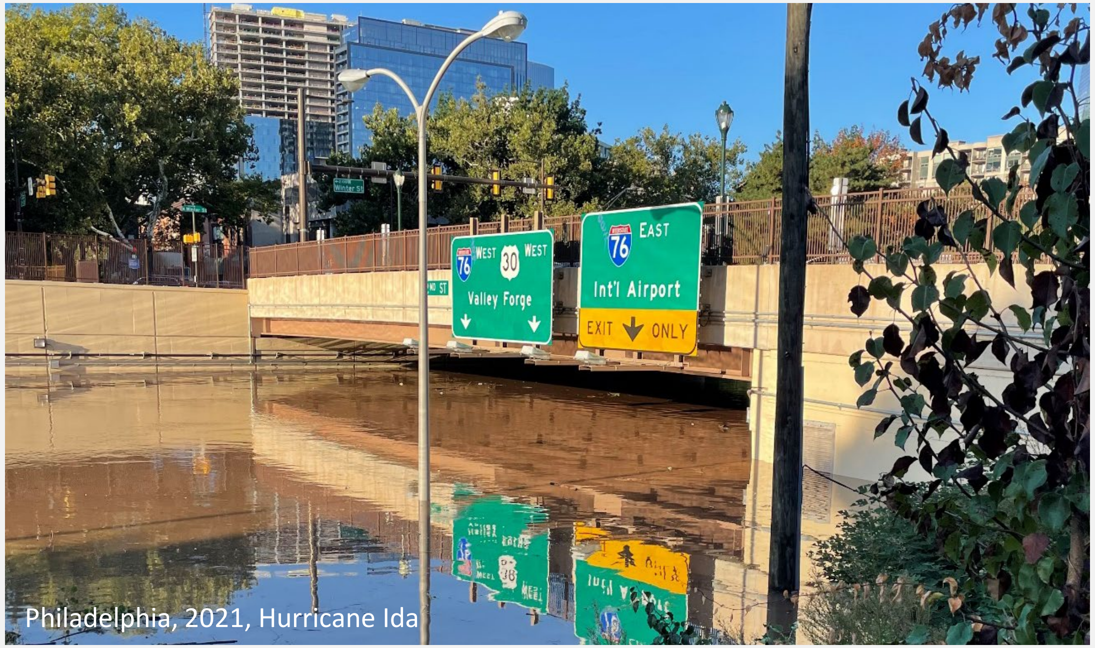
Risks associated with increasingly intense precipitation include:

Water quality impacts

- Increased stormwater runoff and pollutant loadings to our surface drinking water supplies, the Schuylkill and Delaware Rivers
- Increased collection system capacities issues, which can lead to localized flooding and combined sewer overflows

Flooding

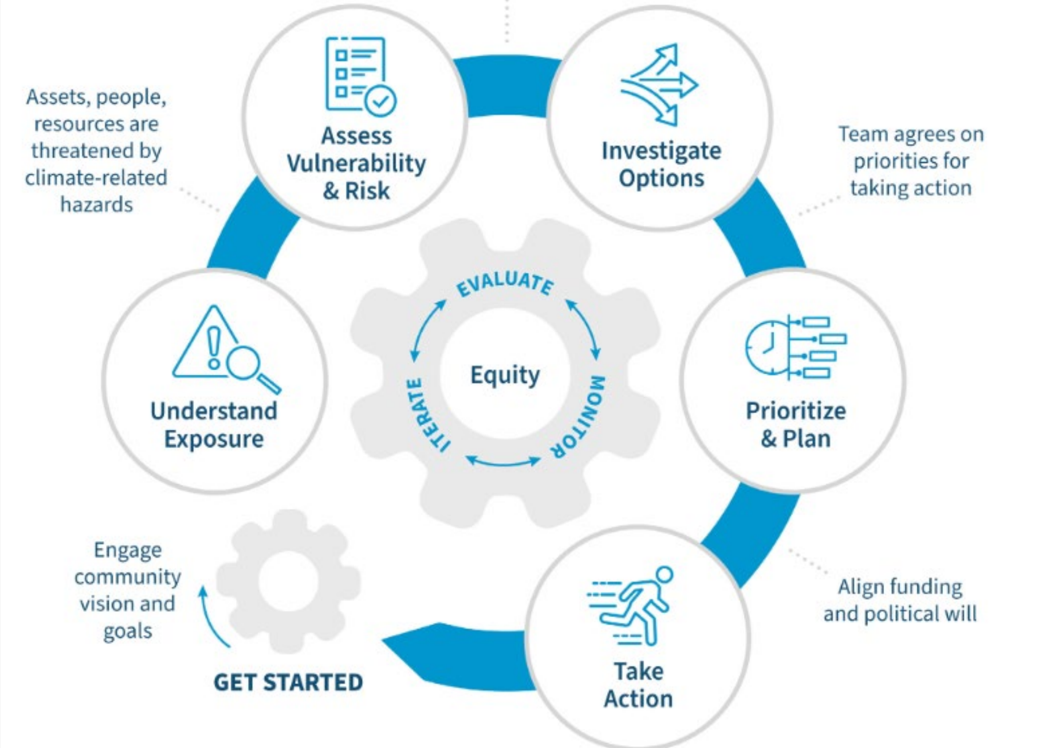
- Localized flooding (infrastructure-based/urban/inland)
- Riverine flooding damaging critical assets



Philadelphia, 2021, Hurricane Ida

What is PWD Doing?
Key risk management strategies

1. Continued investment in actionable climate science
2. Mainstreaming climate science
3. Exploring new / innovative approaches (yesterday's solutions are not adequate to address tomorrow's problems)
4. Employing adaptive planning & design practices



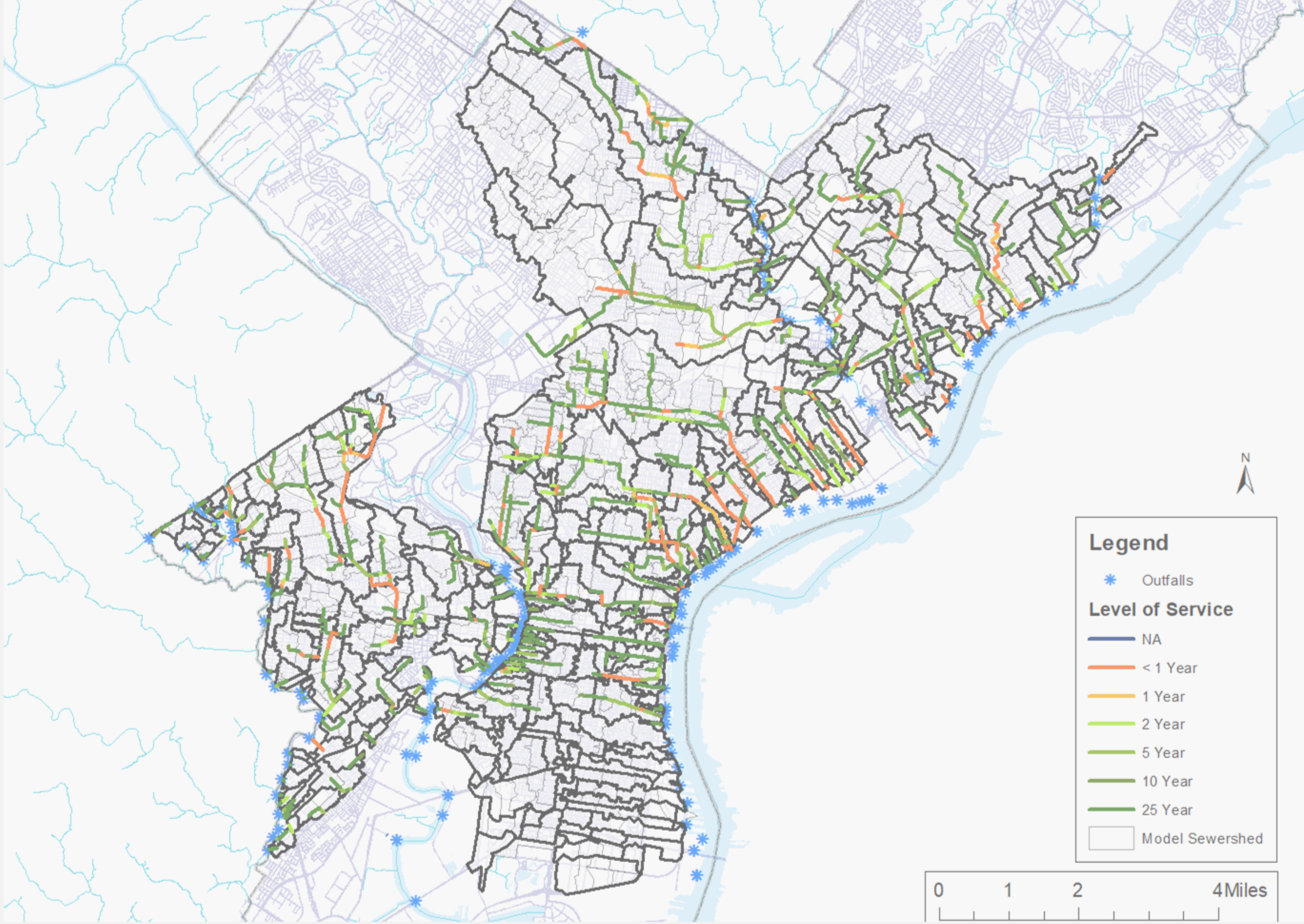
Implementing the Steps to Resilience: a Practitioner's Guide, NOAA 2022

July 11th Microburst: 1,000 Year Event

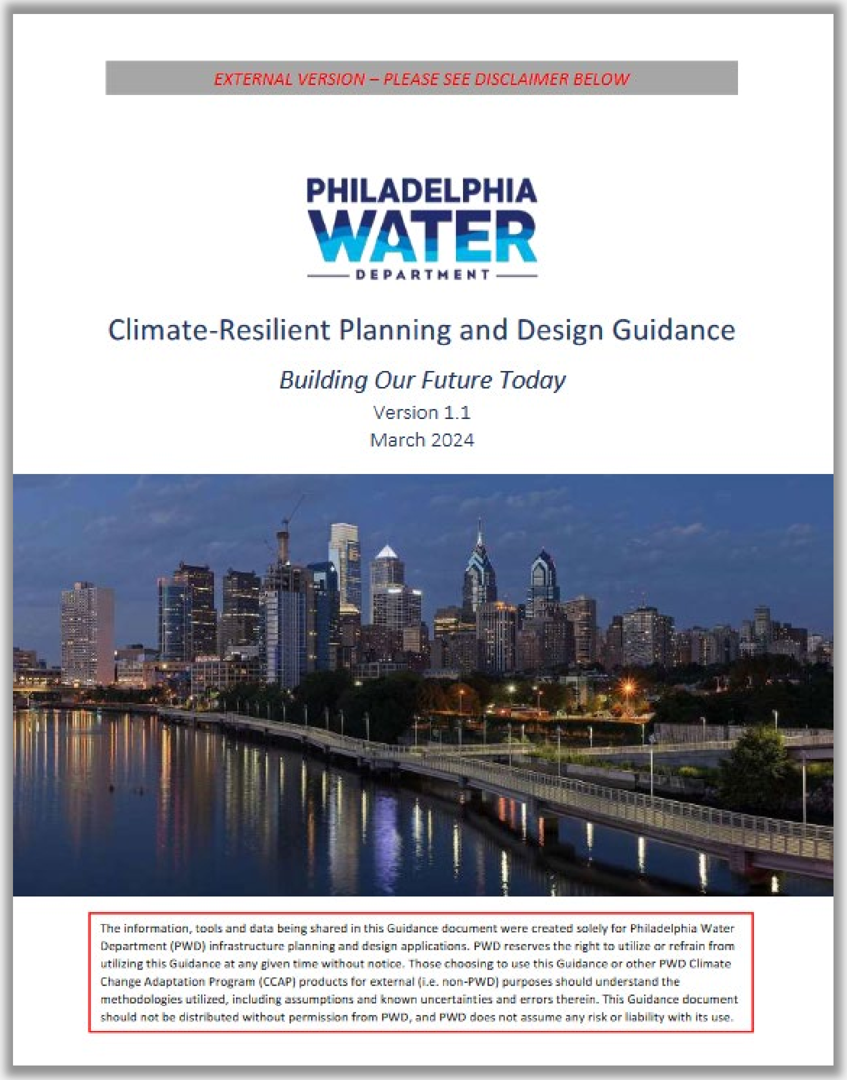
Photos courtesy of @whitneylatelyxxoo

Drainage system level of service

- PWD Design Storm was not formalized until 1915
- Majority of Trunk Sewers constructed before 1915
- Level of service varies between less than 1-year up to 25-year design storm



Strategy #1:
Continue investing in actionable climate science



EXTERNAL VERSION – PLEASE SEE DISCLAIMER BELOW

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Climate-Resilient Planning and Design Guidance

Building Our Future Today

Version 1.1

March 2024

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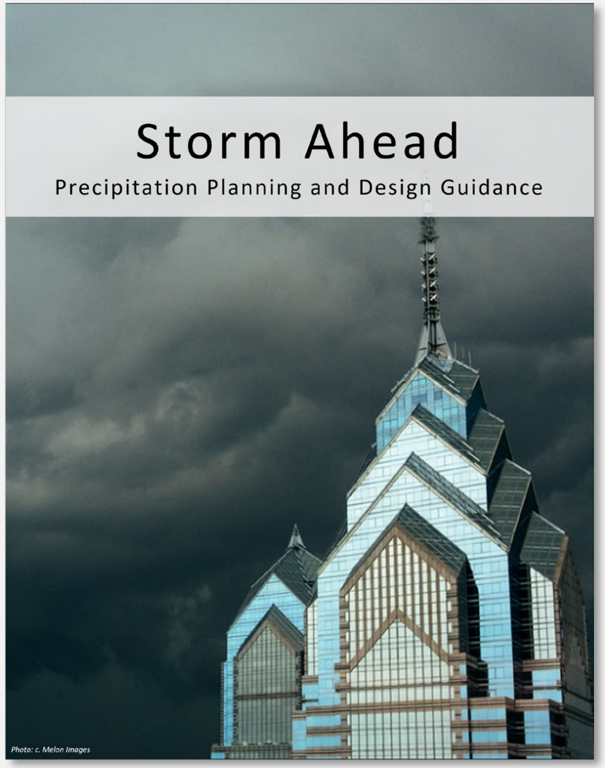
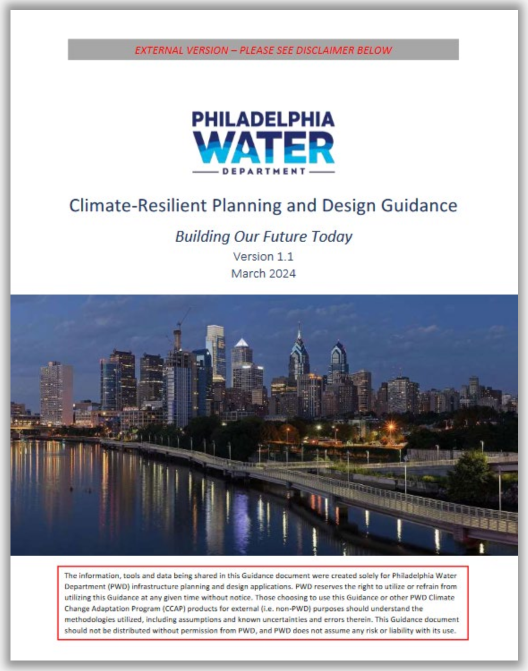
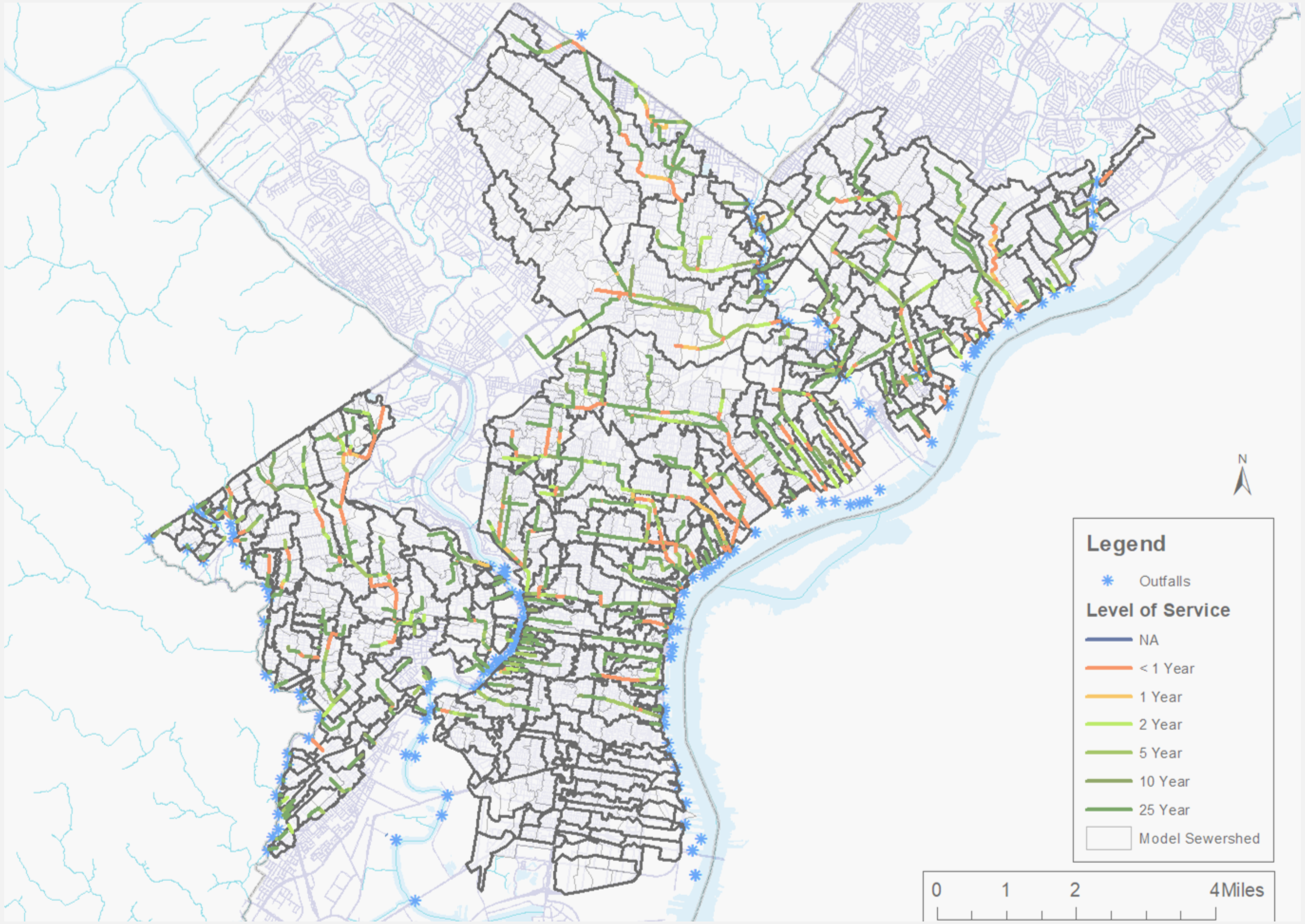


Available online!
https://water.phila.gov/wp-content/uploads/files/climate-resilient-guidance.pdf

Strategy #2: Mainstream climate science



Branch sewers currently being designed for end-of-century 5-year PWD Design Storm



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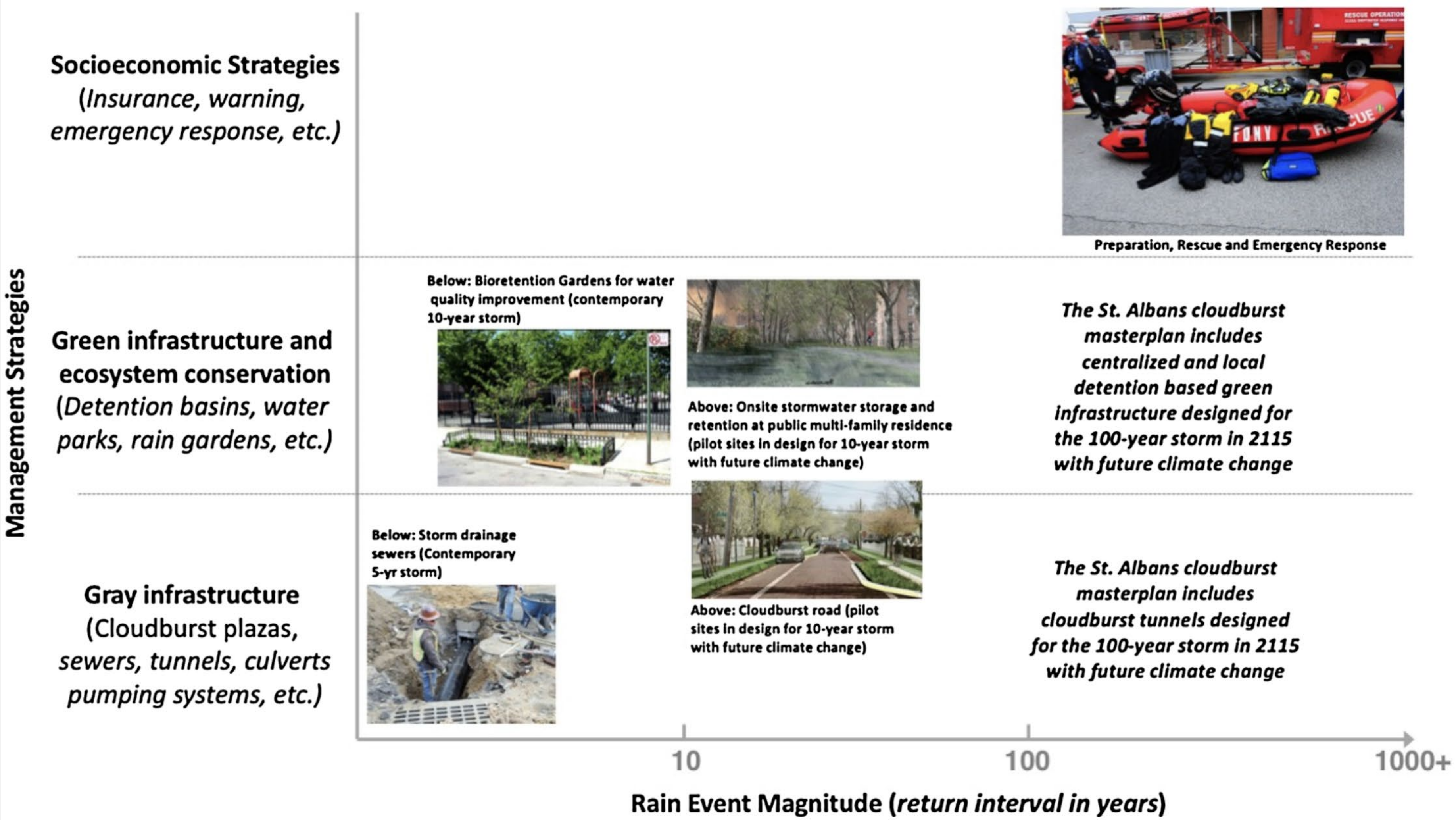
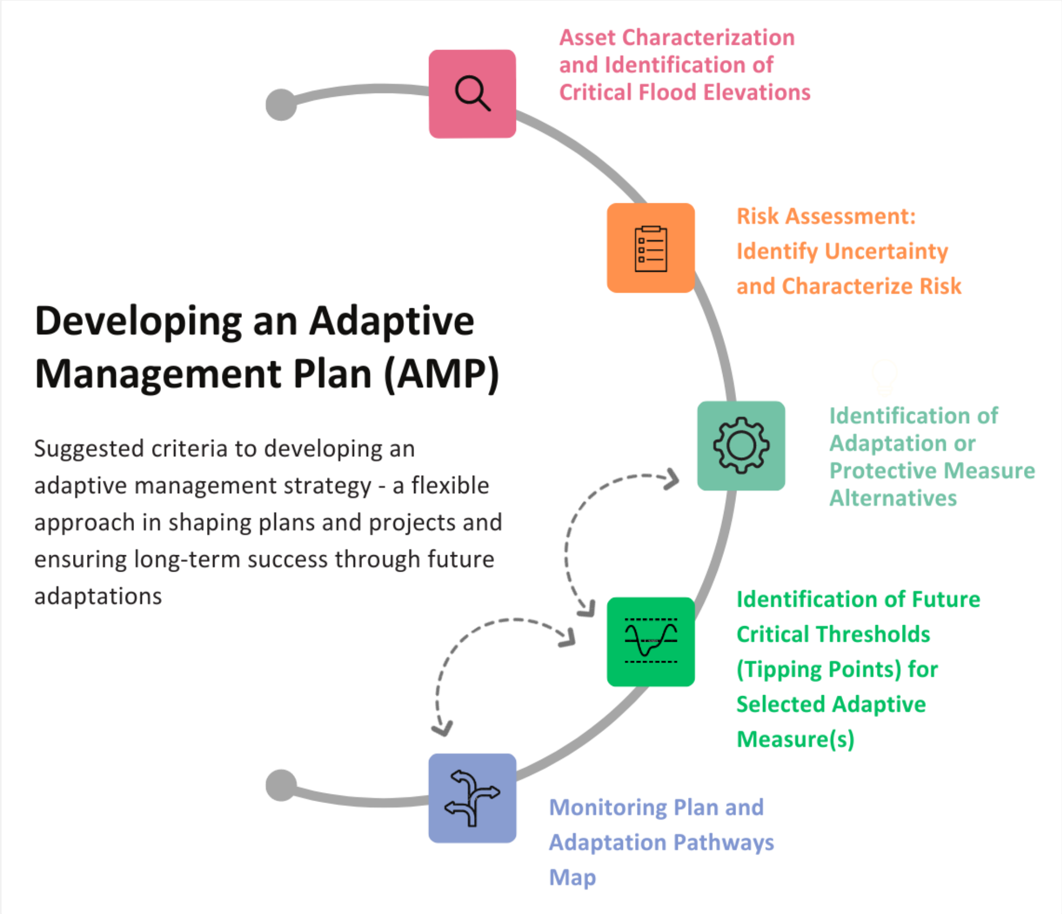
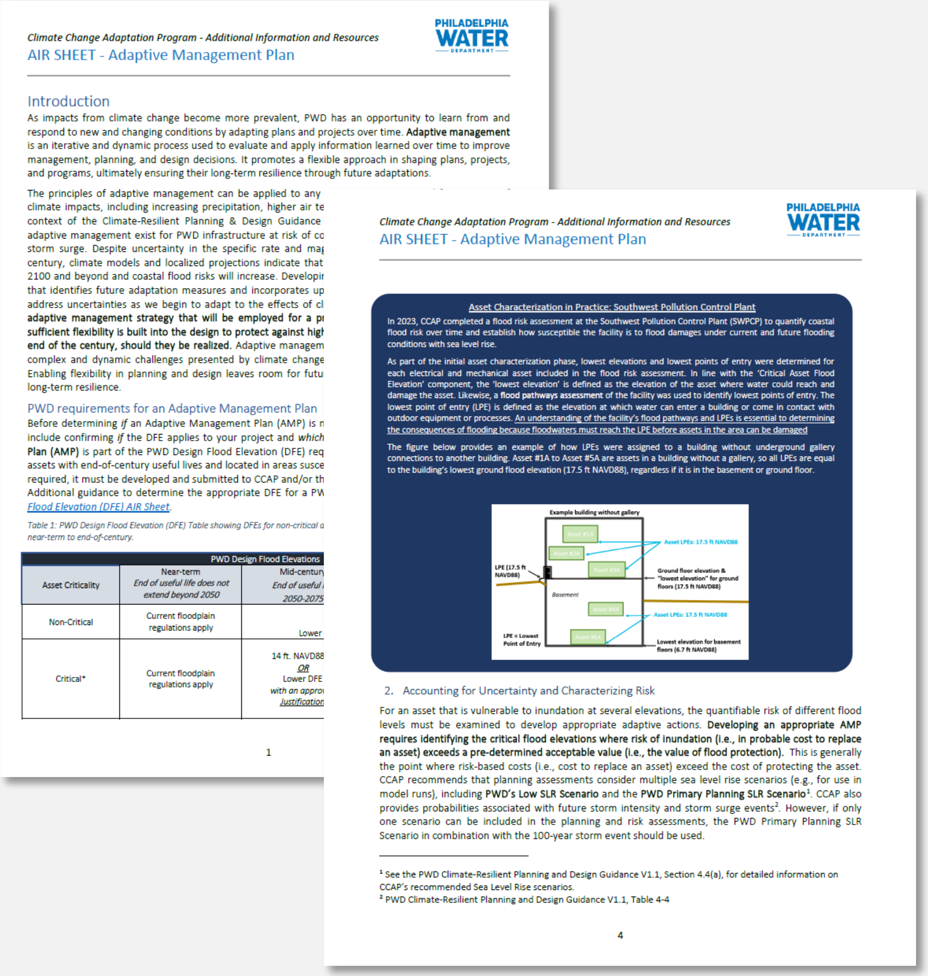
Strategy #3: Explore new/innovative approaches



Rosenzweig, B., et al. (2019). Developing knowledge systems for urban resilience to cloudburst rain events. *Environmental Science & Policy, 99*, 150–159. https://doi.org/10.1016/j.envsci.2019.05.020

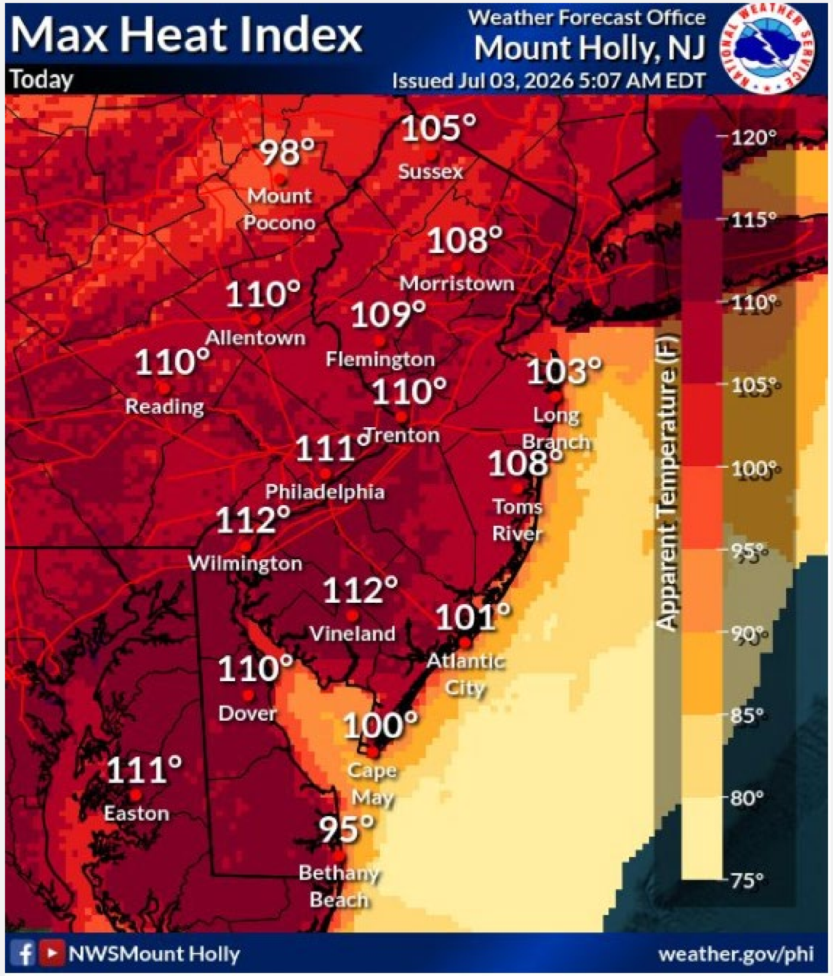
Strategy #4: Employ adaptive planning





*Adaptive management acknowledges that **flood mitigation measures can be installed at facilities incrementally over time**, as new information about climate patterns becomes known.*

Extreme Heat Risks



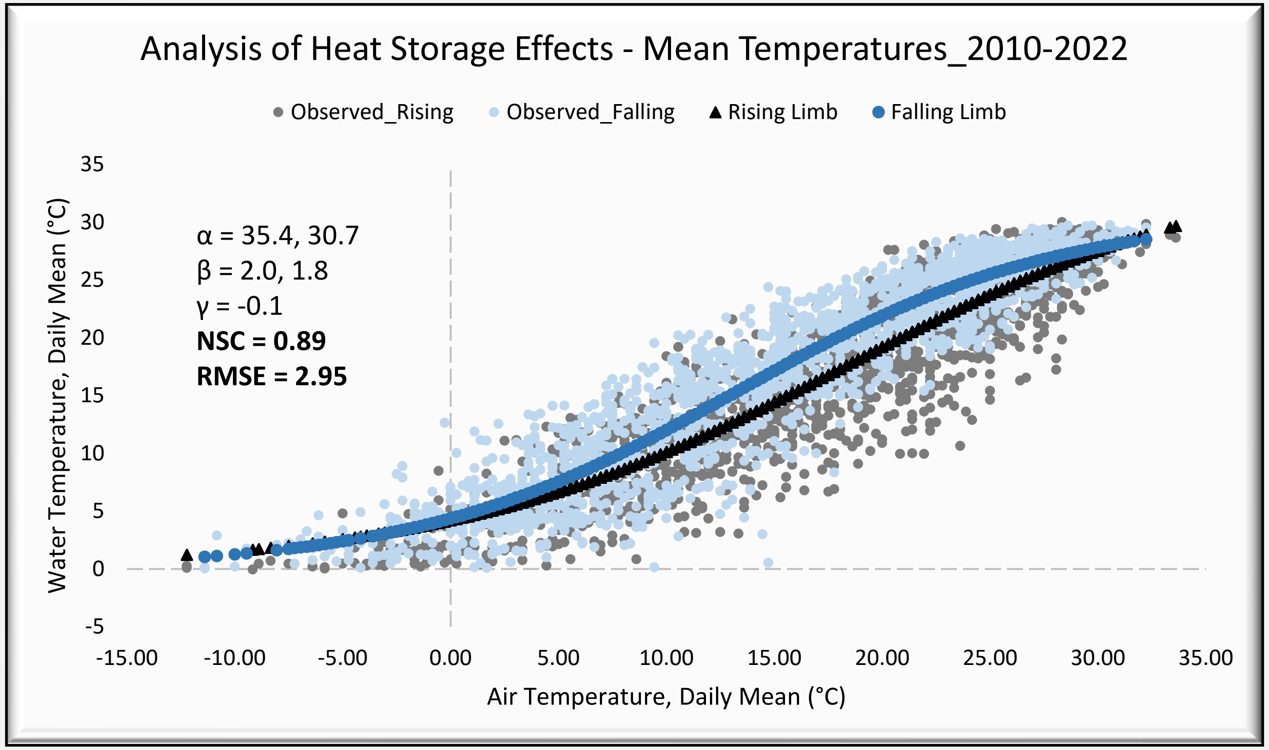
Water quality impacts
Worker health and safety

Delaware & Schuylkill River Air/Water Temperature Analyses

Analysis

- Projected Delaware and Schuylkill River temperature increases
- Nonlinear air-water temperature relationships
- Seasonal hysteresis between warming and cooling periods

Air-Water Temperature Analysis, Delaware River



Potential Applications / Impacts

- Dissolved oxygen levels
- Algal growth / eutrophication
- Bacteria decay
- Disinfection byproduct formation
- Water quality modeling & long-term treatment planning

Learning from our Peers – WUCA Heat Impact Case Studies

OSHA Heat-Index Associated Risk Levels

Heat Index	Risk Level	Protective Measure
Less than 91°F	Lower (Caution)	Basic heat safety and planning
91° to 103°F	Moderate	Implement precautions and heighten awareness
103° to 115°F	High	Additional precautions to protect workers
Greater than 115°F	Very High to Extreme	Triggers even more aggressive protective measures

Heat Index	**Observed PHL Airport** 1995-2014	**GCM RCP4.5 Near-Term** 2030-2049	**GCM RCP8.5 Near-Term** 2030-2049	**Risk Level (OSHA)**
Days per year between 80°F to 90°F	77	71	68	Lower (Caution)
Days per year between 91°F to 103°F	31	46	50	Moderate
Days per year between 103°F to 115°F	3	9	11	High
Days per year greater than 115°F	0	0	0	Very High to Extreme
Total days per year greater than 80°F	111	126	129	Low to Extreme

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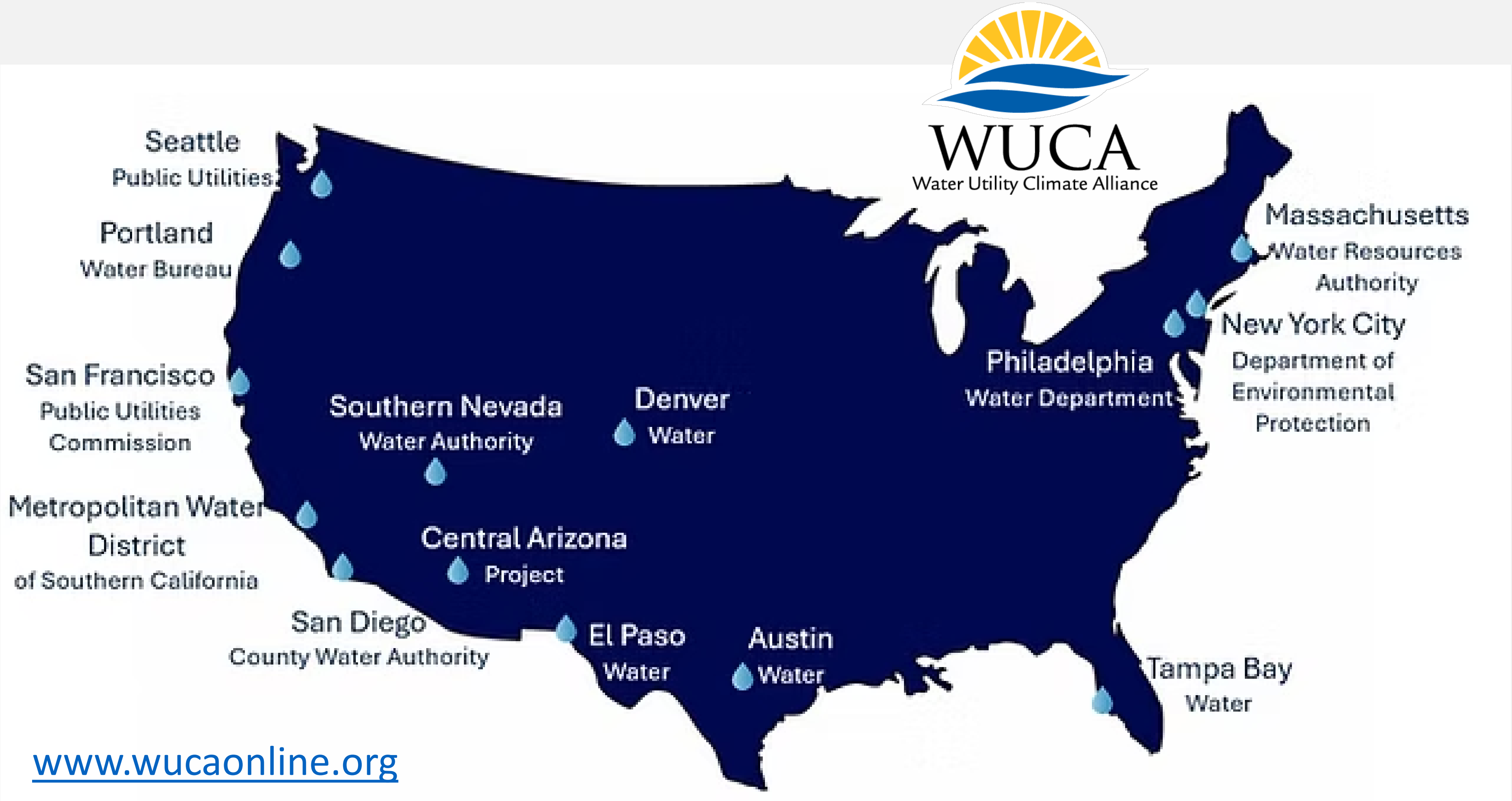
WUCA

Climate Adaptation is a Shared Challenge



www.wucaonline.org

Photos courtesy of @whitneylatelyxxoo

Thank you!

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