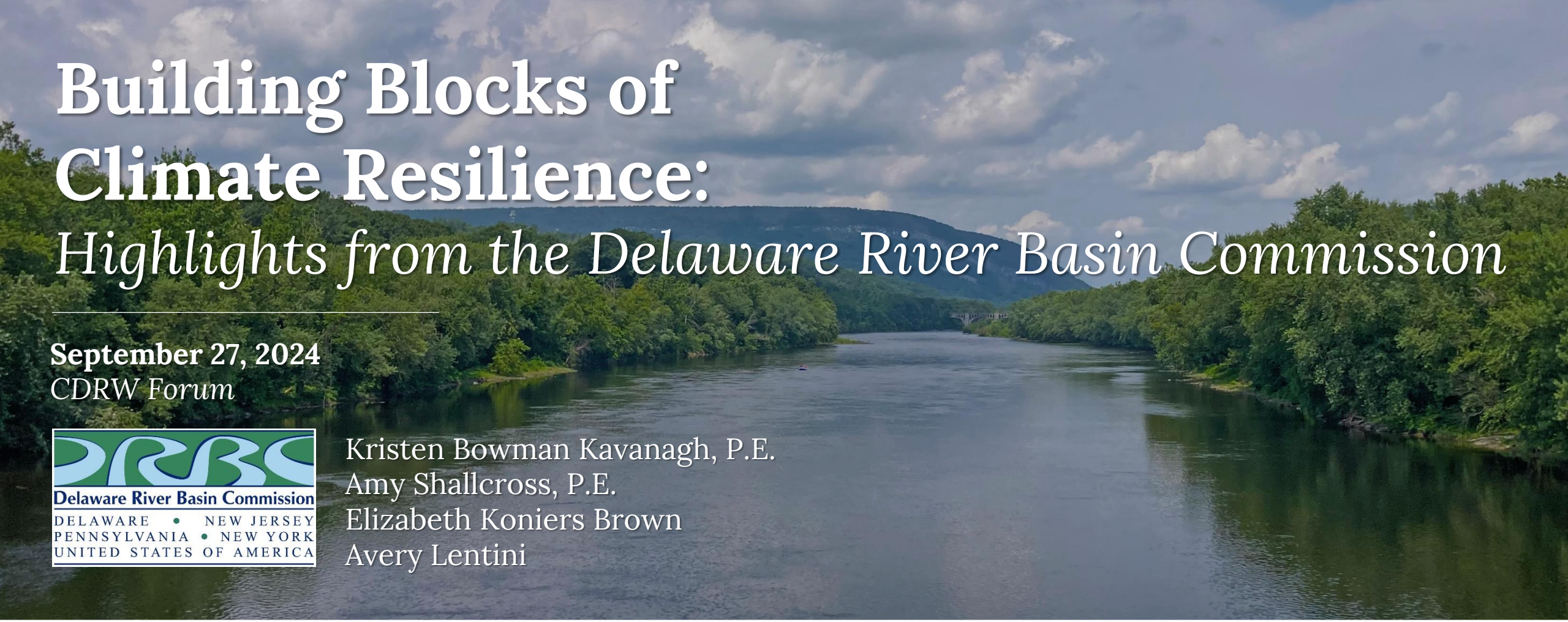

Building Blocks of Climate Resilience:

Highlights from the Delaware River Basin Commission

September 27, 2024
CDRW Forum

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
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Kristen Bowman Kavanagh, P.E.
Amy Shallcross, P.E.
Elizabeth Koniers Brown
Avery Lentini

Coalition *for the* Delaware River Watershed

12th Annual Delaware River Watershed Forum

What's next for the watershed.

Thank you Sponsors: WILLIAM PENN FOUNDATION

Housekeeping

- Please turn phones on silent
- Take care of your needs!
  - Feel free to use the restroom/get water as needed
  - If you need more transition time between sessions, feel free to leave when needed
- If you haven't yet, please download our event app! Search for CVENT in app store or scan the QR code posted around the event site
  - The app houses all important Forum info including upcoming sessions and room locations
- Staff hosts are available if you need anything!

Coalition *for the* Delaware River Watershed

Meet Your Presenters

Kristen Bowman Kavanagh
Deputy Executive Director
Kristen.B.Kavanagh@DRBC.gov

Beth Brown
Director, External Affairs & Communications
Elizabeth.Brown@DRBC.gov

Amy Shallcross
Manager, Water Resource Operations
Amy.Shallcross@DRBC.gov

Avery Lentini
Community Engagement Specialist
Avery.Lentini@DRBC.gov

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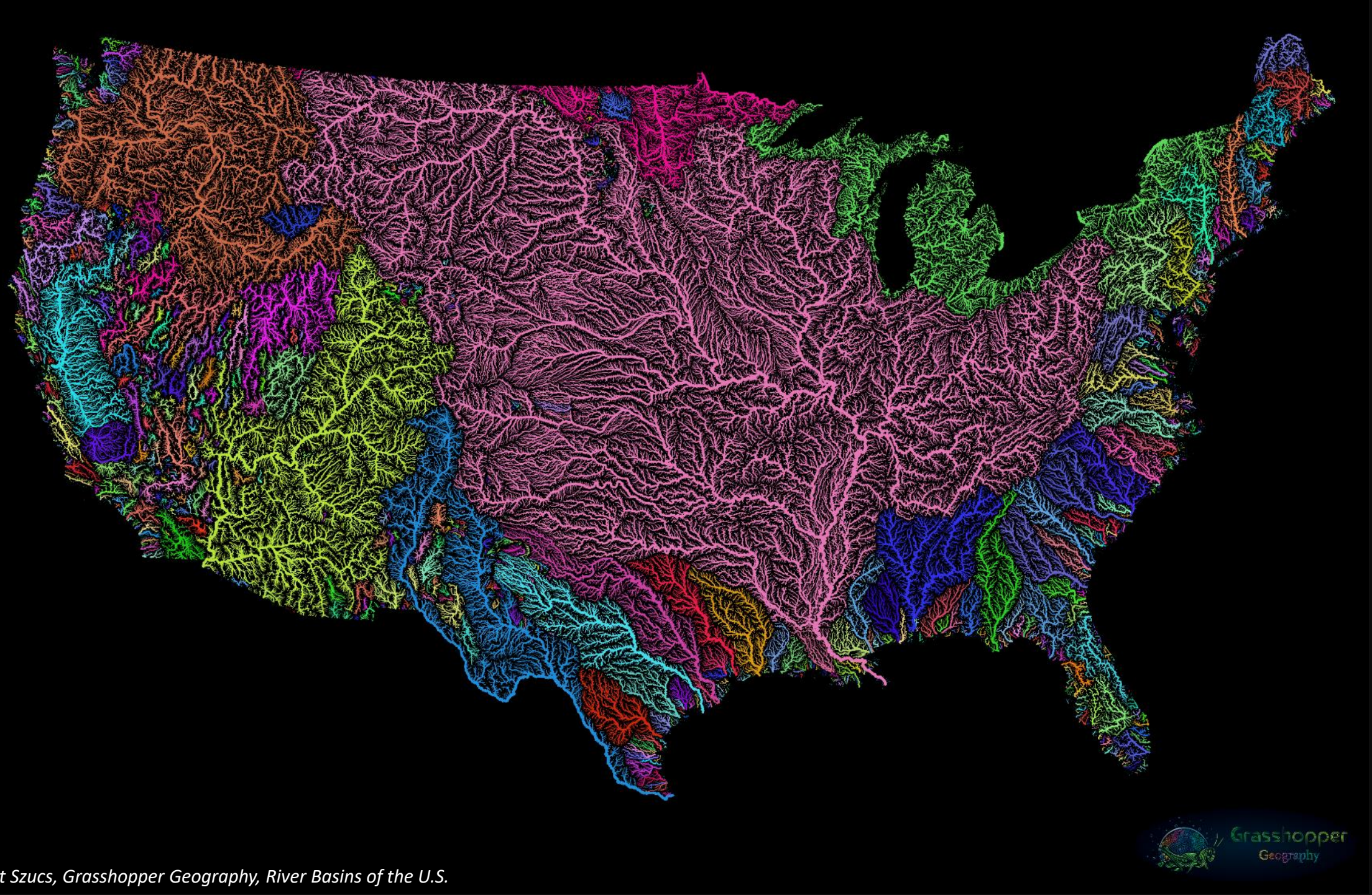

Credit: Robert Szucs, Grasshopper Geography, River Basins of the U.S.

The Delaware River Basin Commission is a federal-interstate Compact agency established in 1961.

Our Mission

Manage, protect, and improve the water resources of the Delaware River Basin.

Our Vision

Provide trusted, effective, and coordinated management of the Basin's shared water resources.

Delaware River Basin Compact Basic "Charges" include planning through regulation.

A Comprehensive Plan administered by a basin wide agency will provide:

- abatement and **control of stream pollution;**
- conservation and development of ground and surface **water supply**…;
- development of **recreational facilities;**
- propagation of **fish and game;**
- promotion of related…**watershed projects;**
- protection to **fisheries…;**
- development of **hydroelectric power;**
- **control of movement salt water**;
- **flood damage reduction**;
- and **regulation** towards the attainment of these goals.

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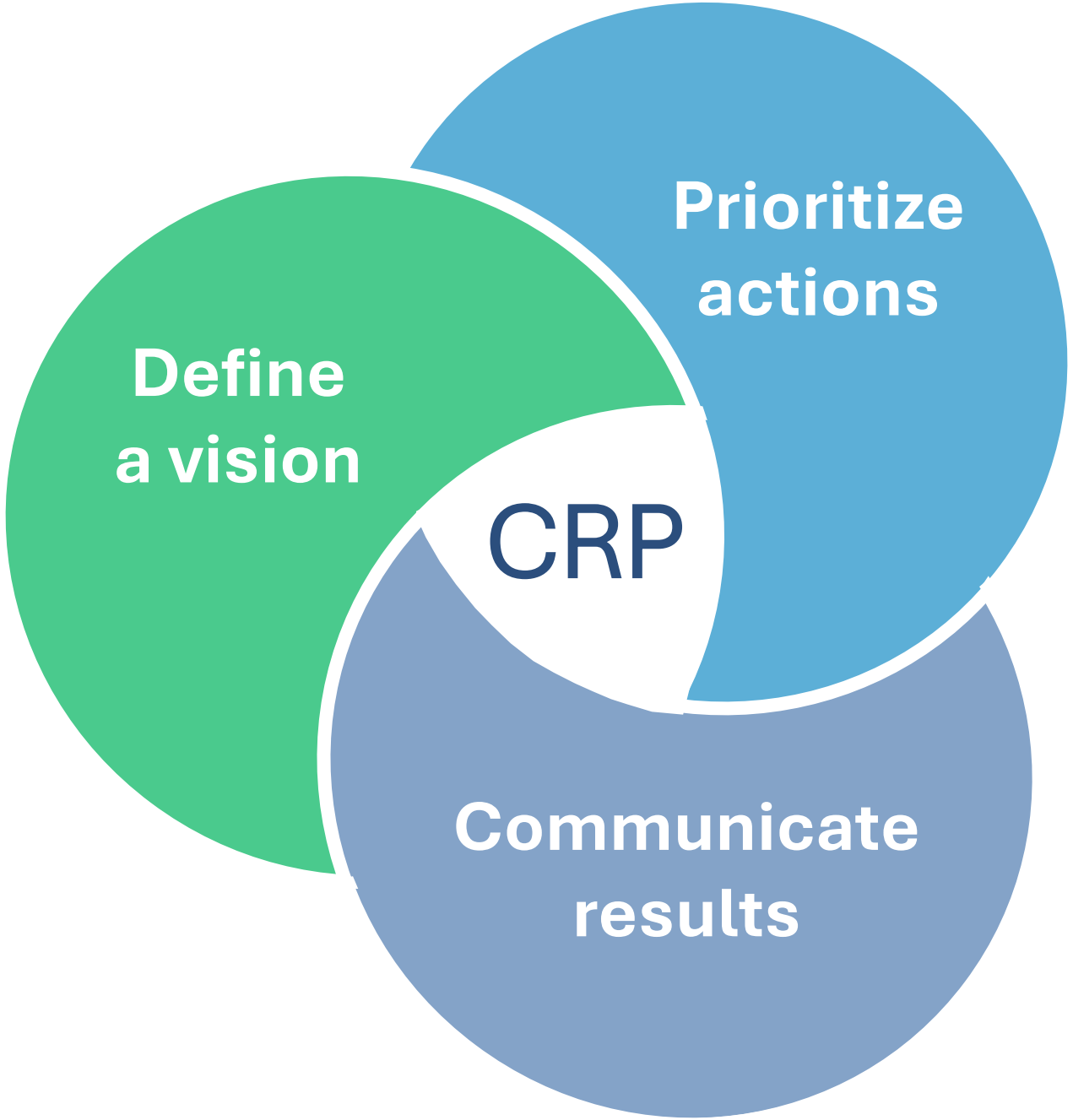

DRBC's climate resilience plan will **coordinate, guide, and expand ongoing and future work**

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Parallel processing: Planning and implementation

Resilience Team

Climate resilience plan framework

- Define vision, goals, and metrics
- Outline next steps

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Parallel processing: Planning and implementation

Resilience Team

Climate resilience plan framework

Vulnerability assessment & gap analysis

- What information do we have? What information do we need?
- Prioritized list of actions

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Parallel processing: Planning and implementation

Resilience Team

Climate resilience plan framework

Vulnerability assessment & gap analysis

Revise, update, re-evaluate

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Parallel processing: Planning and implementation

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Climate resilience plan framework

Vulnerability assessment & gap analysis

Revise, update, re-evaluate

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Staff continue ongoing climate-related work

Commission takes additional actions as identified in CRP

Modeling Basin-Scale Conditions

Technical Tools

Outreach and Communications

Public Policy and Engagement

Building Block: Modeling Basin-Scale Conditions

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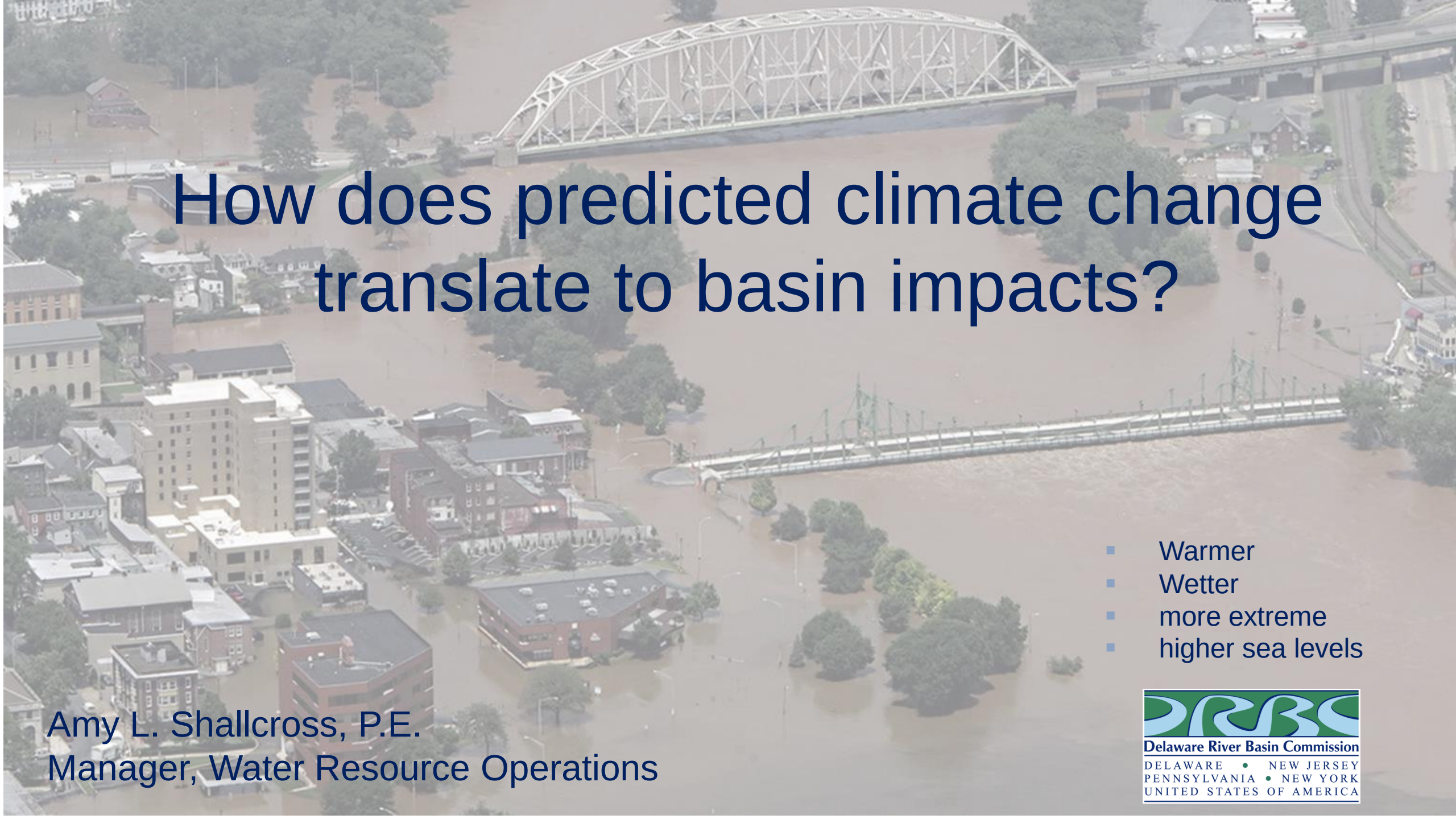

How does predicted climate change translate to basin impacts?

- Warmer
- Wetter
- more extreme
- higher sea levels

Amy L. Shallcross, P.E.
Manager, Water Resource Operations

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The question determines the tools

Will the drought management plan still be effective?

The tale of two cities, a state, and drinking water supplies

DRBC Drought Management

- Protect water supplies
  - NYC
  - Philadelphia
  - NJ (Central, SW)
- Repel salinity (Flow Objectives)
  - Montague from NYC
  - Trenton from LB Reservoirs

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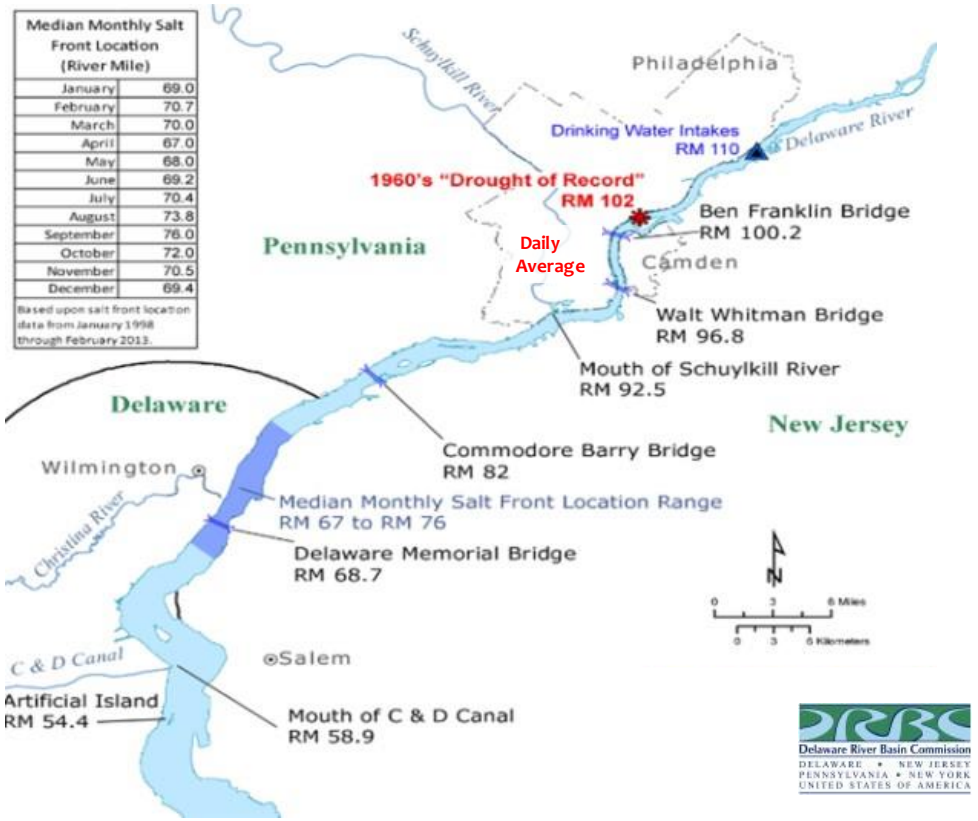
Salinity intrusion is monitored with the salt front.

Salt Front is the 7-day average 250 mg/l isochlor (chloride concentration). Used as an indicator.

Median Monthly Salt Front Location (River Mile)	
January	69.0
February	70.7
March	70.0
April	67.0
May	68.0
June	69.2
July	70.4
August	73.8
September	76.0
October	72.0
November	70.5
December	69.4

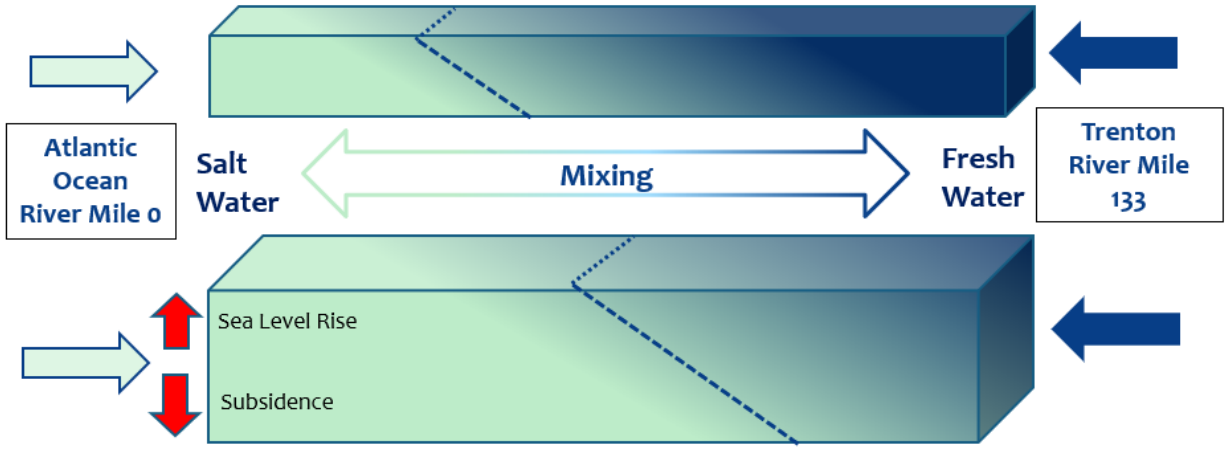
Based upon salt front location data from January 1998 through February 2013.



Approximately 0.45 ppt salinity

Risks of Sea Level Rise

Conceptual diagram of how SLR may affect the location of the salt front.



Location of the salt front depends on the ocean pushing into the bay and the freshwater flow pushing out to the ocean

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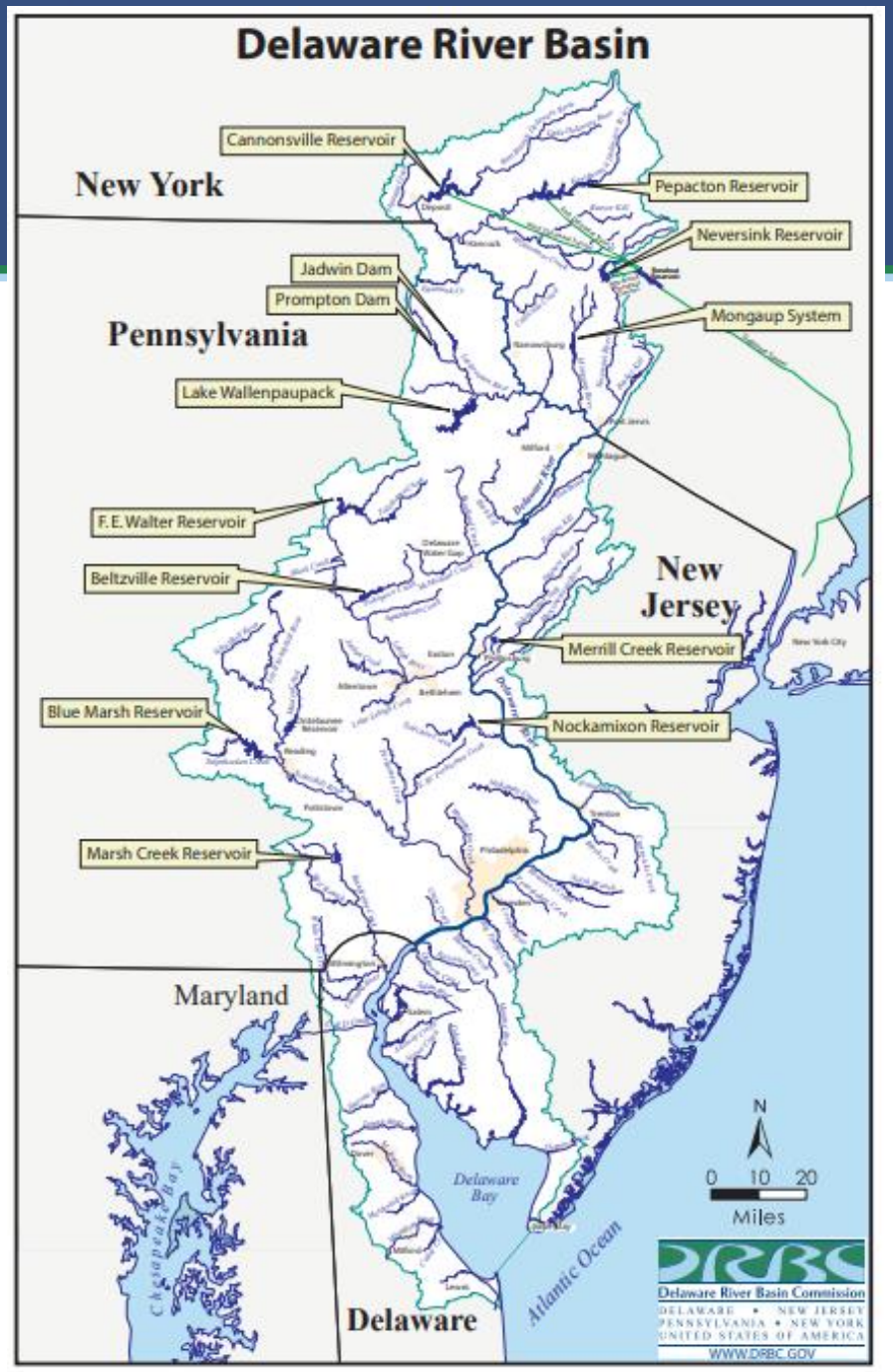
Water supplies are supported by both storage and releases.

- Store when flows are high
  - New York City water supply
  - Montague Flow Objective (NYC)
  - Trenton Flow Objective (DRBC/Federal Res.)
- Release when flows are low
  - Run-of-river water supplies (NJ, Philadelphia)
  - Salinity Repulsion



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What do we need to know?

- How far will salt travel upstream?
- How much water do we need to repel salinity, for water supply?
- Is there enough water at the right time?
- Does evaporation offset increases in precipitation?
- What happens if there is no snowpack?

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Several models are used to evaluate CC impacts

Tides/WSE

Climate

Flow

Sea Level Rise Impacts on Salinity

SM3D
Salinity Model

MDR-H/SLR
Screening
Salinity Model

Climate Change Impacts on Flow

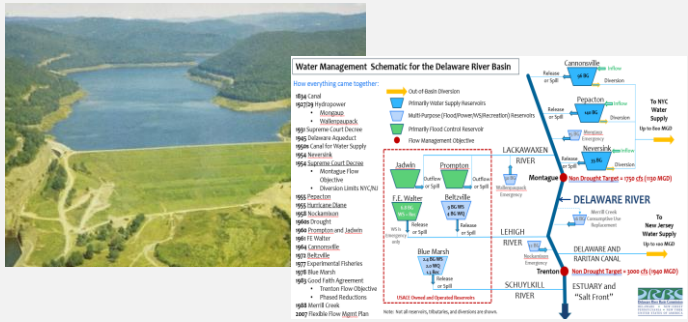
GCM/RCM
Temperature
Precipitation

Hydrologic Model

Alternatives Development, Testing, Refinement, Screening

Detailed Testing

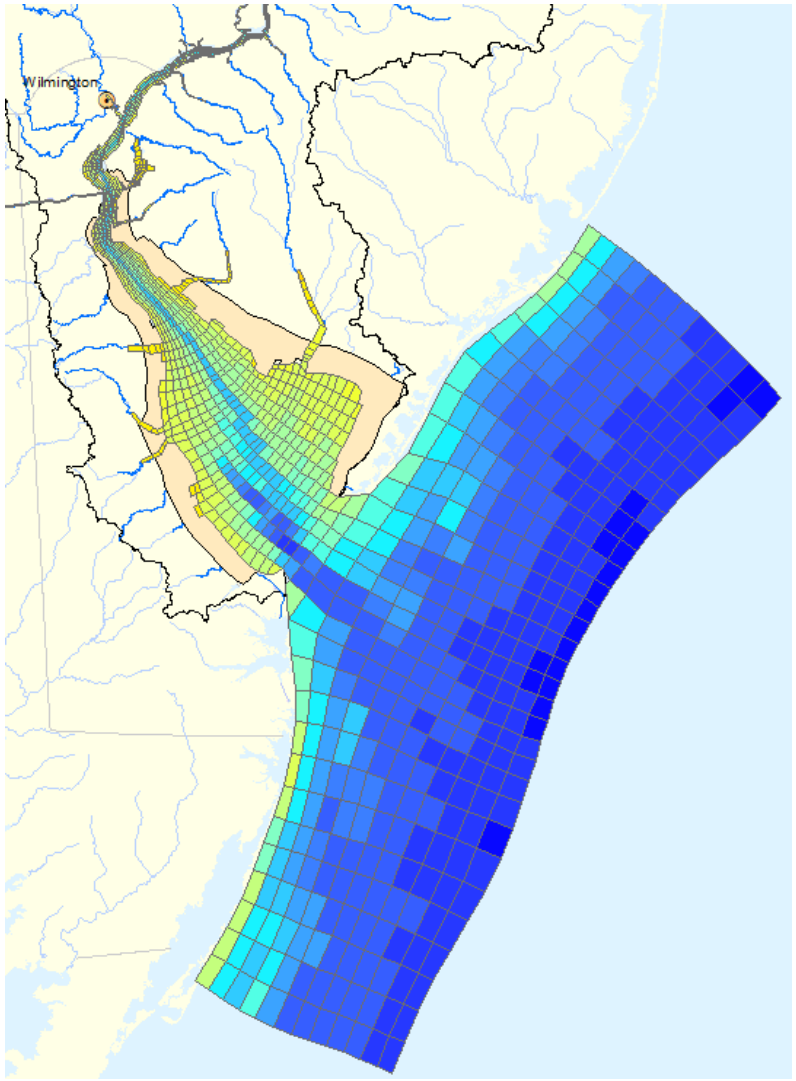
Water Resource System Model
DRB-PST
Planning Support Tool



Storage Opportunities

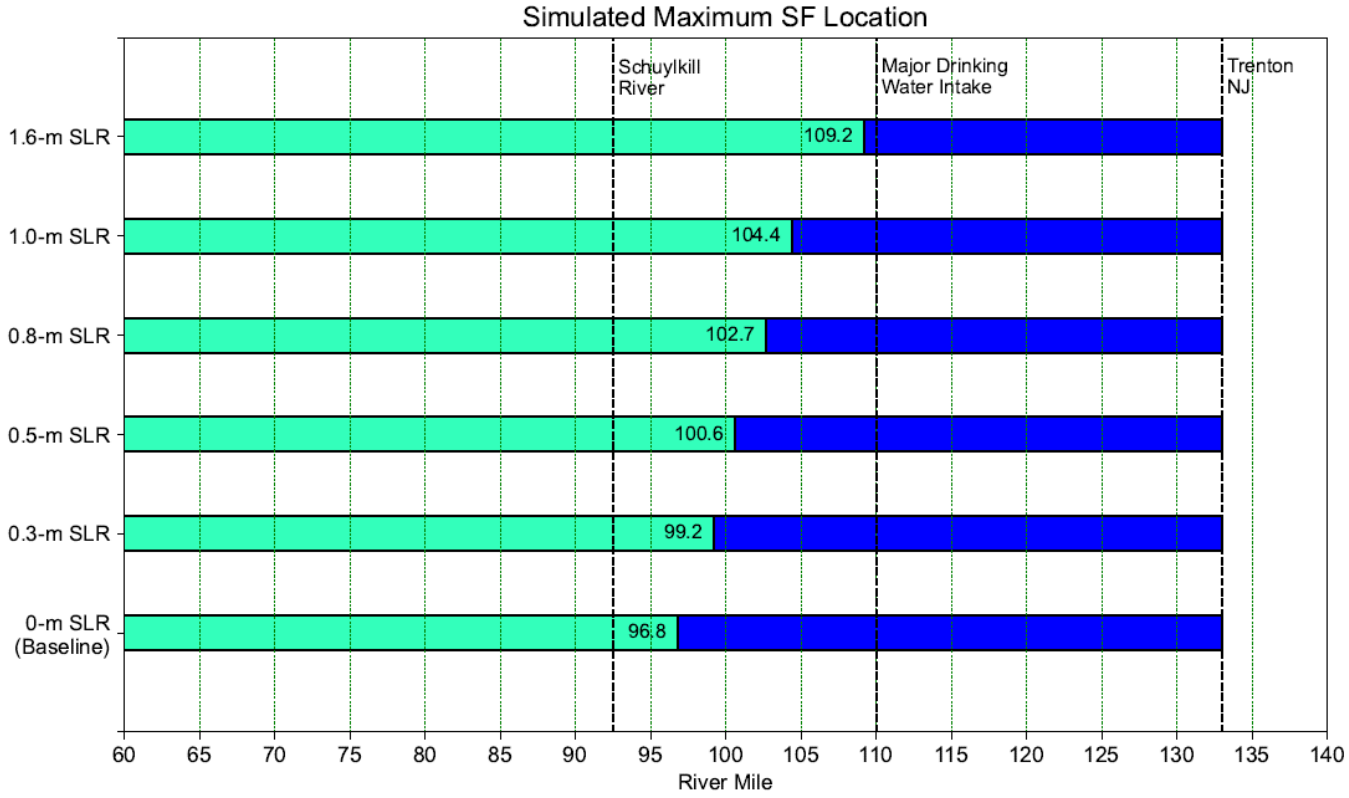
Consumptive Use Projections

Preliminary results indicate we may not be able to repel salinity.



Simulations with the three-dimensional hydrodynamic salinity model indicate that additional water may be needed for salinity repulsion.

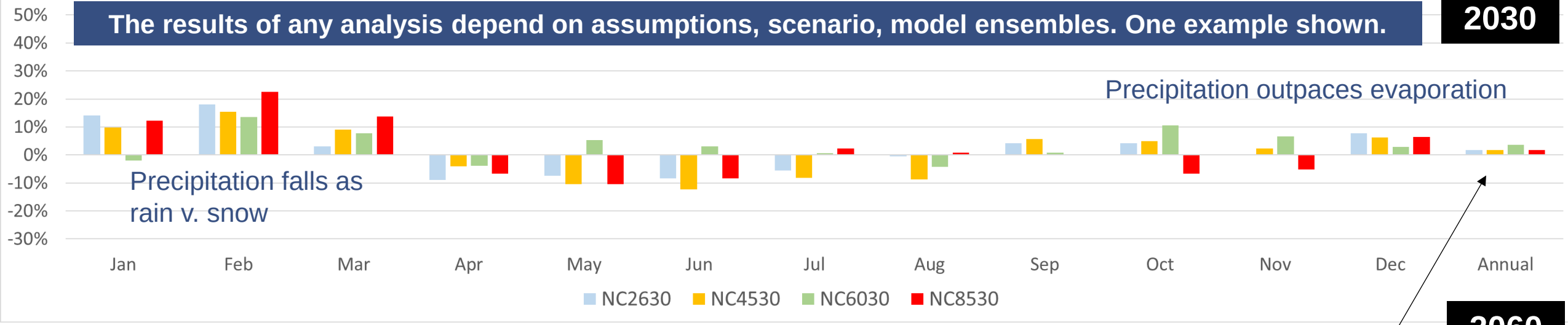
PRELIMINARY



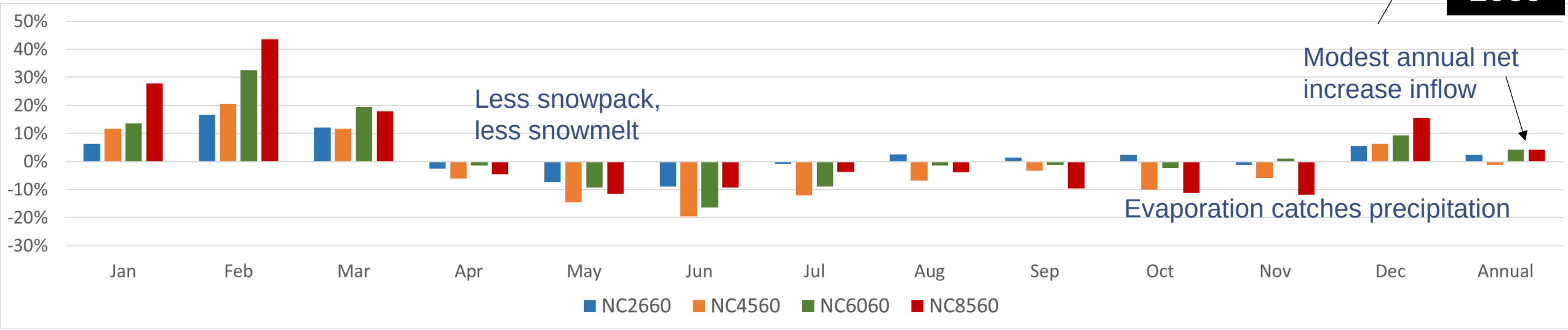
Results indicate similar flows at different times

The results of any analysis depend on assumptions, scenario, model ensembles. One example shown.

2030



2060



Different tools and models are needed to evaluate different types of impacts

- Three-dimensional salinity model
  - Extent of intrusion
  - Water needed for repulsion
- Rainfall-runoff model
  - Available water/seasonality
  - Frequency of extremes
- Reservoir and river model
  - Adequacy of supply
  - Efficiency

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Building Block: Technical Tools

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Select By: County | Municipality | HUC 12

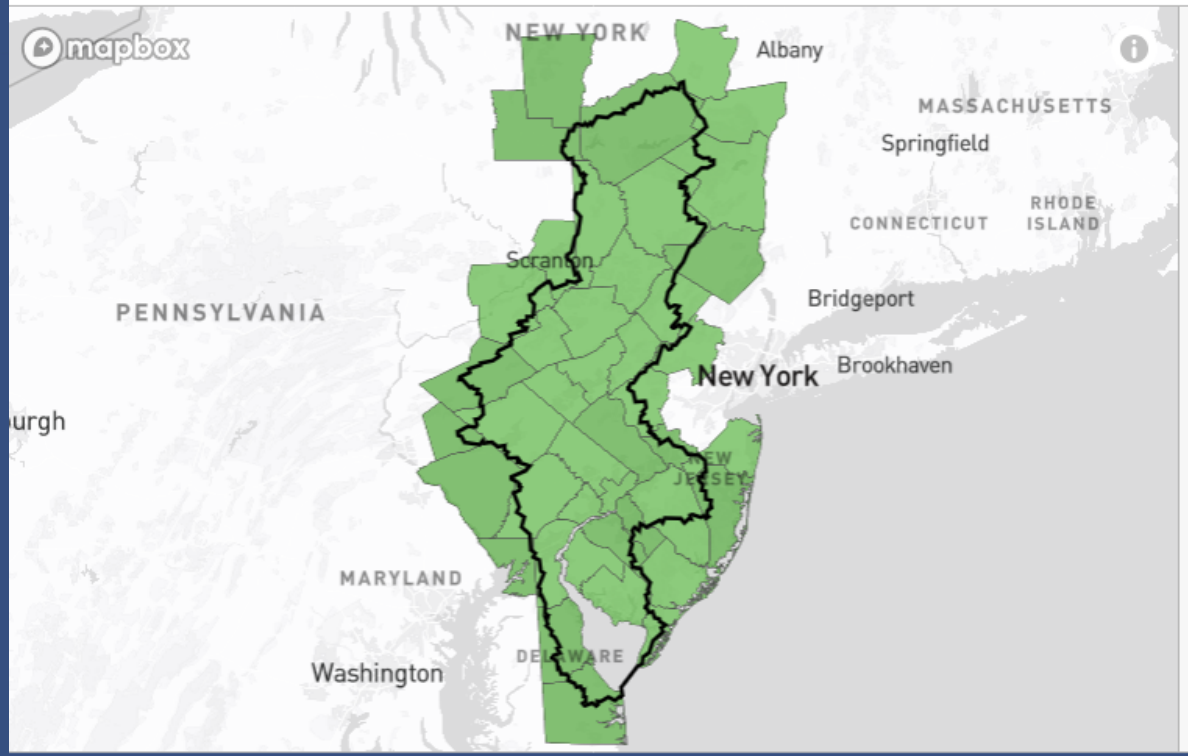
Emission Scenario: Low RCP 4.5 | High RCP 8.5

Time Period: 2020-2069 | 2050-2099

Annual Exceedance Probability: 50% | 20% | 10% | 4% | 2% | 1%

Change Factor
0.90 1.00 1.10 1.20 1.30 1.40 1.50

User Guide | **IDF Curve** | **About the Data**



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Choosing Options

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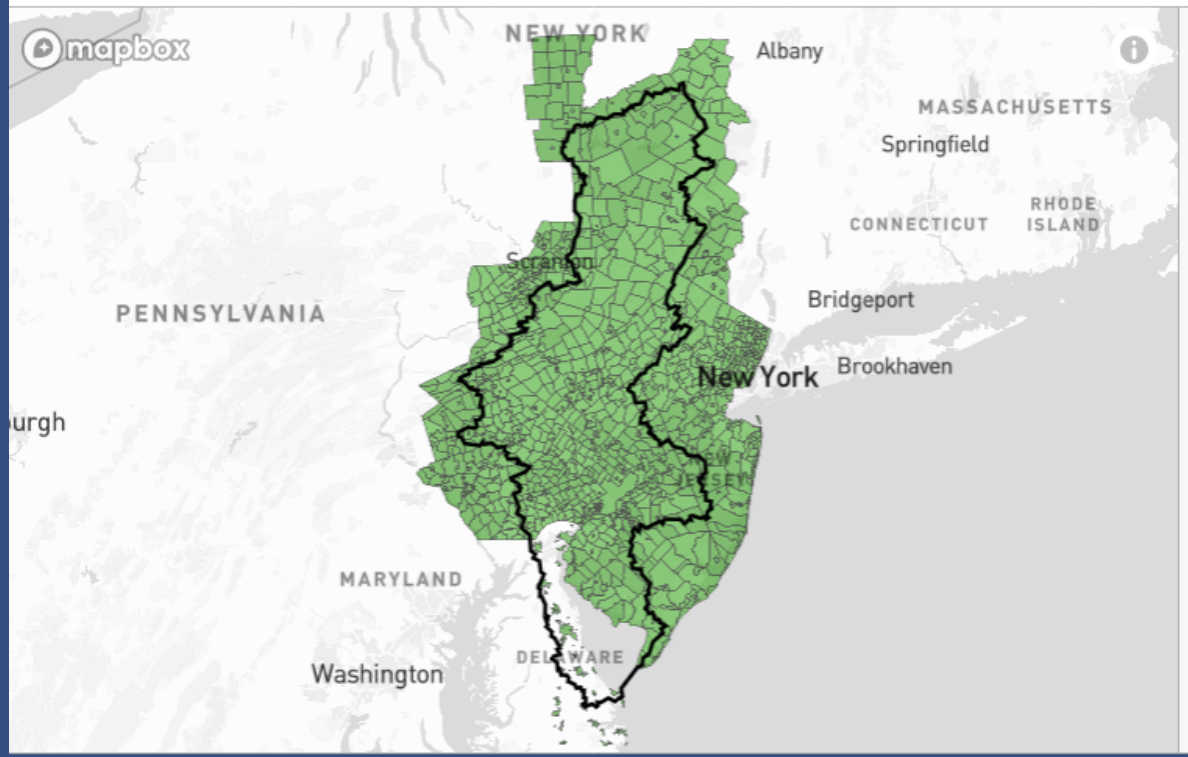

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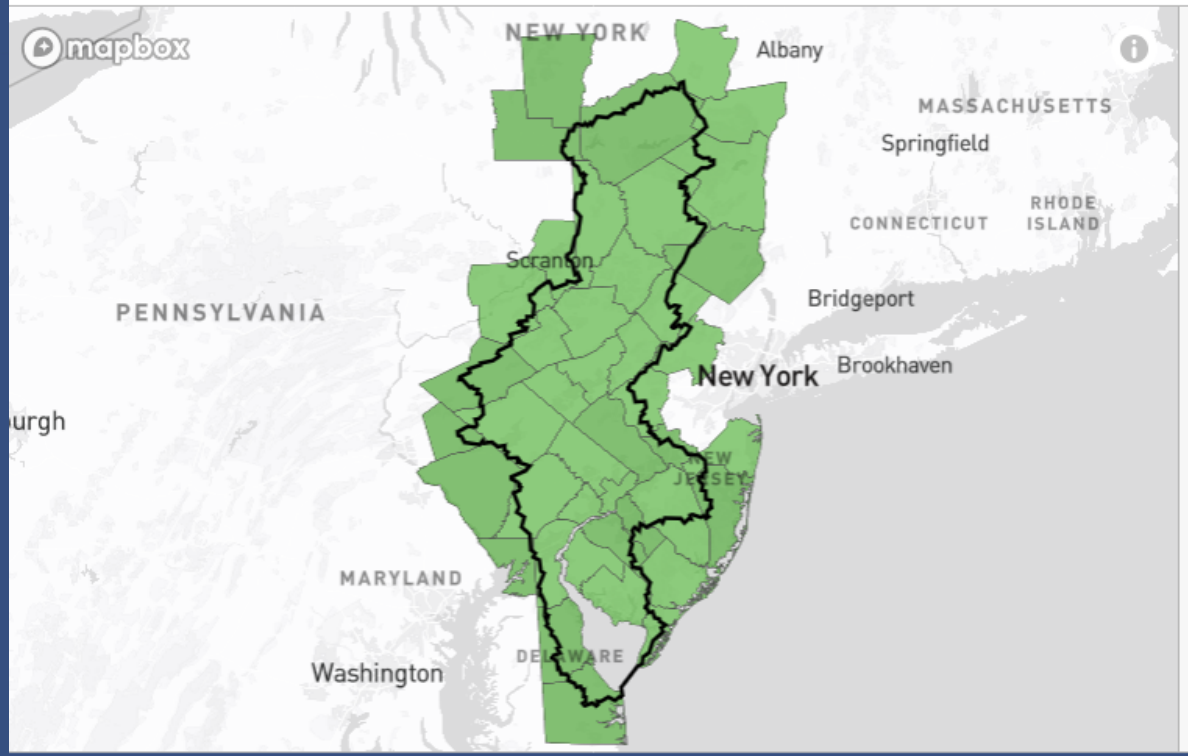

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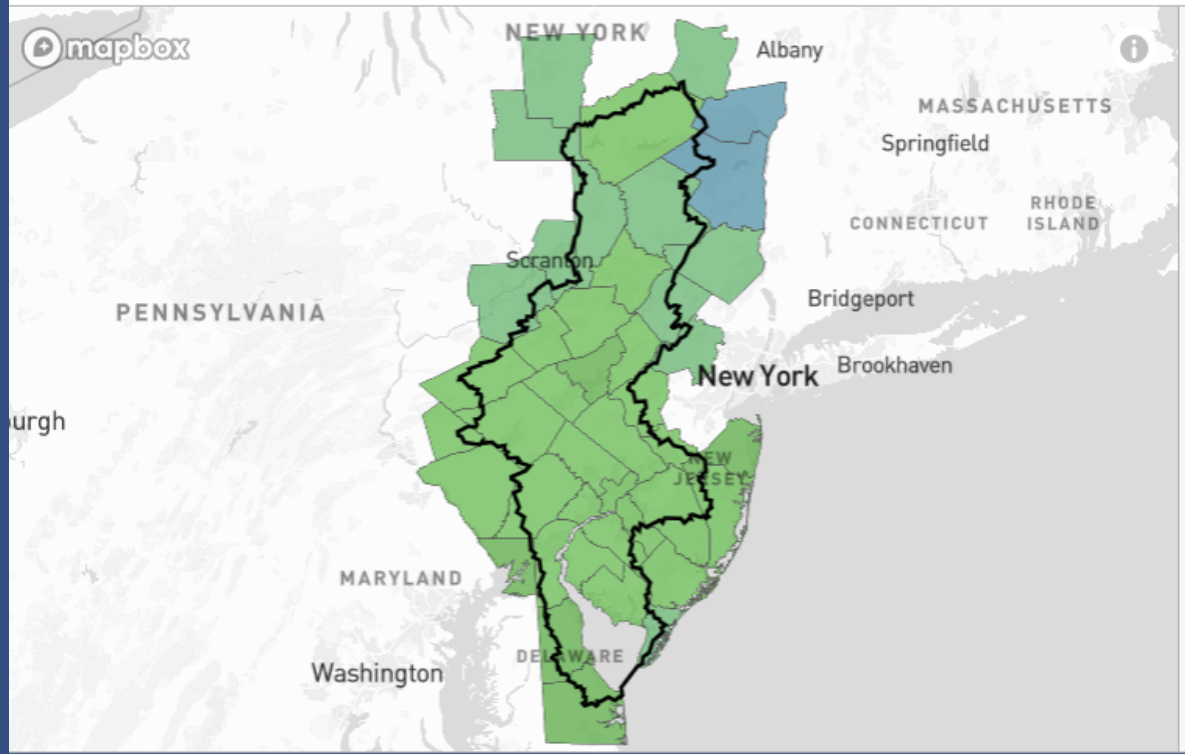

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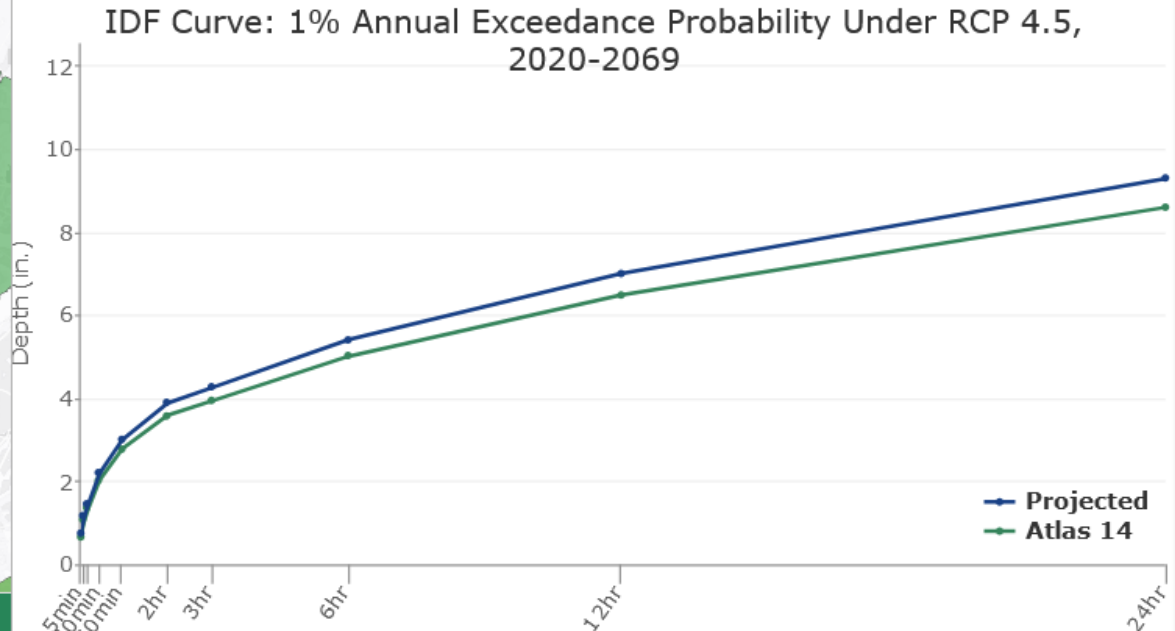
Change Factors by Percentile for County: Lehigh, PA

10th	17th	25th	Median	75th	83rd	90th
0.93	0.96	0.99	1.08	1.17	1.20	1.24



EXCEL | PDF

Toggle Confidence Intervals

Powered by NRCC

Duration	Projected Precipitation (inch) Median	Atlas 14 Precipitation (inch) Median
5min	0.73	0.68
10min	1.16	1.07

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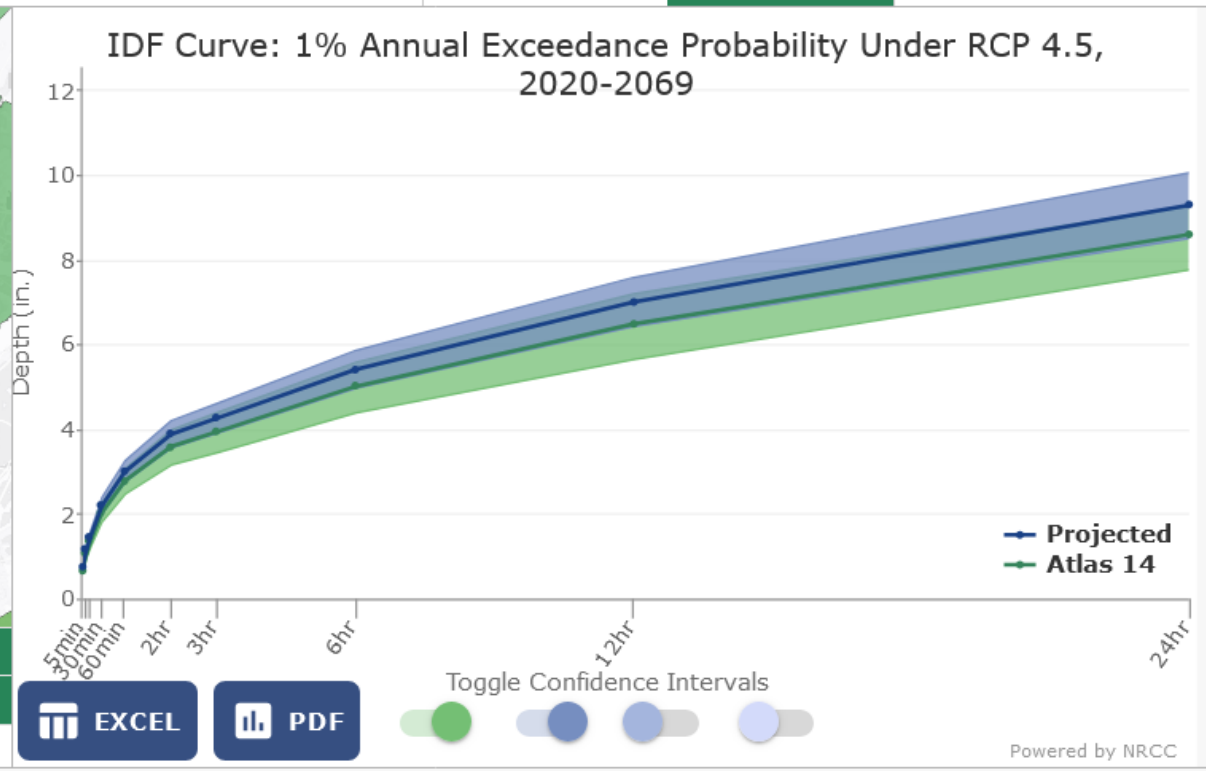

Projected Precipitation (inch)				Atlas 14 Precipitation (inch)		
Duration	**25%**	**Median**	**75%**	**10%**	**Median**	**90%**
Last Hovered (12hr)	6.42	7.00	7.58	5.64	6.48	7.19

Building Block: Outreach and Communications

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Connecting the public with science-based data for climate action

- Flood loss reduction is a key mission in DRBC's water resource management.
- Communities face barriers in planning for and implementing climate resilience projects.
- Considering climate in DRBC's engagement and planning.

Hazard mitigation planning is an opportunity to initiate climate resilience on the local level.

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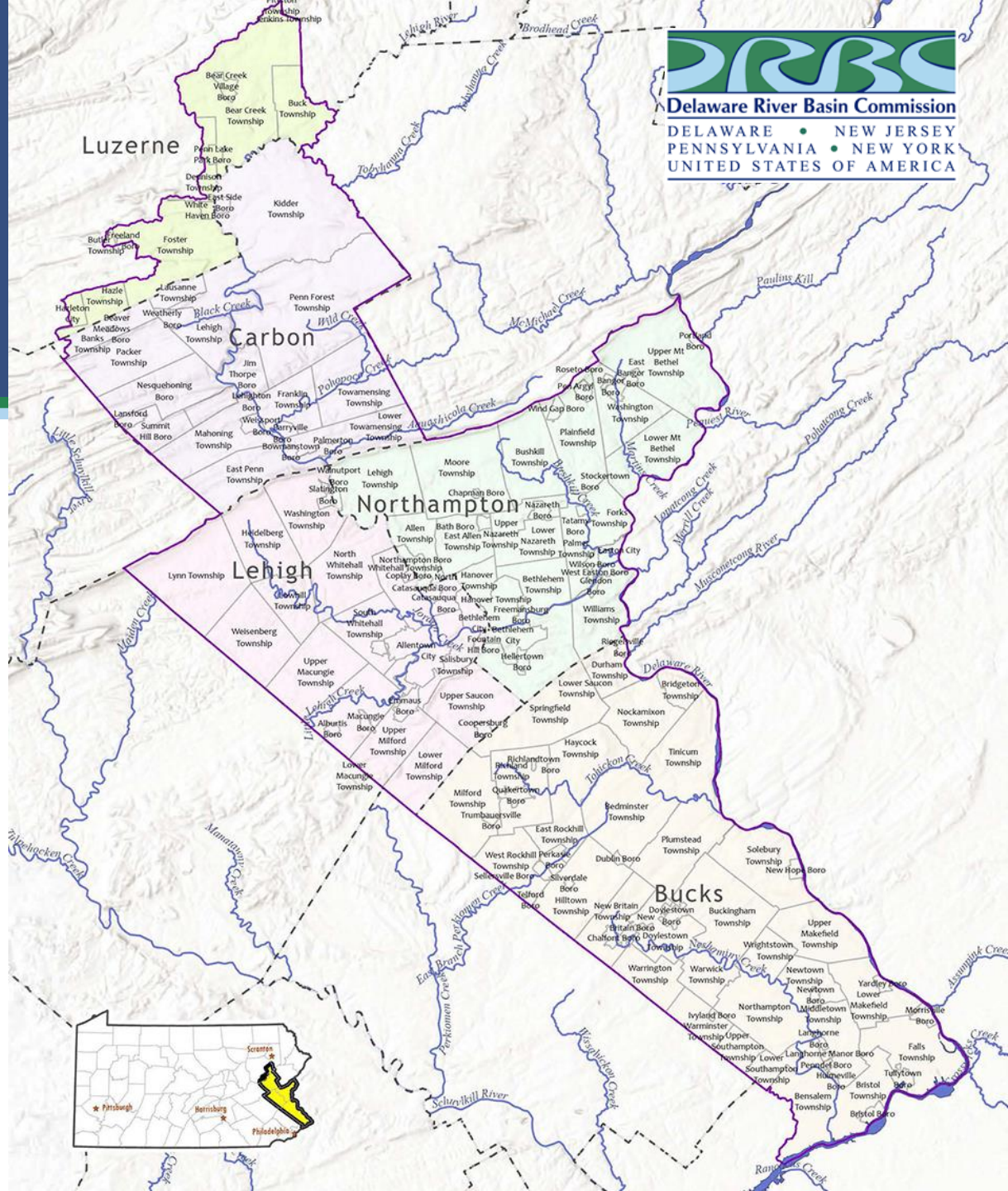
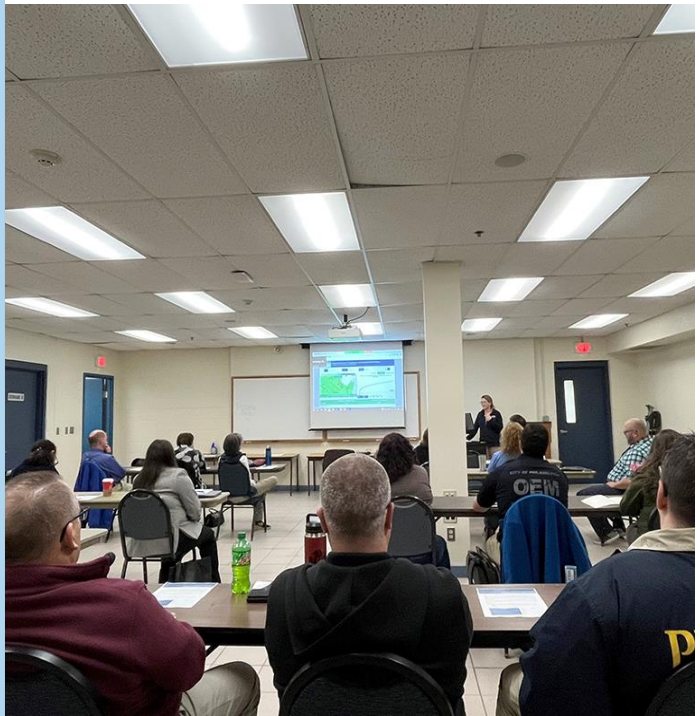
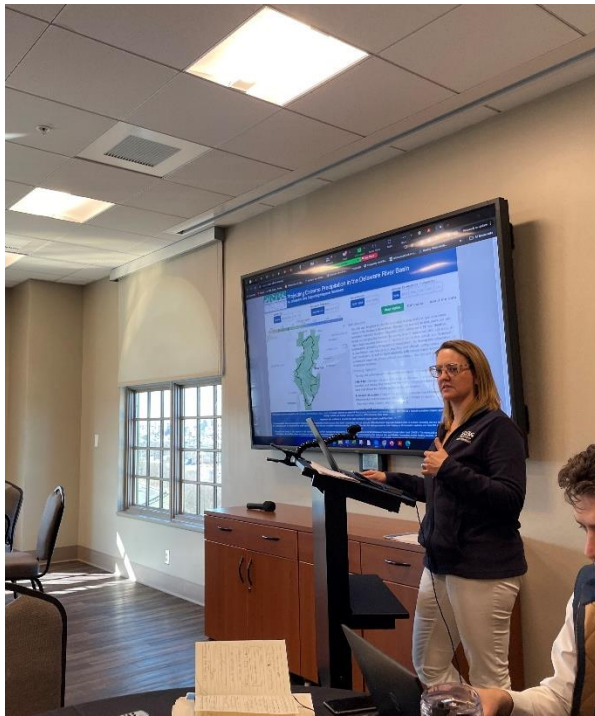
DRBC Partners with the Pennsylvania Emergency Management Agency (PEMA)

- Middle Delaware Flood Mitigation Assistance Workshops
- Project focus: Bucks, Carbon, Northampton, Lehigh, and part of Luzerne counties
- Goal: increase capacity of local municipalities to apply for grants and access state and federal resources







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Event is free and open to the public.

DELAWARE RIVER

Climate Practitioners Workshop

October 28, 2024,
10am-4pm

The Discovery Center
3401 Reservoir Dr. Philadelphia, PA 10121

Hosted by the Delaware River Basin Commission (DRBC) and the U.S. Environmental Protection Agency (EPA) Region 3

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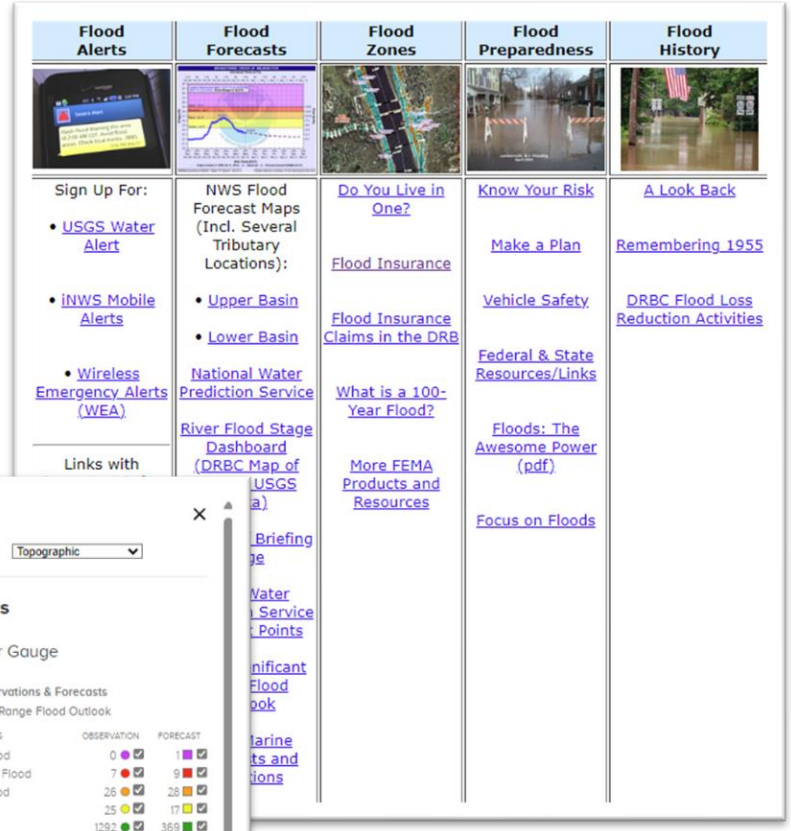
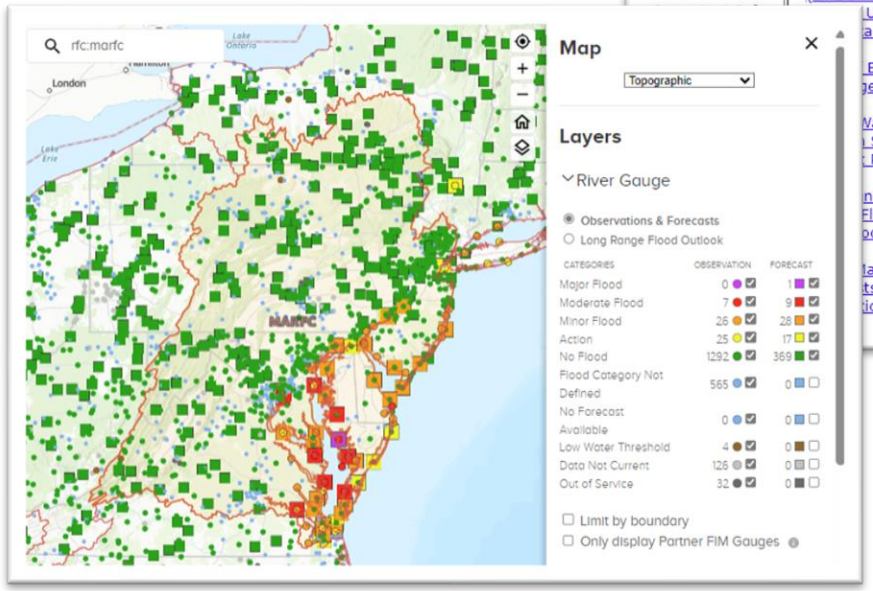
TinyURL.com/ClimatePractitionersWorkshop

Sharing public tools for planning and awareness

- Middle Atlantic River Forecast Center (MARFC)
- Flood Resources Portal
- Silver Jacket guides
- And more!





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Looking Ahead

Building Block:
Public Policy and Engagement

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The DRBC makes policy and takes public input about climate change through formal and informal processes.

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The DRBC's authority and jurisdiction are defined by the Delaware River Basin Compact

- U.S. Constitution, Compact Clause, Article 1, Section 10, Clause 3.
- Once approved by Congress, a Compact is an agreement with the force of federal law to effectuate shared interests and responsibilities.
- Pub. L. 87-328, 75 Stat. Ann. 688 (1961).

The DRBC may make and enforce reasonable rules and regulations

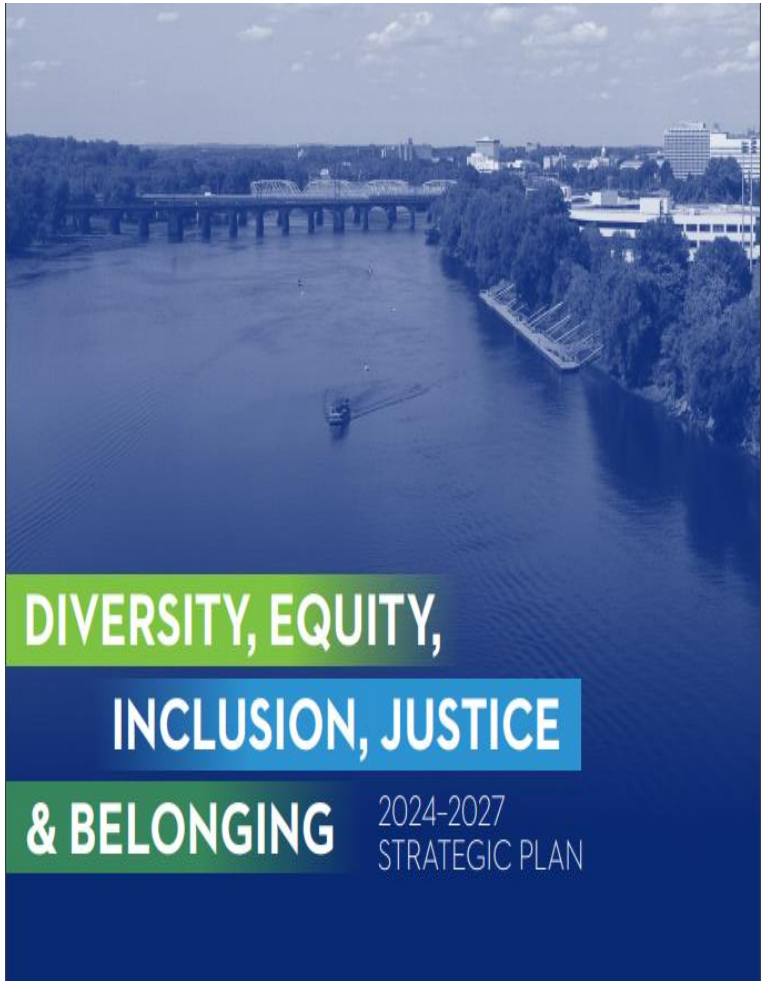
- Compact Section 14.2(a)
- Existing regulations cover
  - Water Quality Standards and Regulations
  - Flood Plain Regulations
  - Water Supply Charging
  - Southeastern Pennsylvania Ground Water Protected Area
  - High Volume Hydraulic Fracturing
- Future "climate" regulations - ???
- Notice and comment

Other formal opportunities for public engagement

- Resolutions
- Docket hearings
- Comprehensive Plan
- Water Resources Program
- …all with notice and comment

The DRBC may take other policy actions to advance its mission

- 2024 Diversity, Equity, Inclusion, Justice & Belonging Strategic Plan
- Incorporates climate and water equity considerations
- Cross-walk with Climate Resilience Plan



Other informal public engagement opportunities

- Advisory Committee Meetings
- Open public comment
- Legislative meetings
- *Our Shared Waters* Roundtables
- Surveys
- Outreach events

Through a Climate Resilience Plan, science-based recommendations *may* result in regulatory or policy action.

Components of "Resolution 2024-04"

- Prioritized actions for
  - evaluating impacts of climate change
  - formulating management approaches to improve resilience and adaptation to a changing climate
- Consultation with stakeholders
- Funding priorities and timing
- Actions within Commission authority

Climate Resilience Plan Considerations

- Flood loss
  - Challenge: Frequency and extent of non-tidal, localized, and main stem flooding; Frequency and extent of tidal flooding, storm surge flooding.
  - Climate Resilience Plan: Review and consider updates to DRBC's Flood Plain Regulations.
- Water quality
  - Challenge: Develop and review surface water quality trends due to climate change for temperature, salinity, pH, and more.
  - Climate Resilience Plan: Review and consider updates to DRBC's Water Quality Regulations.

Climate Resilience Plan Considerations

- Water efficiency
  - Challenge: Re-evaluate water use and consumptive use projections based on climate trends.
  - Climate Resilience Plan: Review and consider updates to DRBC's Rules of Practice and Procedure and the DRBC Water Code.
- Project review
  - Challenge: Significant climate-related risks and vulnerabilities posed to, or by, projects submitted for review under Sec. 3.8, Sec. 10.3, or Art. 11 of the Compact.
  - Climate Resilience Plan: Regulations under DRBC's Rule of Practice and Procedure.
- Environmental Justice
  - Challenge: Enhance the resilience of overburdened and underrepresented communities.
  - Climate Resilience Plan: Identify and propose actions consistent with the Commission's Policy on DEIJB; integrate measures to promote equity and environmental justice.

Stay engaged with the DRBC

DRBC.gov

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Photo Credits:
Slide 5. Middle Atlantic River Forecast Center (MARFC); Silver Jackets

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Join the conversation on social media! Tag @DelRivCoalition with #DelRivForum2024!

Coalition *for the* Delaware River Watershed

12th Annual Delaware River Watershed Forum

What's next for the watershed.

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