

# Water Withdrawal and Consumptive Use Estimates for the Delaware River Basin (1990-2017) With Projections Through 2060

## DRBC Business Meeting

March 9, 2022

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and

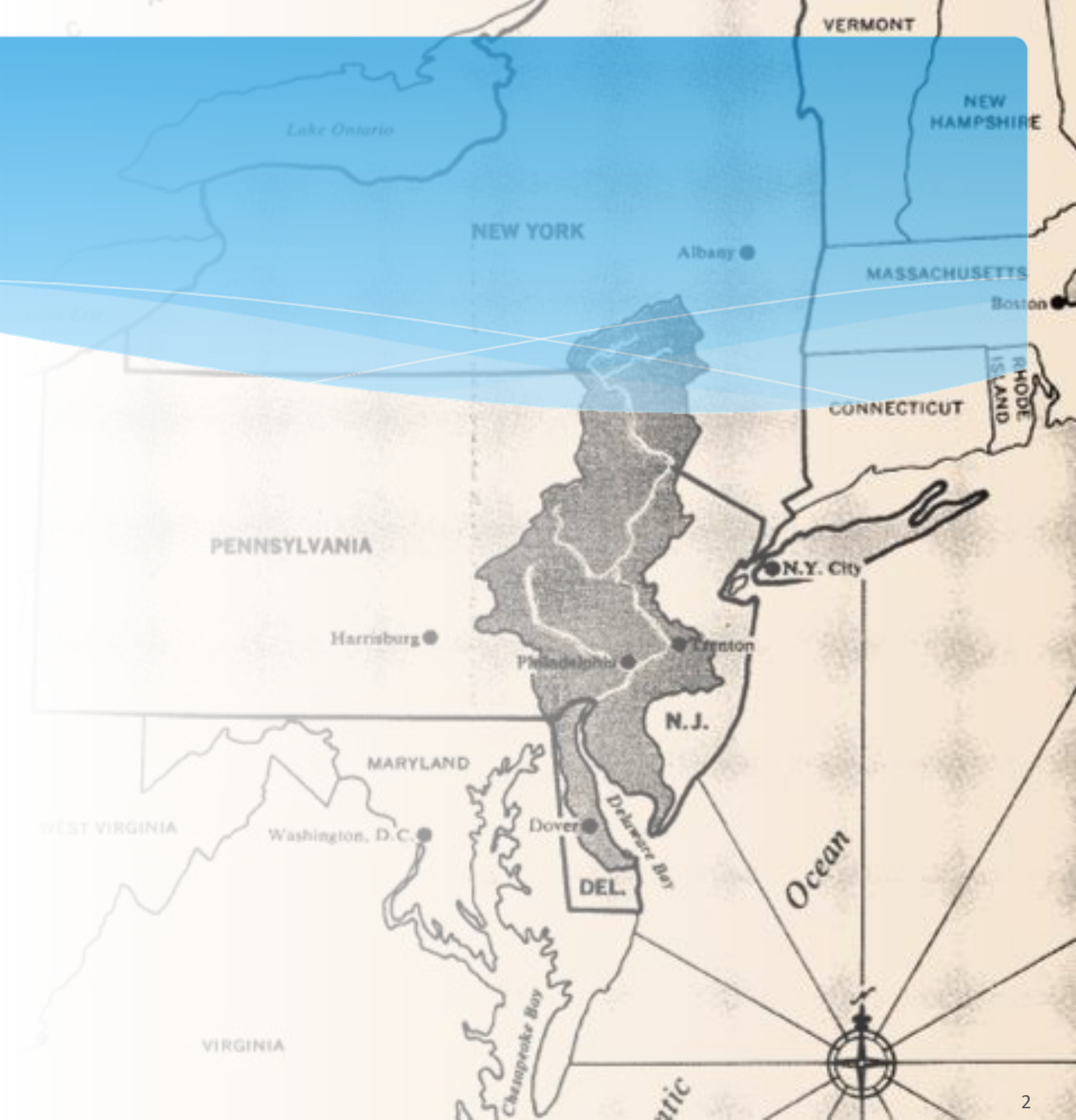
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Manager*



# Outline

1. Publication & Data Deliverables
2. Water Supply Planning – Goals
3. Methodology
4. Results
5. Next Steps
6. Questions



# 2. Publication and Data Deliverables



## Report webpage:

<https://www.nj.gov/drbc/programs/supply/use-demand-projections2060.html>

## You can:



Download the report (~40 MB)  
(Best viewed with Adobe)



Download the dataset (~10 MB)  
MS Excel File (no macros)



Download high resolution maps  
from the report



Reference past presentations  
given on this work



Interact with the Power BI data  
visualization tool

DRBC remains operational, but its West Trenton, NJ Office Building is closed & staff are working remotely until further notice. See homepage for more info.

Water Withdrawal & Consumptive Use Estimates (1990-2017) & Projections Through 2060

DRBC's Water Supply and Planning Program focuses on water security - ensuring that there is a sustainable supply of suitable quality water in the Delaware River Basin (DRB). To support this water resource management goal, the DRBC studies water use and plans for future water availability in the DRB. In October 2021, the DRBC published a new report titled *Water Withdrawal and Consumptive Use Estimates for the Delaware River Basin (1990-2017) with Projections through 2060*. The report analyzes 30 years of historic withdrawal data and projects withdrawal demands to the year 2060.

**Report:**

- View/Download Report (pdf 40 MB)
- View News Release (issued October 19, 2021)

**Report Goals:**

- Analyze existing water withdrawal and consumptive use data for the DRB from 1990-2017
- Project Water Withdrawals through 2060

**Report Focus:**

- Major Water Withdrawal Sectors: Public Water Supply, Power Generation, Industry, Irrigation, Mining, Self-Supplied Domestic, Out-of-Basin Diversions & other
- Consumptive Use: Water that is withdrawn/taken from the Basin, but not returned

**Key Conclusions:**

- Most water withdrawals are coming from surface water (~95%), with the remainder from groundwater.

Please note: this application works best using Chrome. While you can zoom in, the application is best viewed at 100%. Page 1/2 offers data for the entire Delaware River Basin; page 2/2 is for the Southeastern Pennsylvania Groundwater Protected Area (SEPA-GWPA).

Water withdrawals from the Delaware River Basin (historical & projected)

LEGEND (MGD)

- NRW/CFP
- 0 - 1
- 1 - 5
- 5 - 10
- 10 - 100
- 100 - 500
- 500+

DATA SET

- Select all
- Basin Model
- Historical Data

WATER

- Select all
- GW
- SW

STATE

- Select all
- DE
- MD
- NY
- PA

HUC-8 WATERSHED

- Select all
- Brandywine-Christina
- Broadkill-Smyrna
- Cohansey-Maurice
- Crosswicks-Neshaminy
- East Branch Delaware
- Lackawaxen
- Lehigh
- Lower Delaware
- Middle Delaware-Mongaup-Brodhead
- Middle Delaware-Musconetcong
- Schuylkill
- Upper Delaware

SECTOR

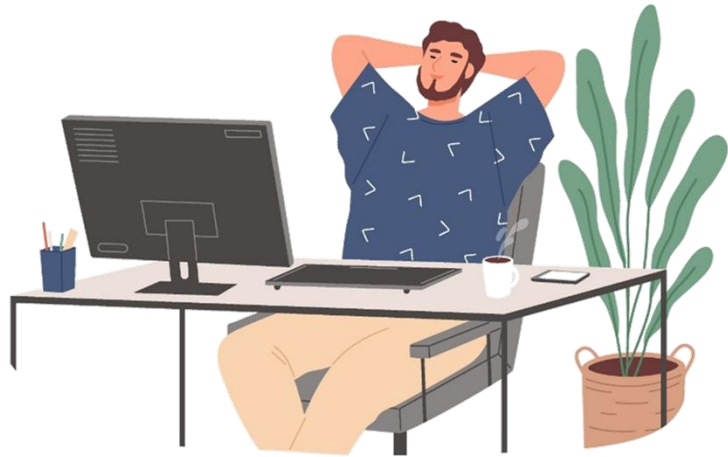
- Select all
- Public Water Supply
- Self-Supplied Domestic
- Out-of-Basin Diversion
- Industrial
- Mining
- Irrigation
- Other
- Hydroelectric Power
- Thermoelectric Power

Map Selections:

Basin ID: ALL  
Sector: ALL  
Years: 2022

Note: Color coded values in the map above correspond to total subbasin values based on the selected variables. If more than one year is selected, the map reflects the summation of multiple years and not the annual average rate as suggested by the legend units. For this reason the map should be used only for relative comparison of subbasins when viewing multiple years of data. All surface water-

## 2. Water Supply Planning: Why are we projecting withdrawal data?



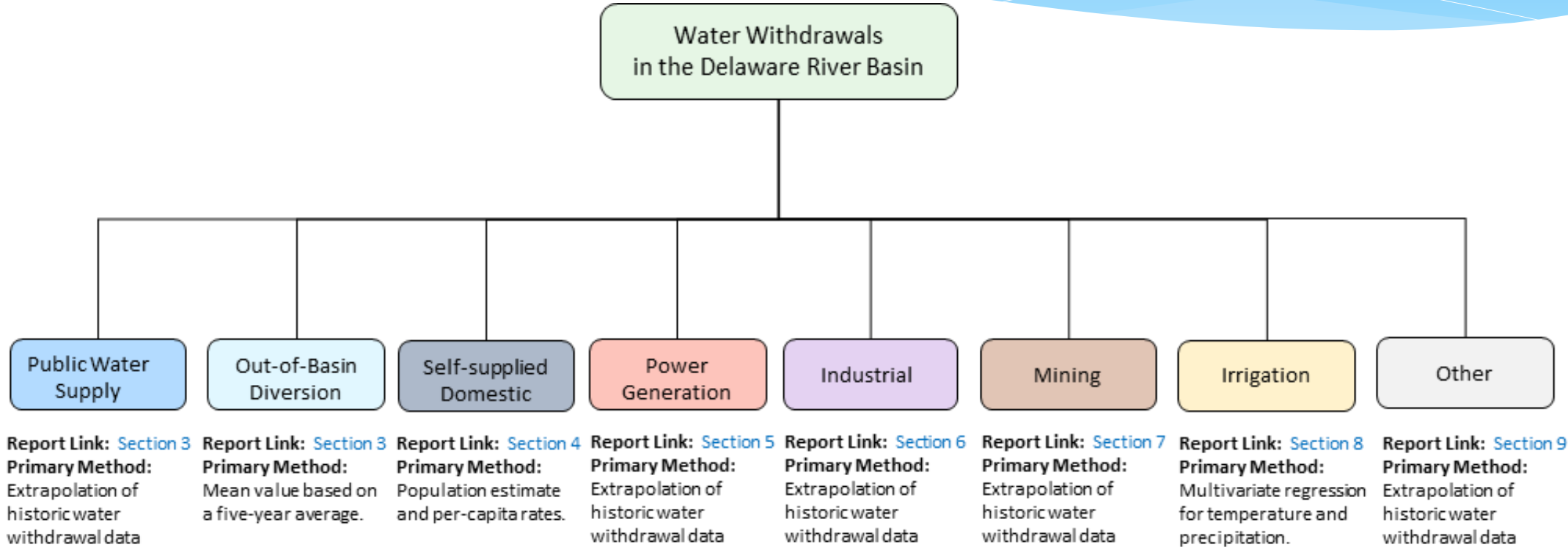
### Is there enough water to meet future demands?

1. What are the current/future demands? ←
2. How does it compare against current allocations?
3. What about a repeat of the Drought of Record?
4. What about climate change?

# 3. Methodology



The primary method is extrapolation of historic reported withdrawal data



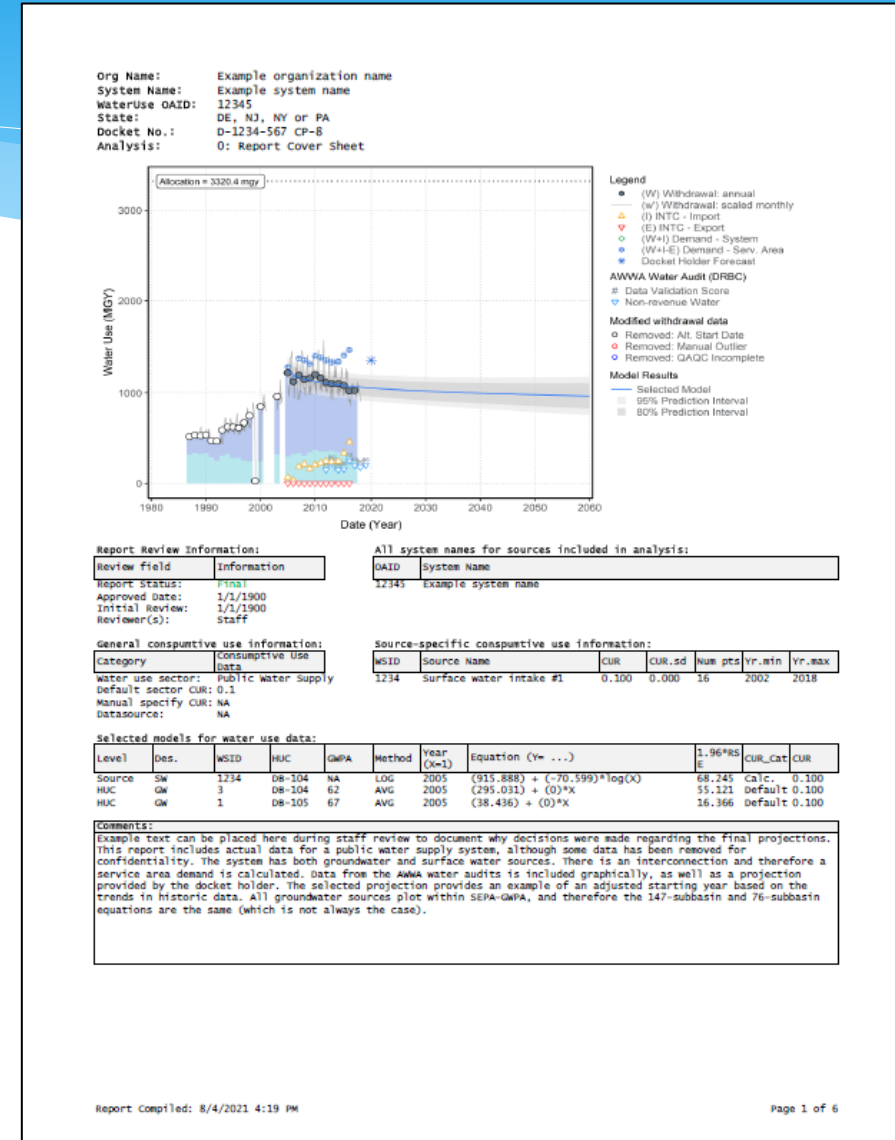
# 3. Methodology: A plan for projecting data?

The main model is based on extrapolating historic withdrawal data.

- Significant QAQC of historic data
- 600+ system reports
- 1,100+ equations

Method	Associated		Unassociated		Subtotal	
	GW	SW	GW	SW		
Mean Value	218	71	147	0	436	
OLS	Exponential	72	17	36	0	125
	Linear	83	11	11	0	105
	Logarithmic	250	74	69	0	393
Other	62	48	4	0	114	
<b>Subtotal</b>	<b>685</b>	<b>221</b>	<b>267</b>	<b>0</b>	<b>1,173</b>	

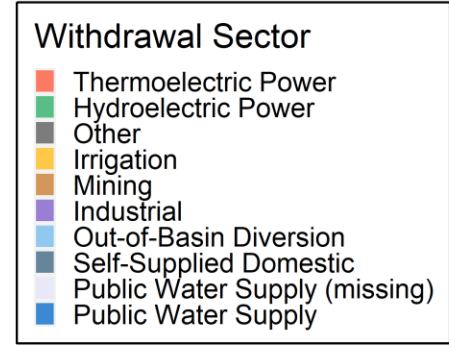
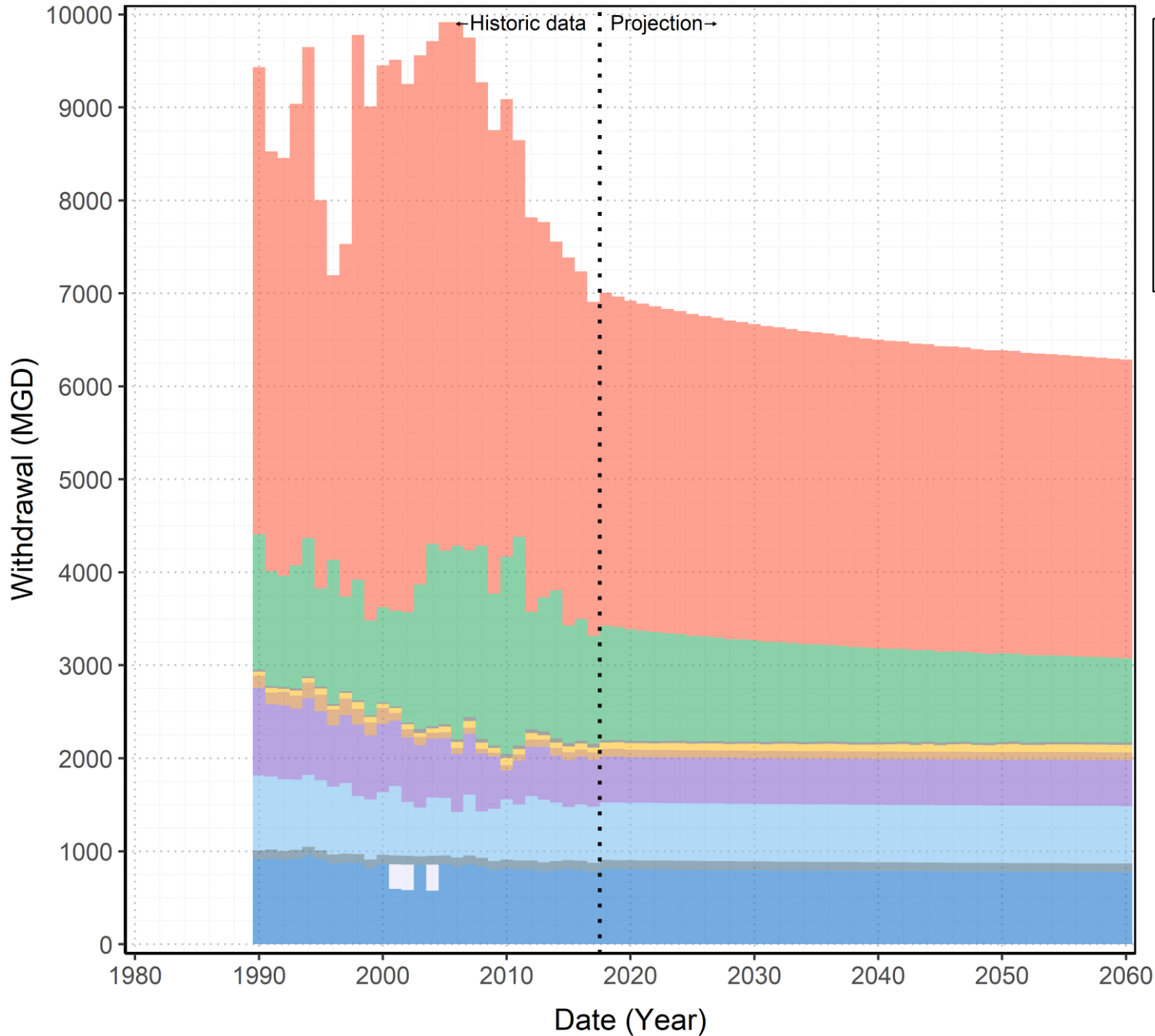
- OLS = Ordinary Least Squares
- Associated means system operate above review thresholds and has allocation regulatory approval.
- Does not include agriculture and self-supplied domestic analyses



# 4. Results



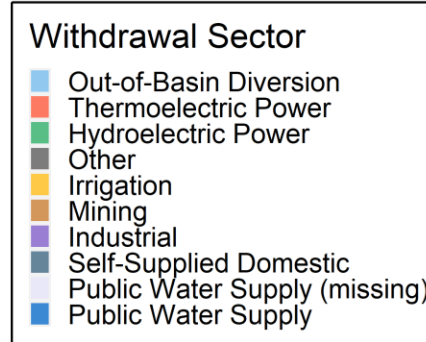
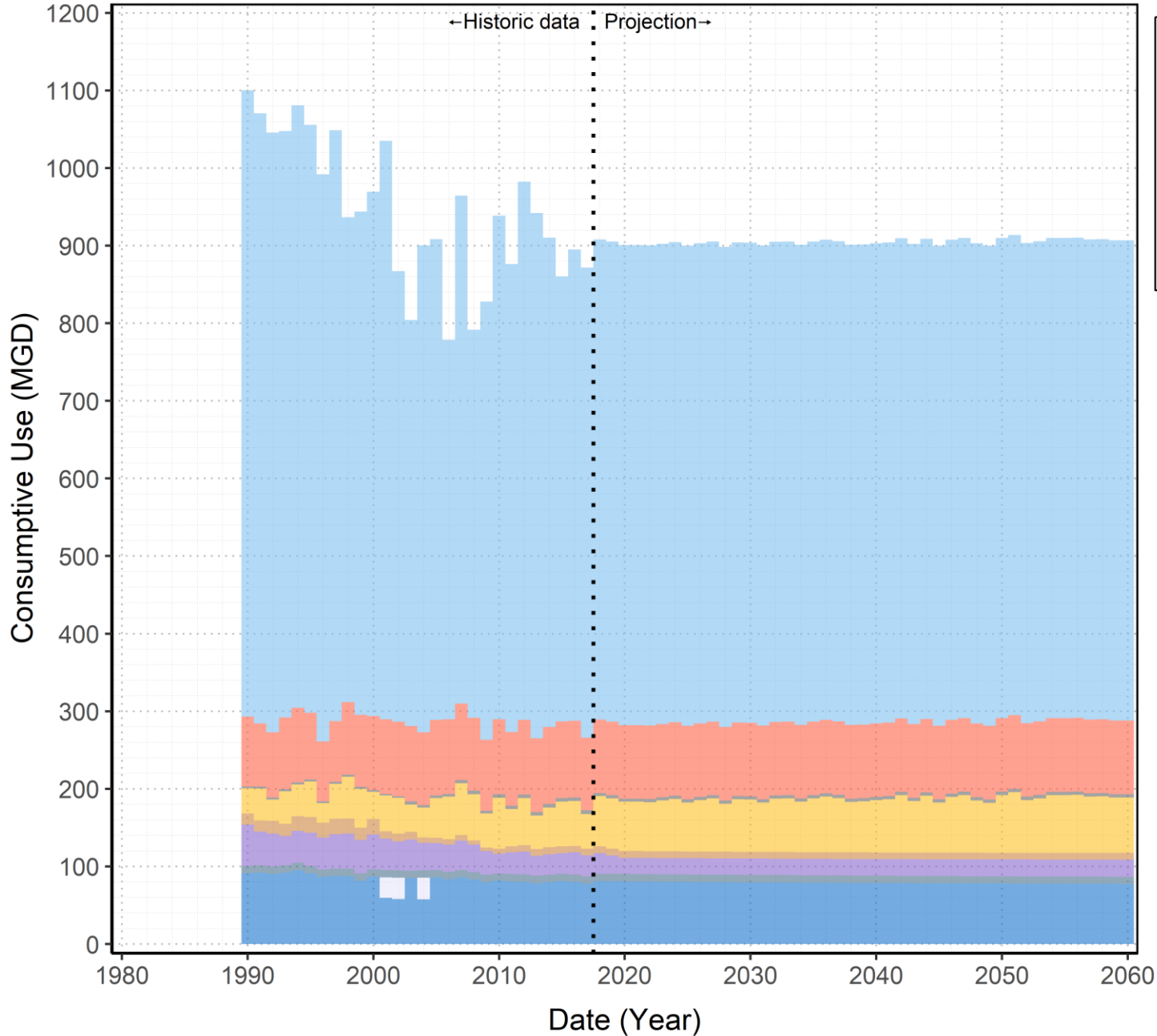
# Historic and projected water withdrawals from the Delaware River Basin



- **Peak withdrawals have occurred**
- **Thermoelectric** decreases since 2007 will plateau as coal-fired facilities using once-through are limiting
- **Public Water Supply** has shown and projects decreases despite historic and projected growing in-Basin population
- **Hydroelectric** withdrawals are significant; however, no consumptive use
- **Industrial** withdrawals historically decrease, but plateau

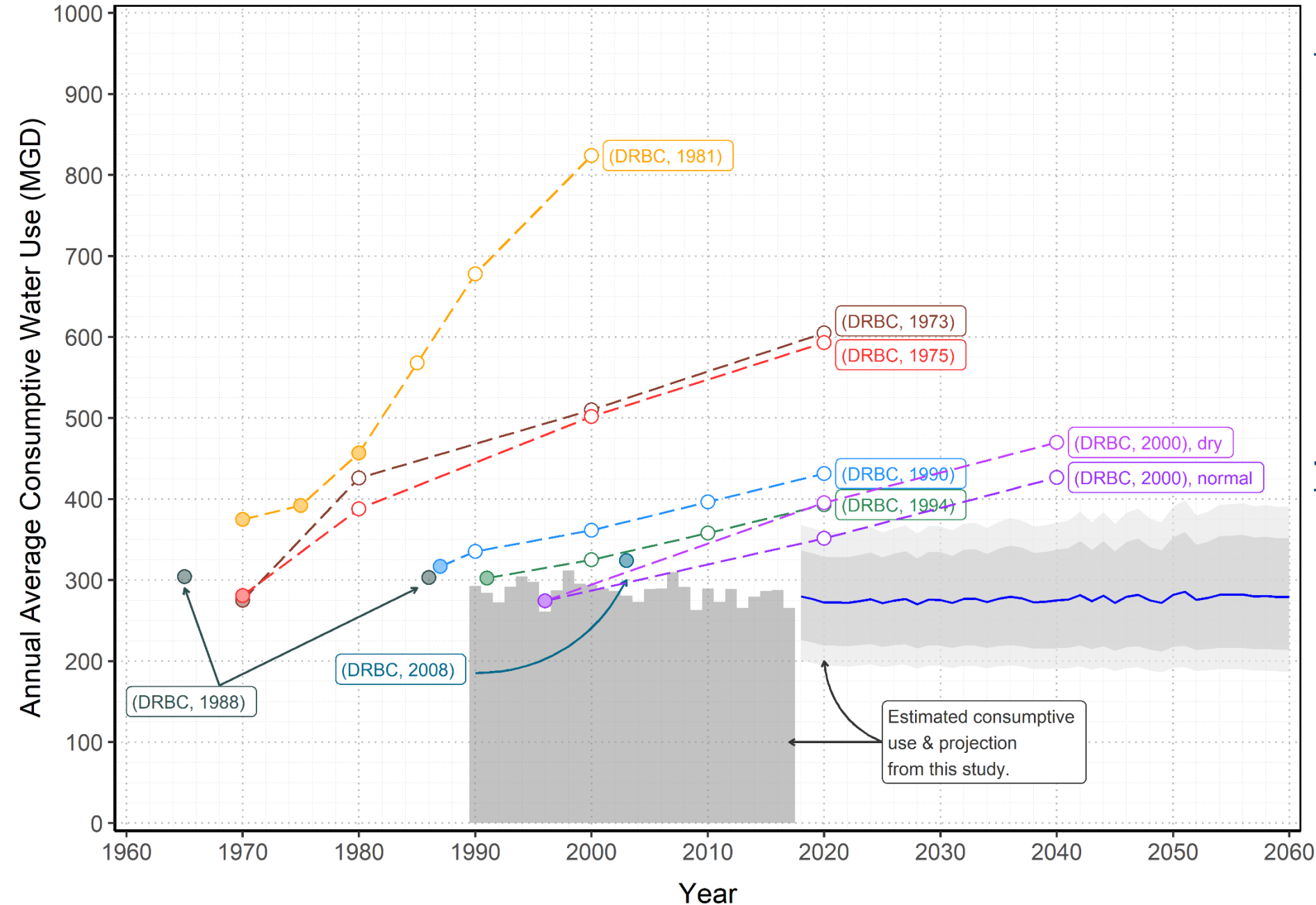


# Historic and projected consumptive water use in the Delaware River Basin



- **Consumptive use projected to remain relatively constant**
- **Largest consumptive use is Out-of-Basin Exports under a U.S. Supreme Court Decree**
- **Thermoelectric** consumptive use constant despite decreased withdrawals due to changes in technology
- **Irrigation** is significant and shows slight increases related to projected changes in climatic variables
- Significant **spatial variation** in terms of both withdrawal and consumptive use

Previous DRBC projections of Basin-wide consumptive water use (comparison)



**Prior projections often:**

- Work from one estimated year of withdrawal data
- Are performed indirectly (e.g., applying population projections)
- May have considered/ accounted for planned facilities (e.g., power)

**This study:**

- Almost 30 years of data
- Aligns with previous estimates
- Most conservative projection

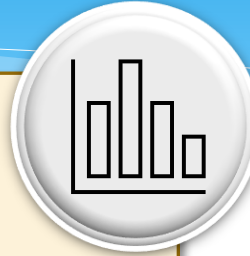


# 5. Next Steps

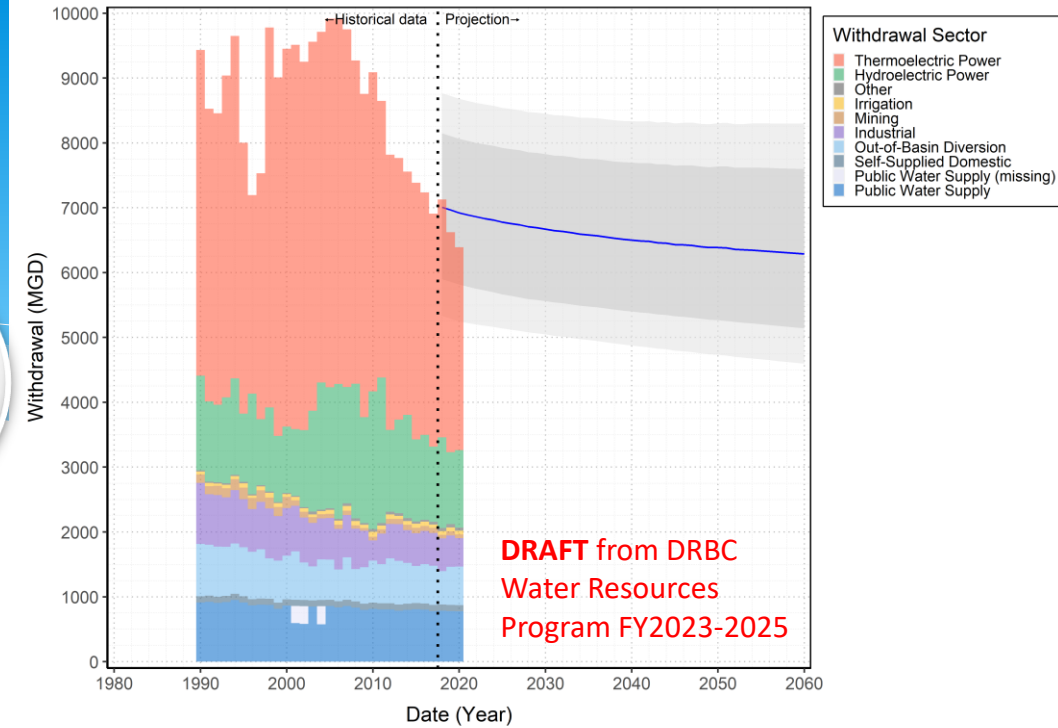


# 5. Next Steps

Continued updates and tracking as more recent data becomes available



Historical and projected water withdrawals from the Delaware River Basin



## Groundwater availability

*(anticipated report 1Q2022)*

- \* 147 HUC scale
- \* SEPA GWPA scale

## Surface water availability

*(preliminary work such as model development is ongoing)*

- \* Consider effects of climate change
- \* Consider reservoir operations
- \* Consider the Drought of Record

# 6. Questions



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