Delaware River Basin Commission
New York City Department of Environmental Protection

Salinity and Implications for Upper Basin Releases

Amy L. Shallcross
Manager, Water Resource Operations, DRBC
Jennifer Garigliano
Chief of Staff, NYC DEP

Presentation at
Water Water Everywhere
October 12, 2021

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

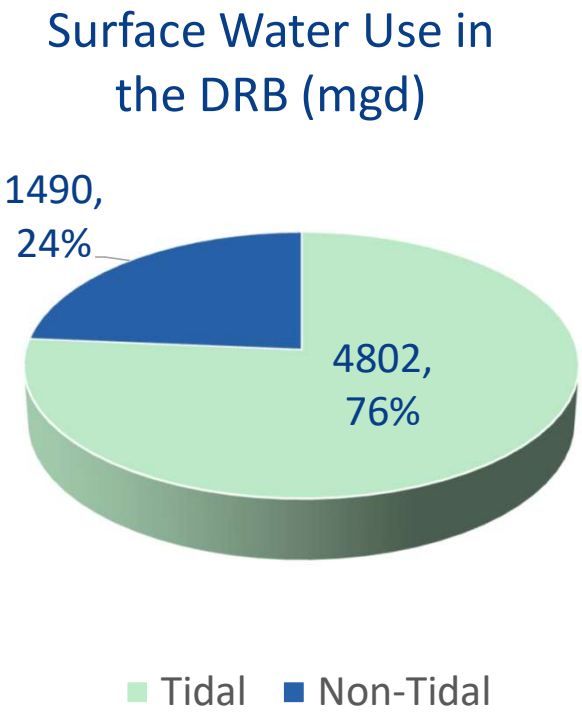
NYC Environmental Protection

Delaware River and Basin

- Main stem (Hancock NY => Ocean) is 330 miles long – No Dams
- The River forms interstate boundaries over its entire length
- Watershed drains 13,539 square miles in 4 states
- Drinking water for 13.3 million people (approximately 5 % of the U.S. population)
- Water withdrawals exceed 6.4 billion gallons/day
- Significant Exports to NYC (up to 800 MGD) and NJ (up to 100 MGD)
- Contributes over $21B in economic value to region
- Two Supreme Court Decrees

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Estuary Water Users



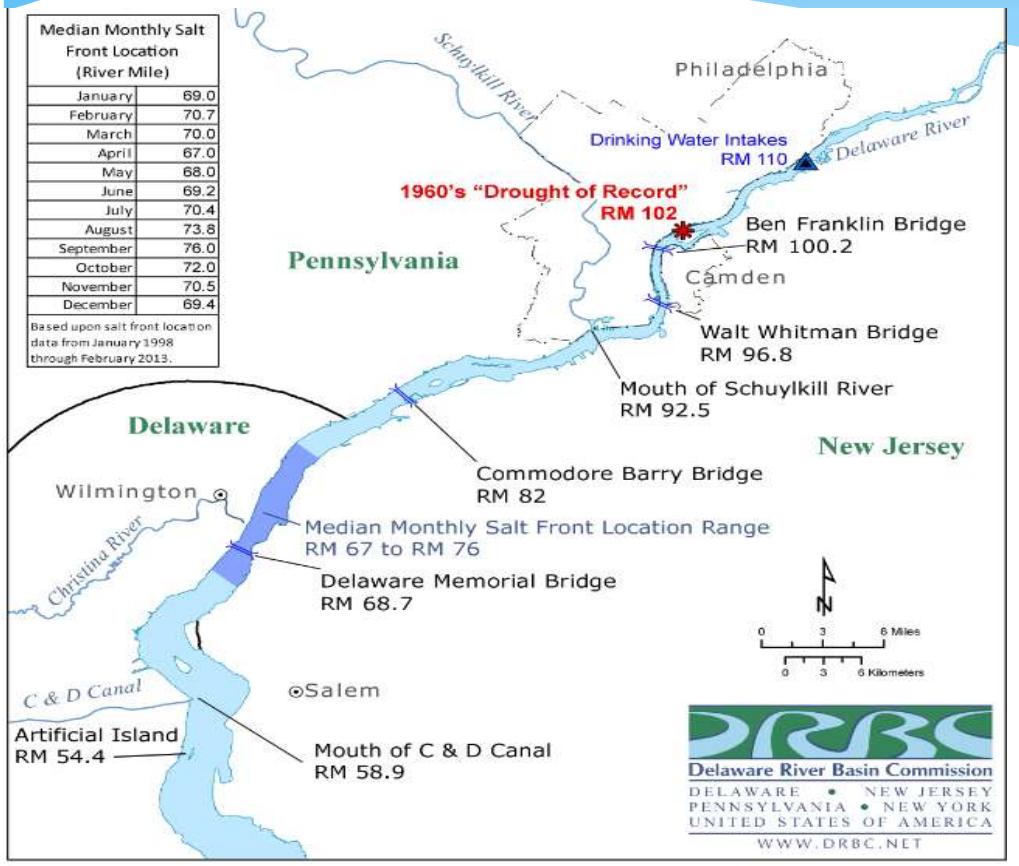
Phila.gov

Suk

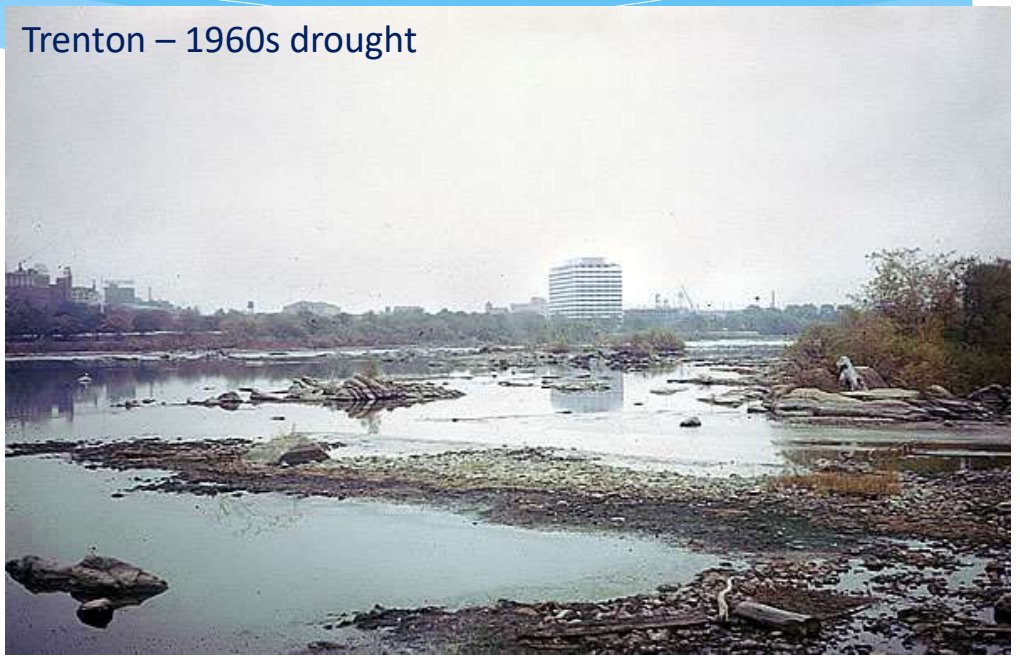
http://wikimapia.org/21274124/Kimberly-Clark-Inc-Chester-Papermill#/photo/1905408

Photo: Peretz Partensky, https://www.flickr.com/photos/ifl/7238282472/in/album-72157629823114004/; unedited

Salinity and Drought



Trenton – 1960s drought



The watershed above Trenton provides 76 percent of the freshwater inflows into the estuary

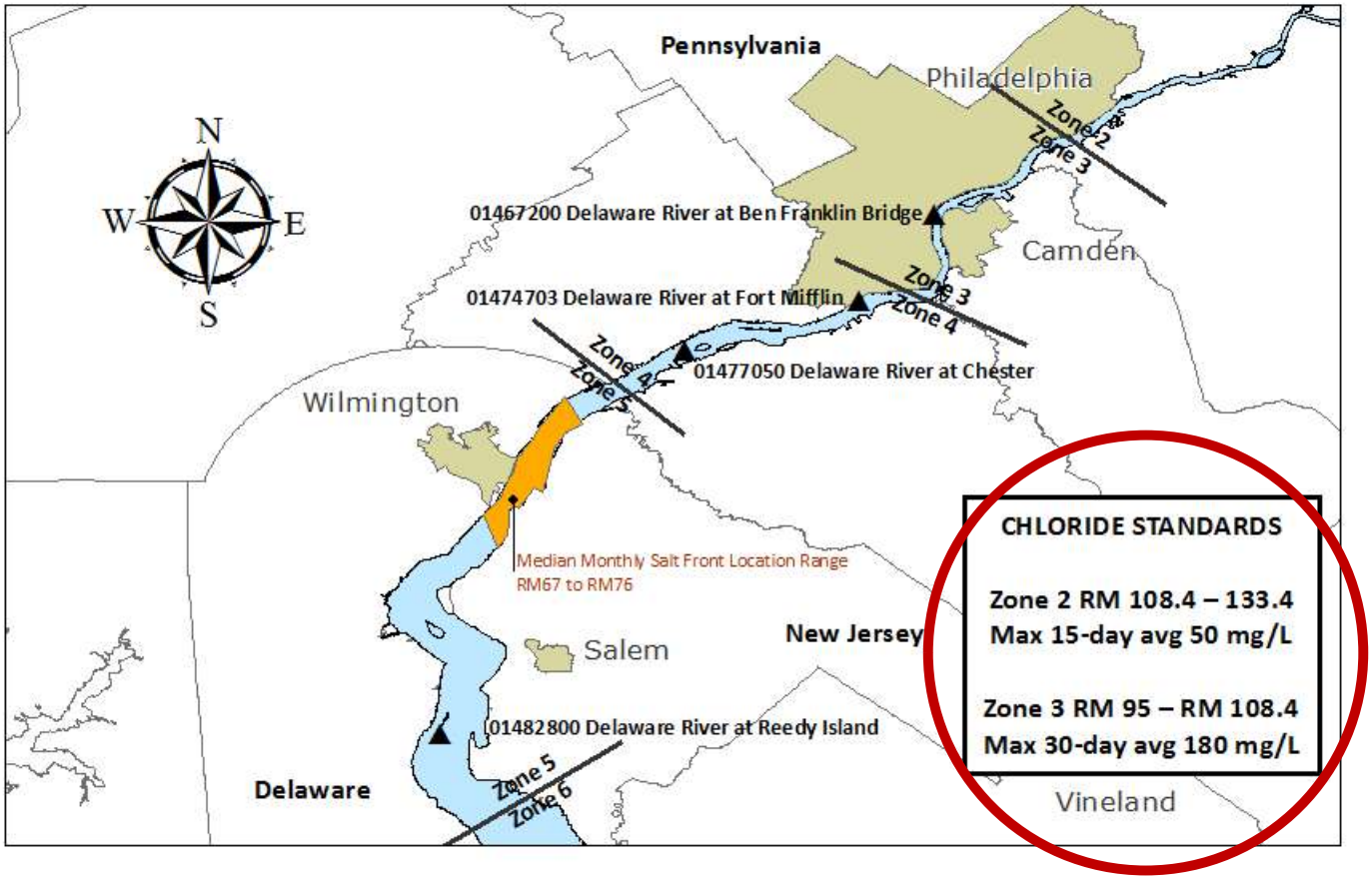
Key Terms of the Good Faith Agreement

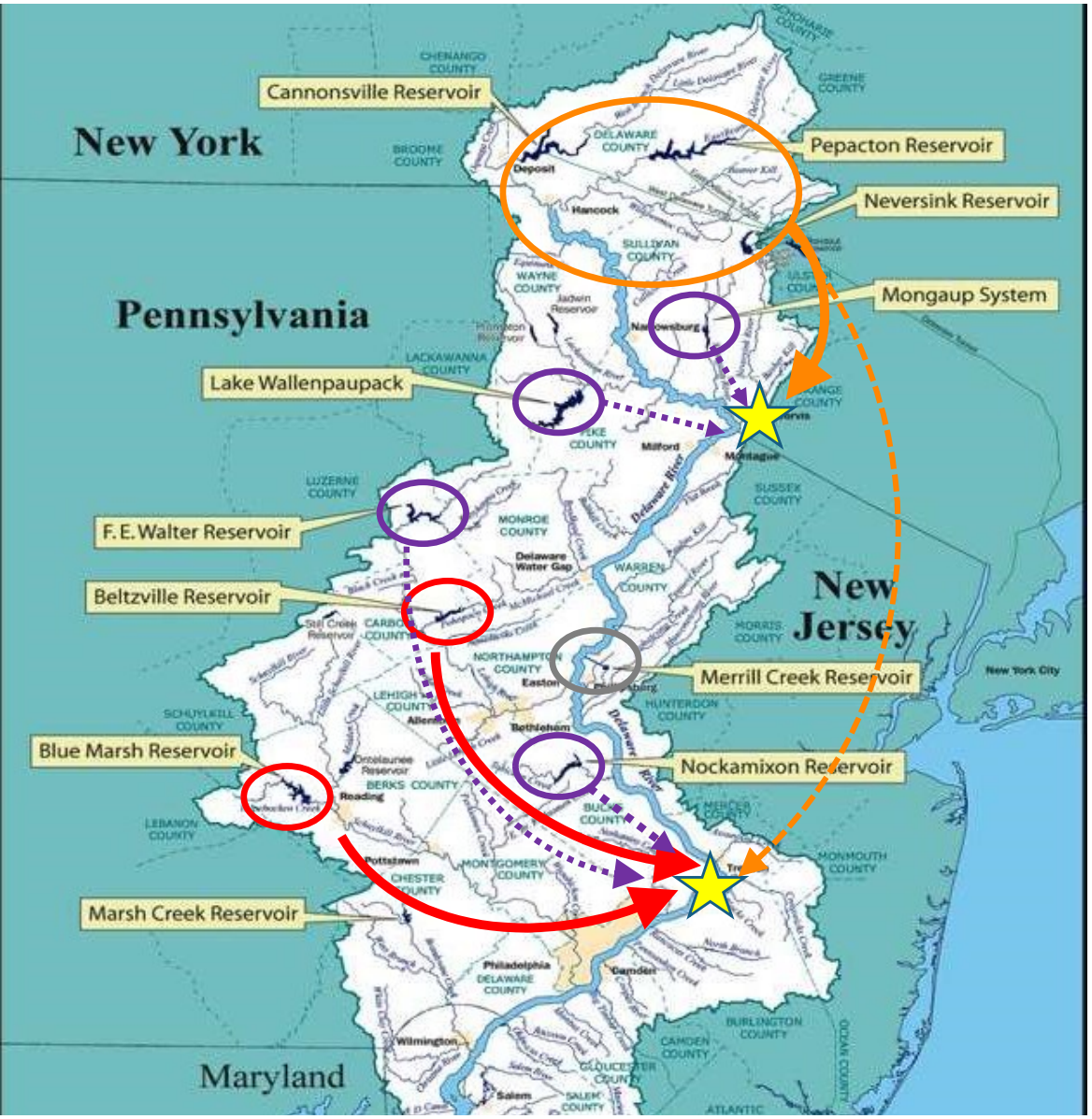
1983

* Revised Salinity Management Goals (Maximum 30-day average of 180 mg/l Chloride at River Mile 98) – protect drinking water – PRM, PWD, now NJAWC
* Identified storage pursuits (FE Walter, Prompton, Cannonsville, Merrill Creek)
* Established drought operating curves
* Created Trenton Flow Objective
* Phased reductions of Diversions and Flow Objectives
* Allowed for banking “excess water” for other purposes (e.g., ERQ/IERQ)
* Provided enhanced conservation releases during normal conditions (D77-20 Revision 1, a.k.a. Rev1)
* Water conservation and consumptive use management

Water Quality Zones

- Salinity
- Chlorides
- Dissolved Oxygen
- Bacteria
- PCBs
- Toxics
- Contaminants of Emergency Concern





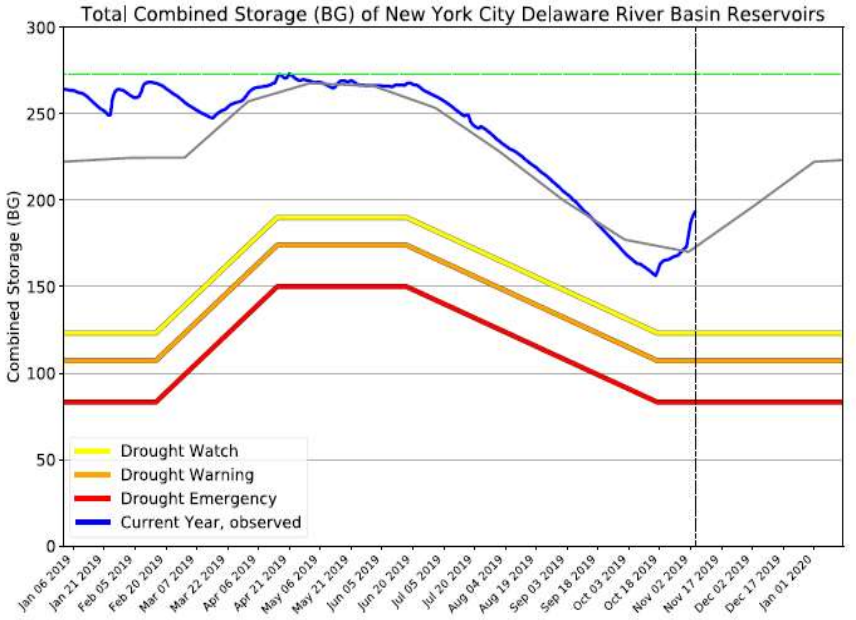
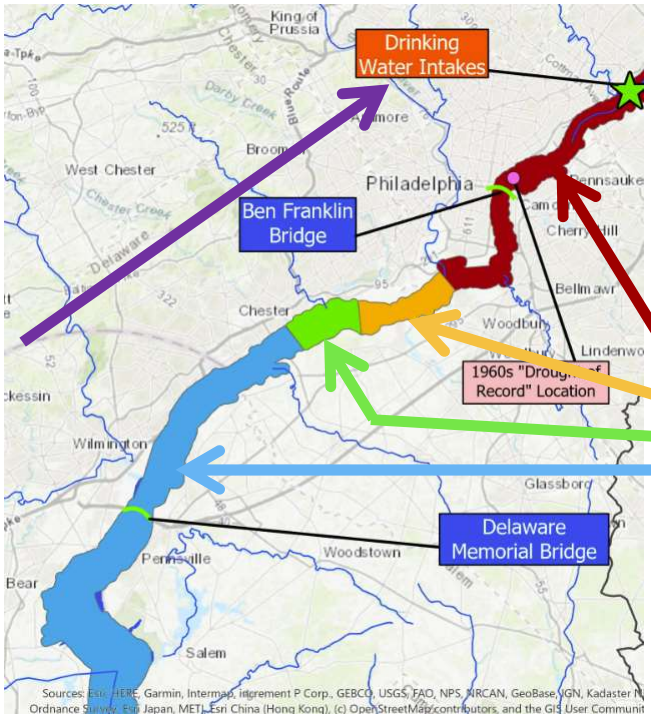


Table 1
Interstate Operation Formula for Diversions and Flow Objectives

NYC Storage Condition	*NYC Diversion (mgd)*	*NJ Diversion (mgd)*	*Montague Flow Objective (cfs)*	*Trenton Flow Objective (cfs)*
Normal (L1, L2)	800	100	1,750	3,000
Drought Watch (L3)	680	100	1,650	2,700
Drought Warning (L4)	560	90	1,550	2,700
Drought Emergency (L5)	520	80	1,100-1,650*	2,500-2,900*

Drought Emergency Flow Objective



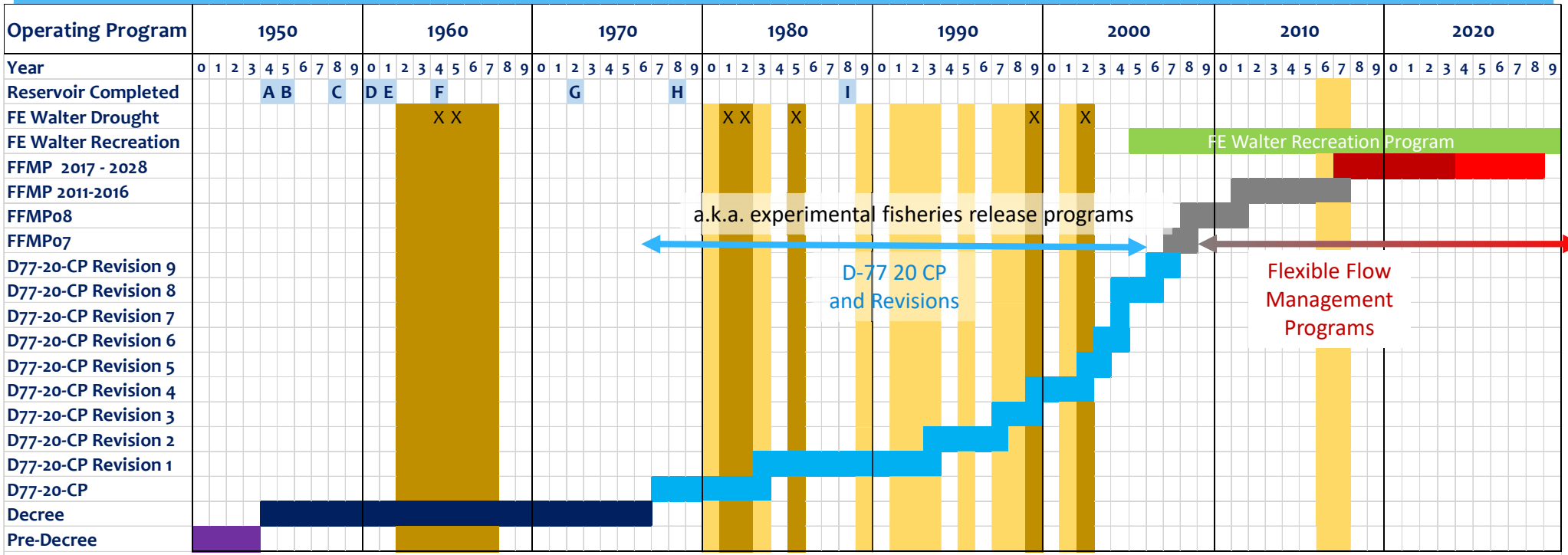
Flow Objectives Drought Conditions*

7-day average location of Salt Front	Flow Objectives During Drought Emergencies					
	Montague, NJ			Trenton, NJ (Gage+Blue Marsh Releases)		
River Mile	Dec-Apr.	May-Aug.	Sept-Nov.	Dec-Apr.	May-Aug.	Sept-Nov.
Upstream of R.M. 92.5	1,600	1,650	1,650	2,700	2,900	2,900
Between R.M. 87.0 and R.M. 92.5	1,350	1,600	1,500	2,700	2,700	2,700
Between R.M. 82.9 and R.M. 87.0	1,350	1,600	1,500	2,500	2,500	2,500
Downstream of R.M. 82.9	1,100	1,100	1,100	2,500	2,500	2,500

*The location of the salt front determines the flow objective at Trenton during any lower basin drought condition or during basinwide drought emergencies.

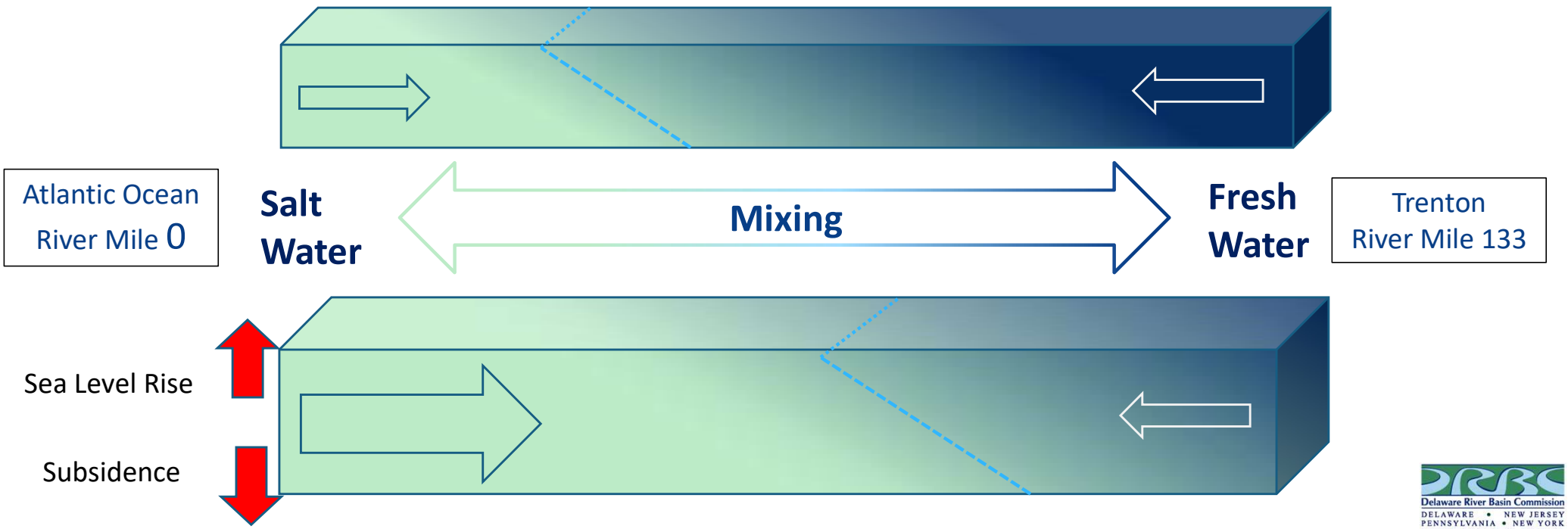
During the drought of record, the lowest monthly average flow at Montague was 870 cfs and 1,550 cfs at Trenton

Reservoir Operating Programs

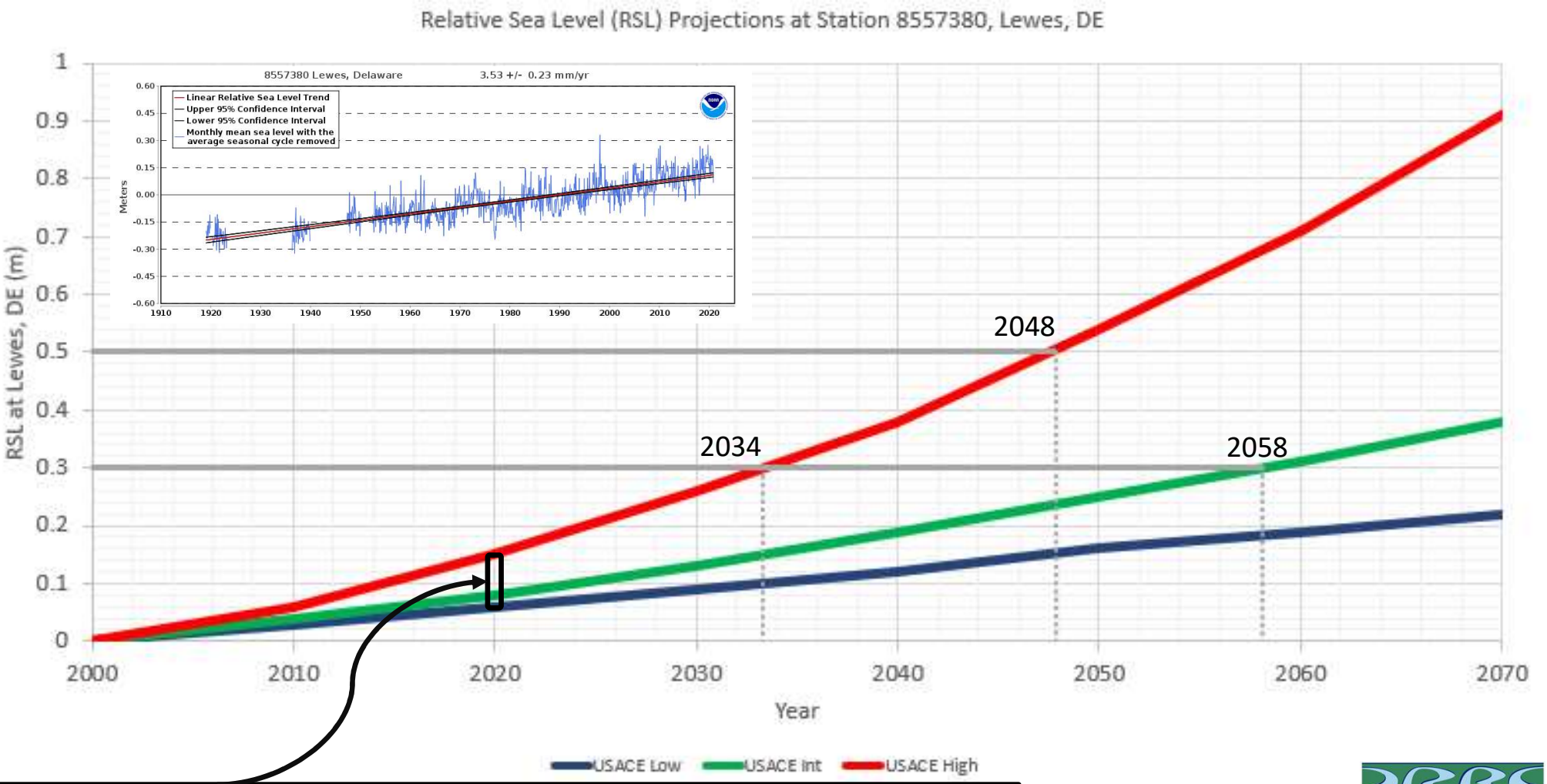


Conservation releases – flow objectives – out-of-basin diversions – flood mitigation – Excess Release Quantity

Sea Level Rise and Salinity

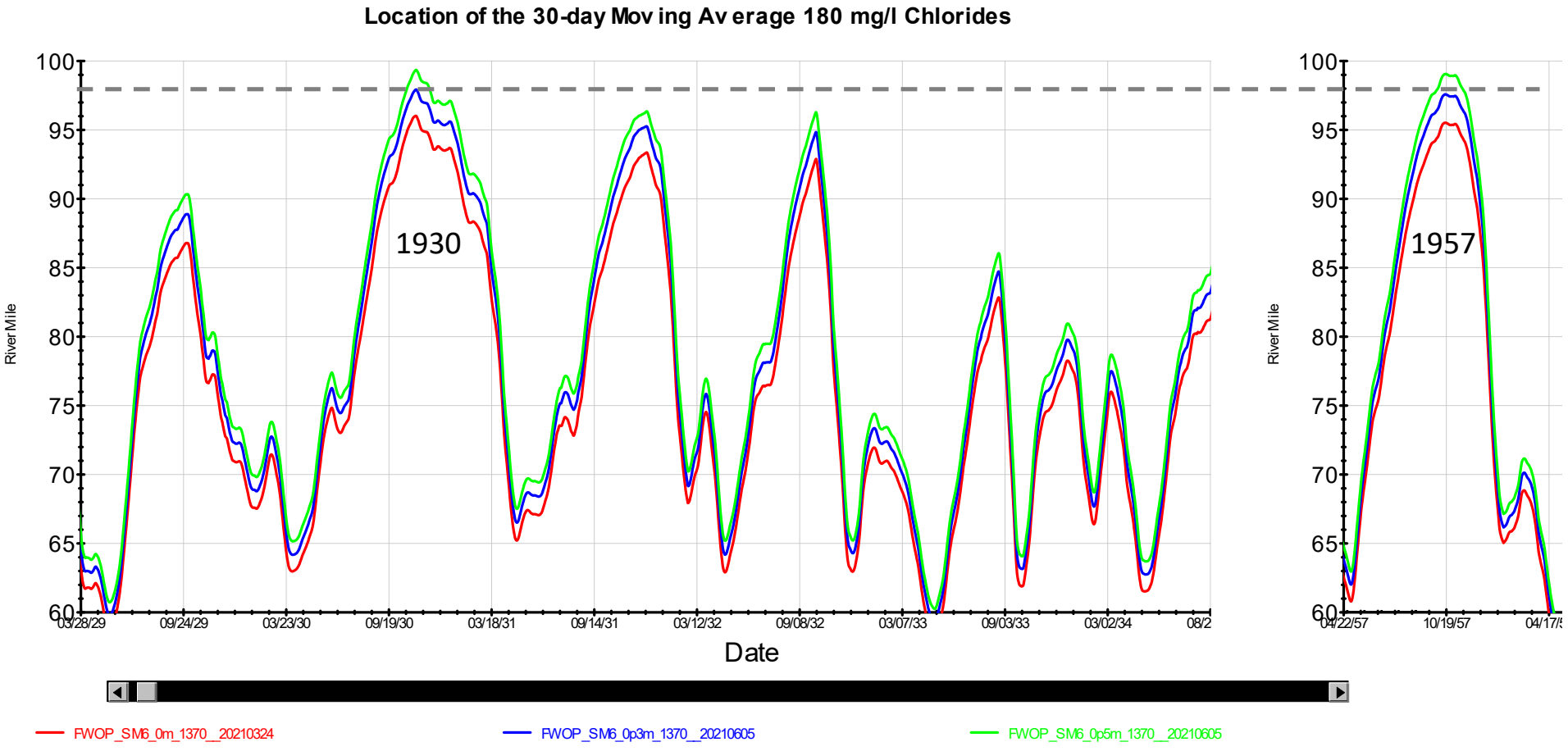


Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

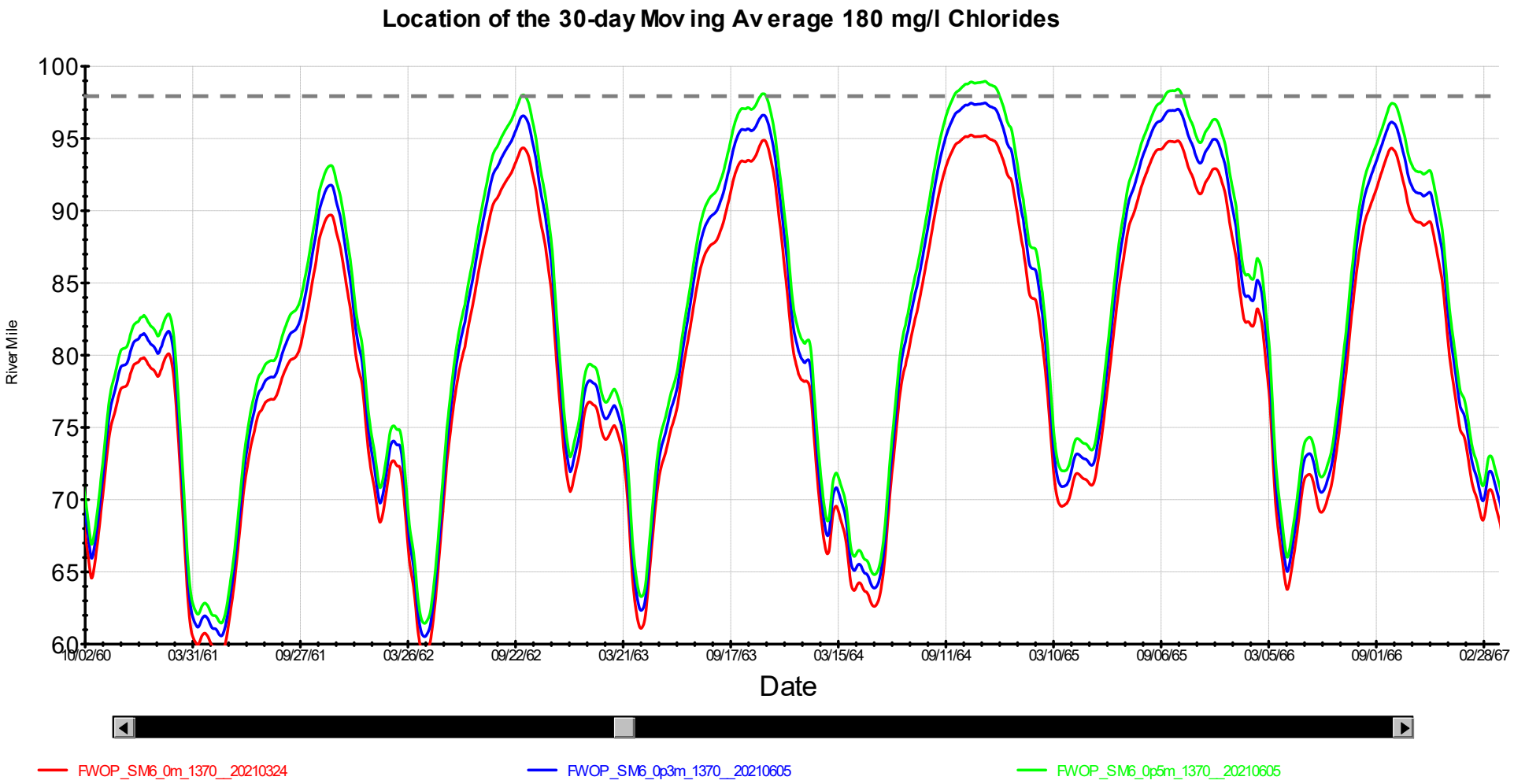


Using the historic rate of 3.53 mm/yr (1920-2000), SL has risen 0.07 m since the year 2000. Using the average sea level change since year 2000, SL has risen 0.15 m

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA



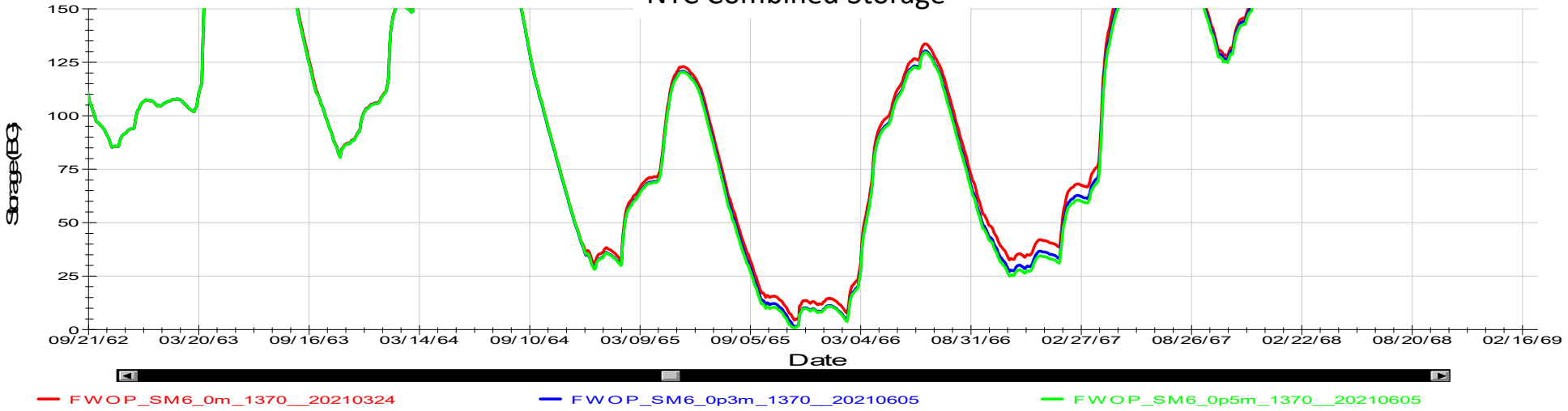
Simulations of FFMP2017 with SLR: 0 m 0.3 m 0.5 m



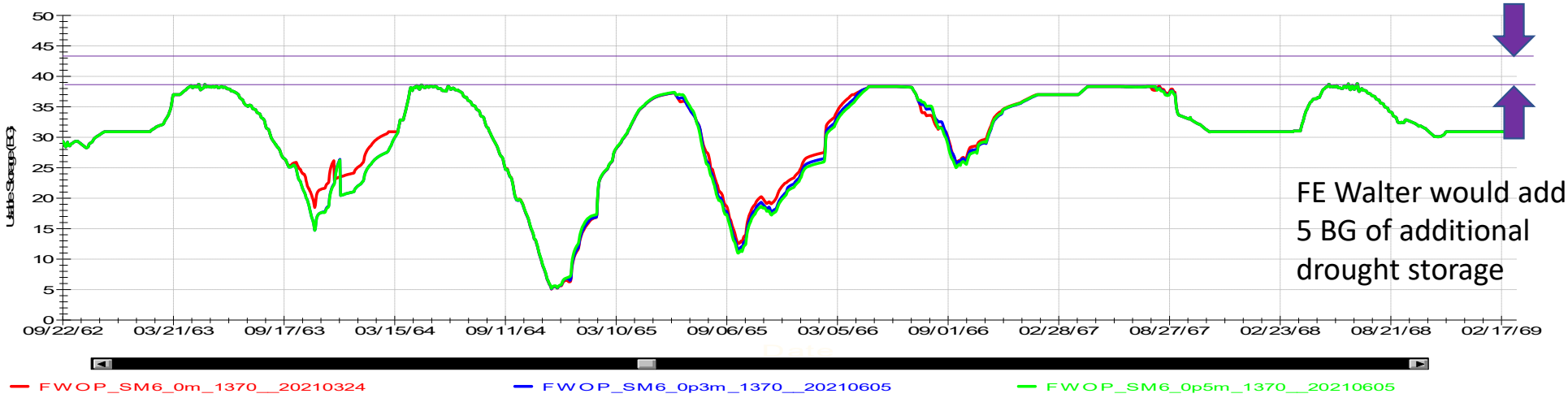
Simulations of FFMP2017 with SLR: 0 m 0.3 m 0.5 m

Simulations of FFMP2017 with SLR: 0 m 0.3 m 0.5 m

NYC Combined Storage



Lower Basin Combined Storage

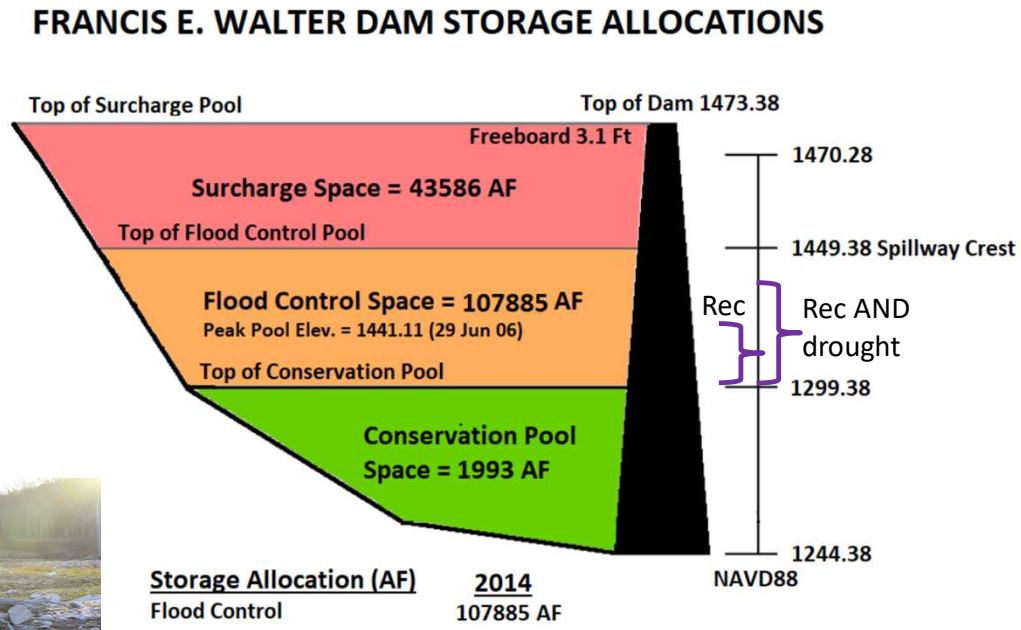


FE Walter would add 5 BG of additional drought storage

FE Walter

Summer Pool

Storage Allocation



Summary

* On average, 66 percent of flow in the river is from the watersheds above Trenton and Philadelphia
* The estuary supports a variety of water users
* Salinity has been a long-standing concern in the basin
* Unlike the fisheries program, the salinity/drought management program and components have not been adapted over time
* Sea level rise and chlorides present the greatest challenges to use of water from the estuary
* Work is underway to understand those challenges and develop or modify strategies to manage issues

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Why you should care?

Jennifer Garigliano
BUREAU OF WATER SUPPLY

NYC Environmental Protection

- NYC Delaware releases tied to the position of the salt front during drought emergencies
- NYC modeling has shown that those releases don't make enough of a difference
- Not an effective use of storage
- Storage from F.E. Walter is more efficient
- More water in PCN during times of drought, therefore higher releases