Delaware River Basin Commission

Flow Management

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March 17, 2016

AWWA NJ Annual Conference

Photo: David B. Soete

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Flow Management:
What is it all about?

High (flood)

Low (**Drought**/ Supply Quality)

Competing Objectives

- Drinking Water – 15+ million people
- Flow Augmentation – basin equity
- Aquatic Resources
  - endangered species (Mussels, Atlantic Sturgeon)
  - Oysters
  - Trout
- Assimilative Capacity
- Hydropower
- Recreation
- Flood Mitigation

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When is the next flood?

WHEN IS THE NEXT DROUGHT?

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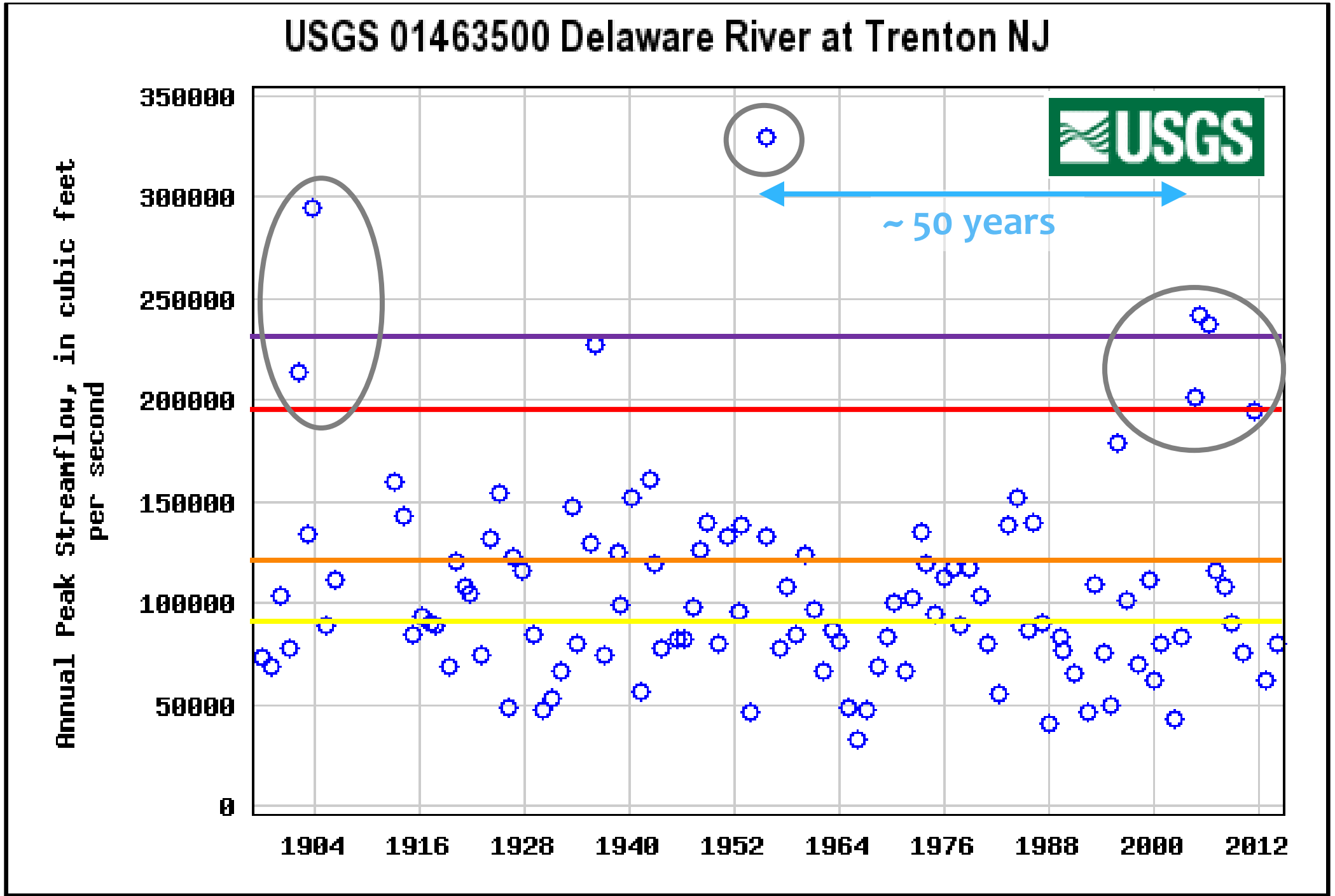
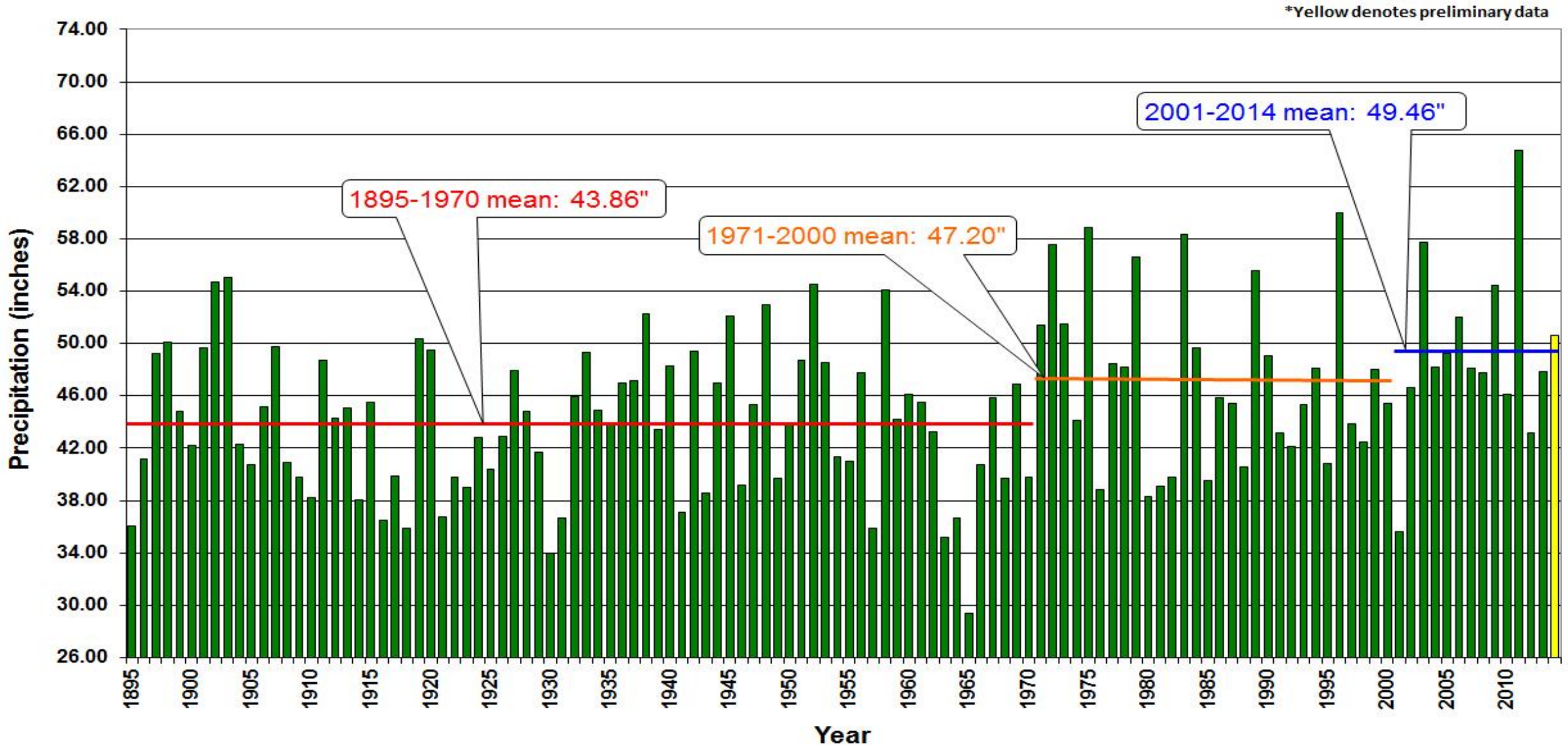

USGS 01463500 Delaware River at Trenton NJ
Annual Peak Streamflow, in cubic feet per second
350000
300000
250000
200000
150000
100000
50000
0
1904
1916
1928
1940
1952
1964
1976
1988
2000
2012
~ 50 years
USGS

1965 @ Trenton, NJ

NJ Statewide Annual Precipitation (1895-2014)



Water Supply and Droughts

* New York City - Reservoirs
* New Jersey - Run of River - Canal
* Pennsylvania – Run of River

* 1929-1931 - Drought
* 1931 – Supreme Court Decree
* 1954 – Amended Supreme Court Decree
* 1964-67 – Drought
* 1983 – Good Faith Agreement
* 2007 – Flexible Flow Management Program

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Key Terms of the Decree

1954

* **Out-of-basin diversions** for NJ (100 mgd) an d NYC (800 mgd)
* **Compensating releases** to maintain flow to the lower portion of the River (NYC responsibility)
  * **Flow objective at Montague, NJ**
  * "Excess" water between 6/15 and 3/15
* Treatment of Port Jervis Sewage (NYC responsibility) improve water quality going downstream
* Establish **River Master** to administer Decree

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Key Terms of the Good Faith Agreement

1983

* Established **drought operating curves**
* Created **Trenton Flow Objective**
* **Phased reductions of Diversions and Flow Objectives**
* **Banking** "Excess Water"
* Provided **enhanced conservation releases** during normal conditions

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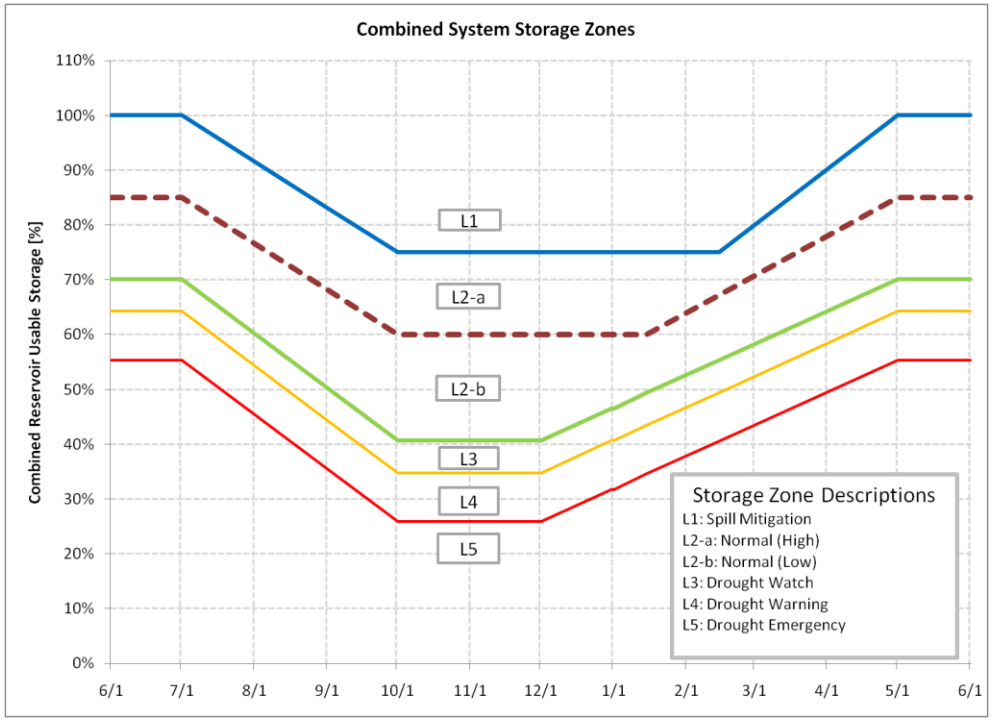
Flexible Flow Management Program

Delaware Basin Flow Objectives		
	Montague	**Trenton**
NYC Storage Condition	(cfs)	(cfs)
Normal (L1, L2)	1,750	3,000
Drought Watch (L3)	1,650	2,700
Drought Warning (L4)	1,550	2,700
Drought Emergency (L5)	1,100-1,650*	2,500-2,900*
Severe Drought (to be negotiated depending upon conditions)		
* Varies with time of year and location of salt front		

Figure 1

Drought Zones based on NYC Combined Storage



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

Trenton Flow Objective

Concept:

- ✓ Based on drought status
  - ✓ Basinwide – NYC Storage
  - ✓ Lower Basin – Beltzville and Blue Marsh Storage
- ✓ Varies Seasonally
- ✓ Varies with location of the "salt front" (drought emergency)

Goals:

- ✓ Salinity Repulsion
  - ✓ Drinking Water
  - ✓ Industry
  - ✓ Power
- ✓ Freshwater Inflows to Estuary

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Impacts of Salinity and Chloride
on Water Users

* Corrosion
* Requires additional treatment – Membranes/ Desalination
* Secondary drinking water standards
  * Chloride 250 mg/l
  * Sodium restricted diets
  * Dialysis
  * Food and Beverage Manufacturers

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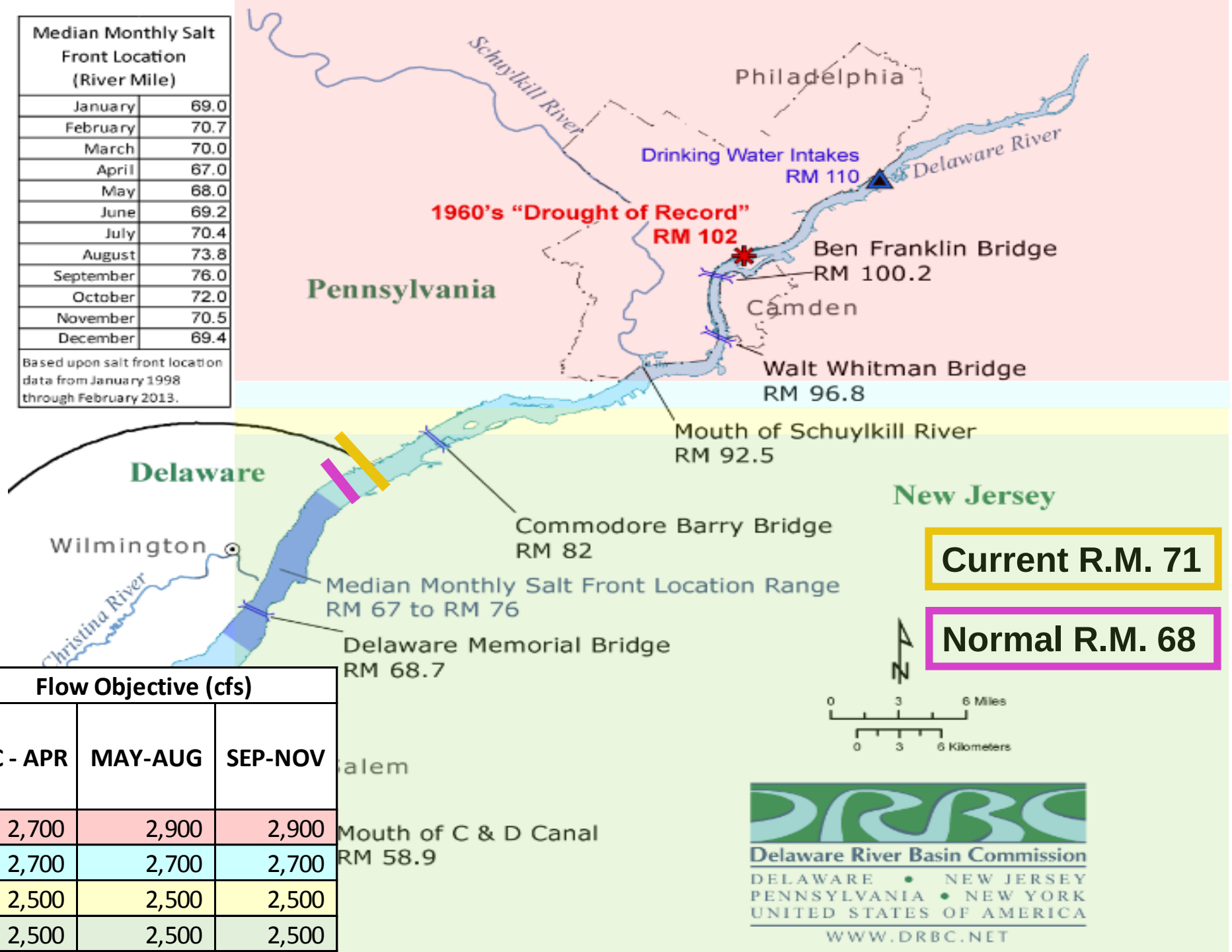
Median Monthly Salt Front Location (River Mile)	
January	69.0
February	70.7
March	70.0
April	67.0
May	68.0
June	69.2
July	70.4
August	73.8
September	76.0
October	72.0
November	70.5
December	69.4

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



7-Day Average Salt Front Location	Flow Objective (cfs)		
	DEC - APR	MAY-AUG	SEP-NOV
US RM 92.5	2,700	2,900	2,900
BTN 92.5 and 87	2,700	2,700	2,700
BTN 87 and 82.5	2,500	2,500	2,500
DS 82.5	2,500	2,500	2,500

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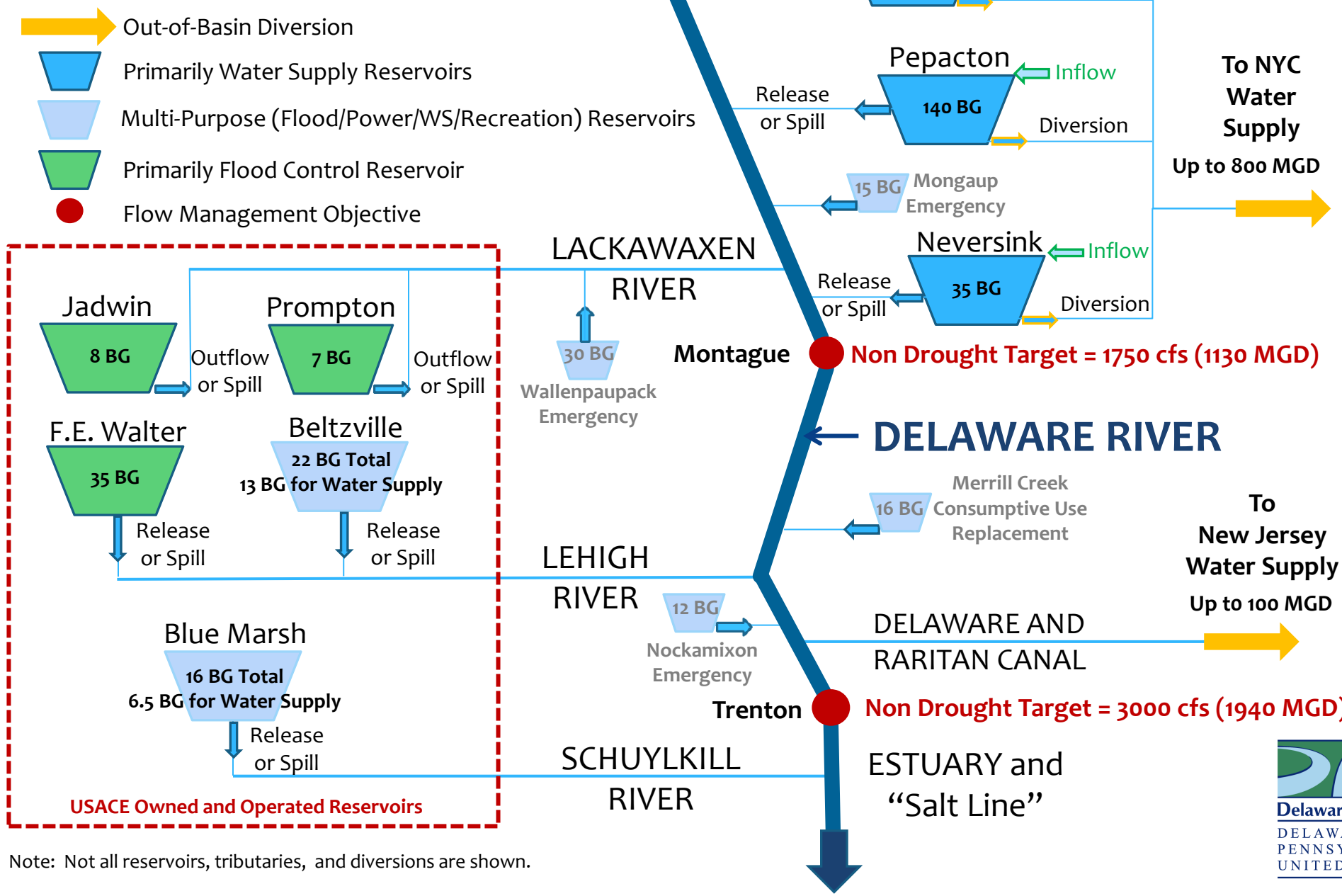
Water Management Schematic for the Delaware River Basin



Note: Not all reservoirs, tributaries, and diversions are shown.

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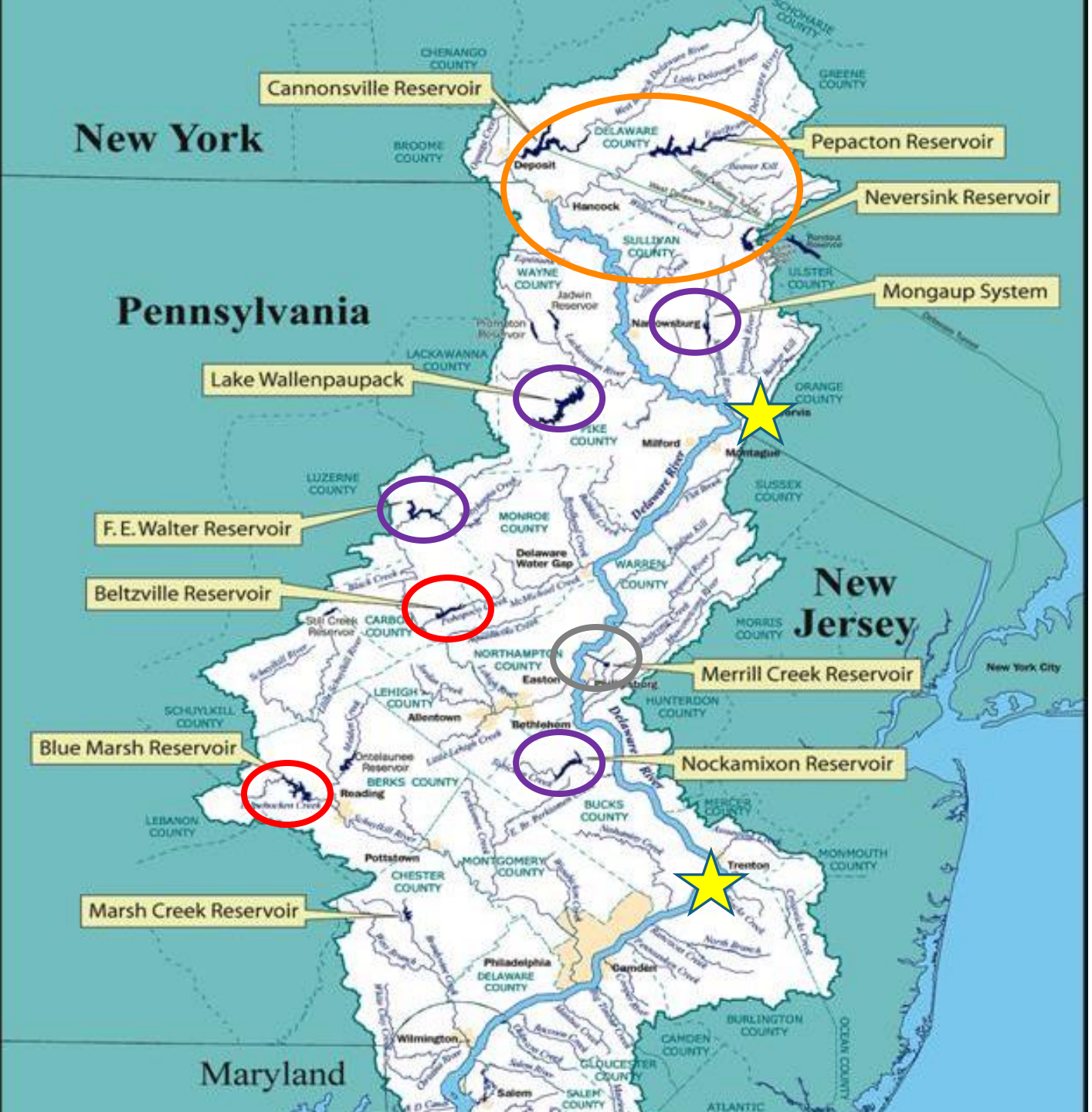

Sources of Water

for Flow Objectives

MONTAGUE – River Master

- NYC Reservoirs
- Hydropower*

TRENTON - DRBC

- ERQ (Decree)
- DRBC Storage in USACE Reservoirs
- Emergency
- Consumptive Use Make –Up

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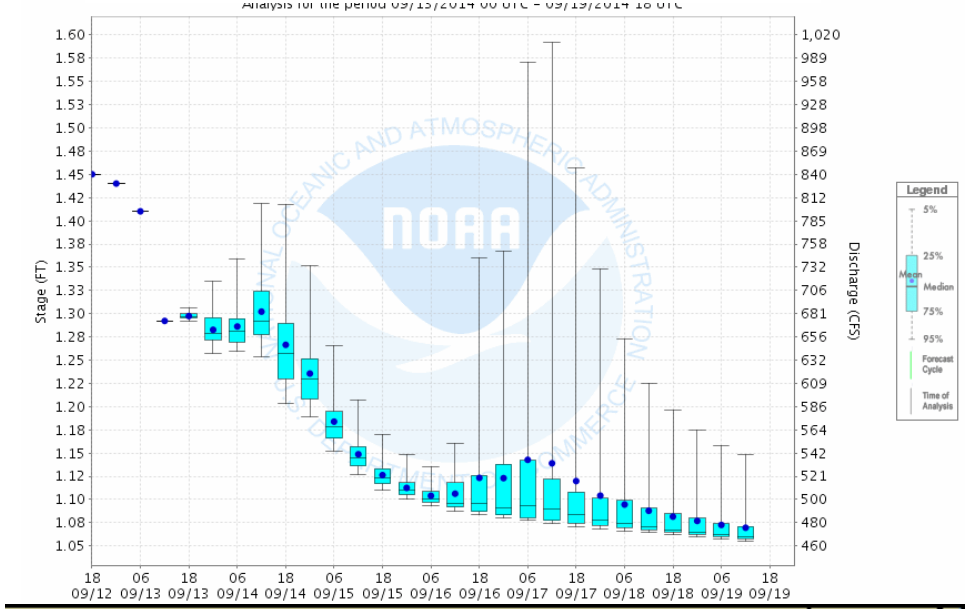
How quickly will baseflow drop?



Will it get there on time?

Approximate Travel Times During Low Flow Conditions				
	Hours		Days	
	Montague	Trenton	Montague	Trenton
Cannonsville	48	96	2	4
Pepacton	60	108	2.5	4.5
Neversink	33	84	1.4	3.5
Wallenpaupack	16	64	0.7	2
Rio	8	56	0.3	2
Merrill Creek		24		1
FE Walter	44	60		2.5
Beltzville		32		2
Nockamixon		12		0.5
	Philadelphia			
Blue Marsh		38		

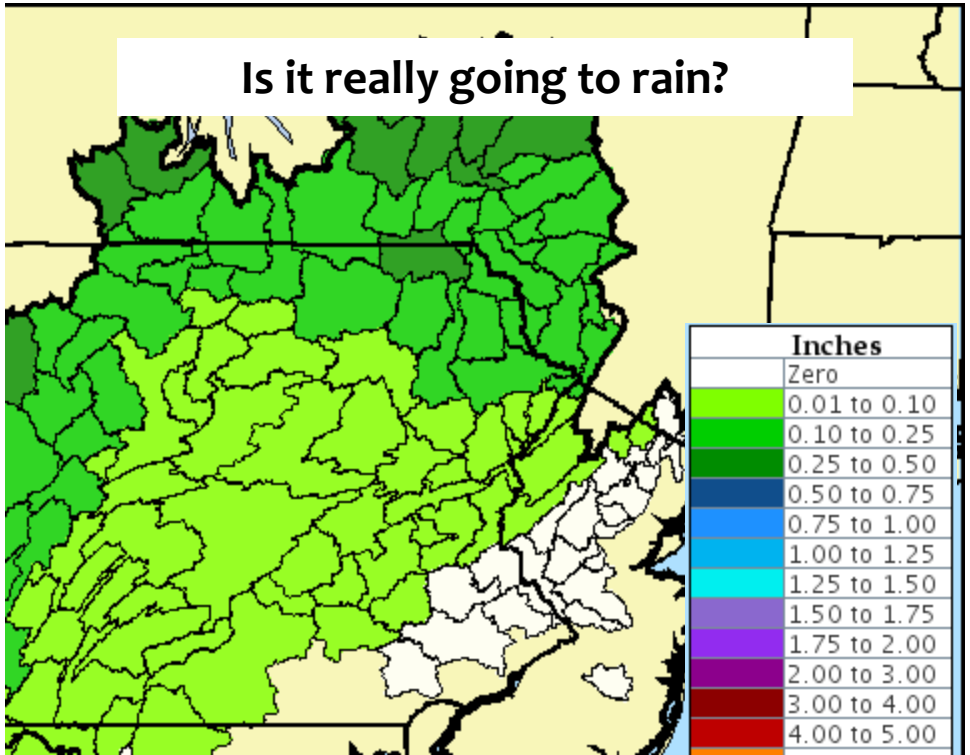
Will the River Master meet Montague?

USGS science for a changing world

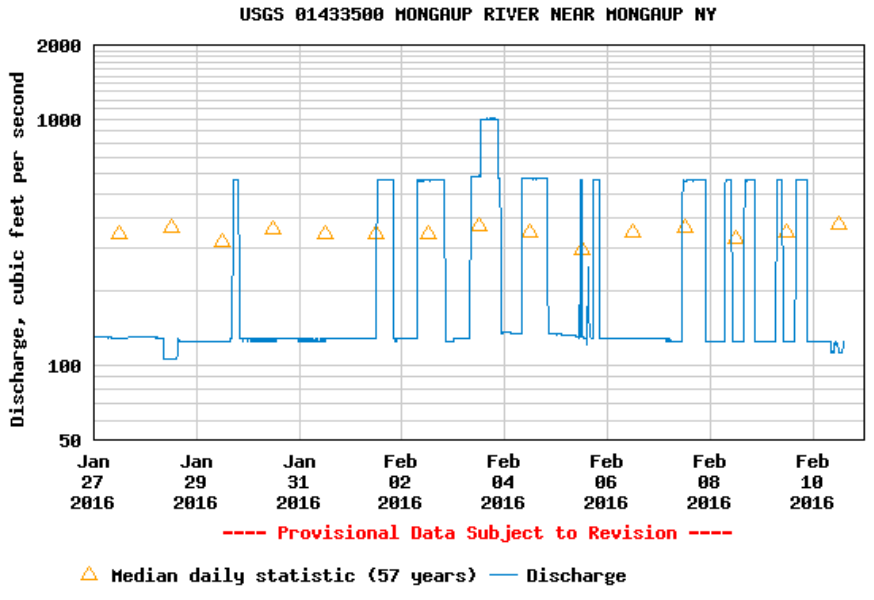
What is NJWSA taking from the Canal?

EST. 1981

Is it really going to rain?



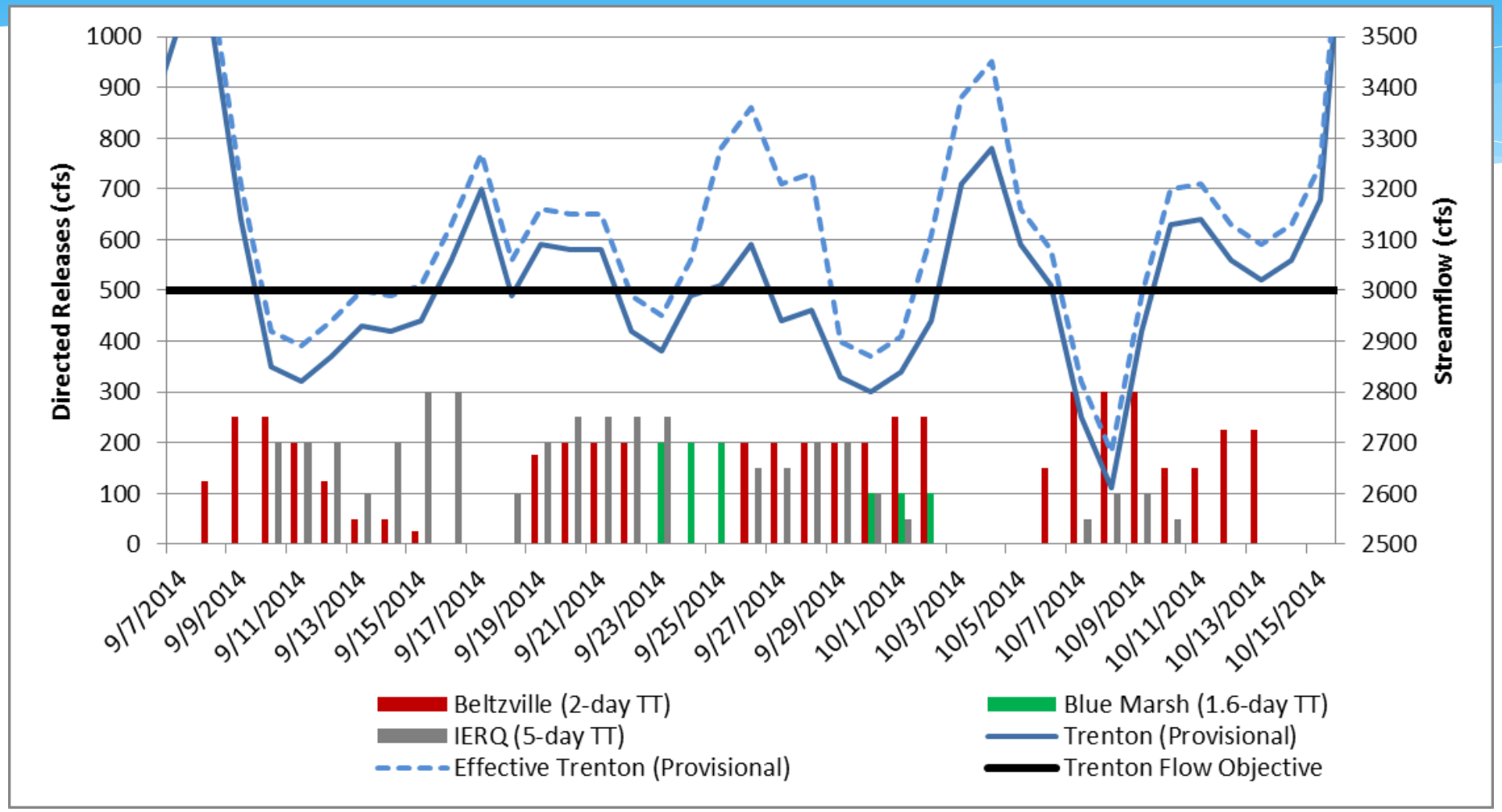
Will scheduled hydropower release occur?



Are there recreation releases from reservoirs?

USACE

2014 Directed Releases
for Trenton



Flow Management

Today could be the first day of the next drought of record

Thank You!


Photo: NYCDEP

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