

Delaware River Basin Commission

FFMP Implementation Performance

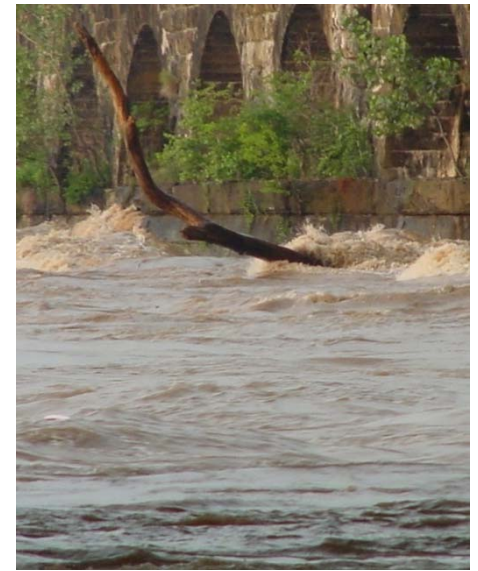
Release Year 2017

June 1, 2017 – May 31, 2018

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Manager, Water Resource
Operations

July 2018



Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Prepared for DRBC's Regulated Flow Advisory Committee. Contents should not be published or re-posted in whole or in part without the permission of the author.

NOTE

All data are provisional.

Final/approved data are available from:

NYC Department of Environmental Protection (NYCDEP)

Office of the Delaware River Master (ODRM)

United States Geological Survey (USGS)

FFMP Performance Goals

- * Manage droughts
- * Maintain flow objectives
- * Provide enhanced conservation releases
- * Maintain desirable tailwater temperatures
- * Minimize spills using the Conditional Seasonal Storage Objective (CSSO)

FFMP 2017

The Decree Parties did not reach full agreement by June 1, 2017. FFMP Operations followed an interim program until the Agreement was signed on October 21, 2017.

All comparisons are based on the release rates and Combined Seasonal Storage Objective in effect at the time:

- * 6/1/2017 – 10/21//2017: Interim FFMP
- * 10/22/2017 – 5/31/2018: FFMP 2017

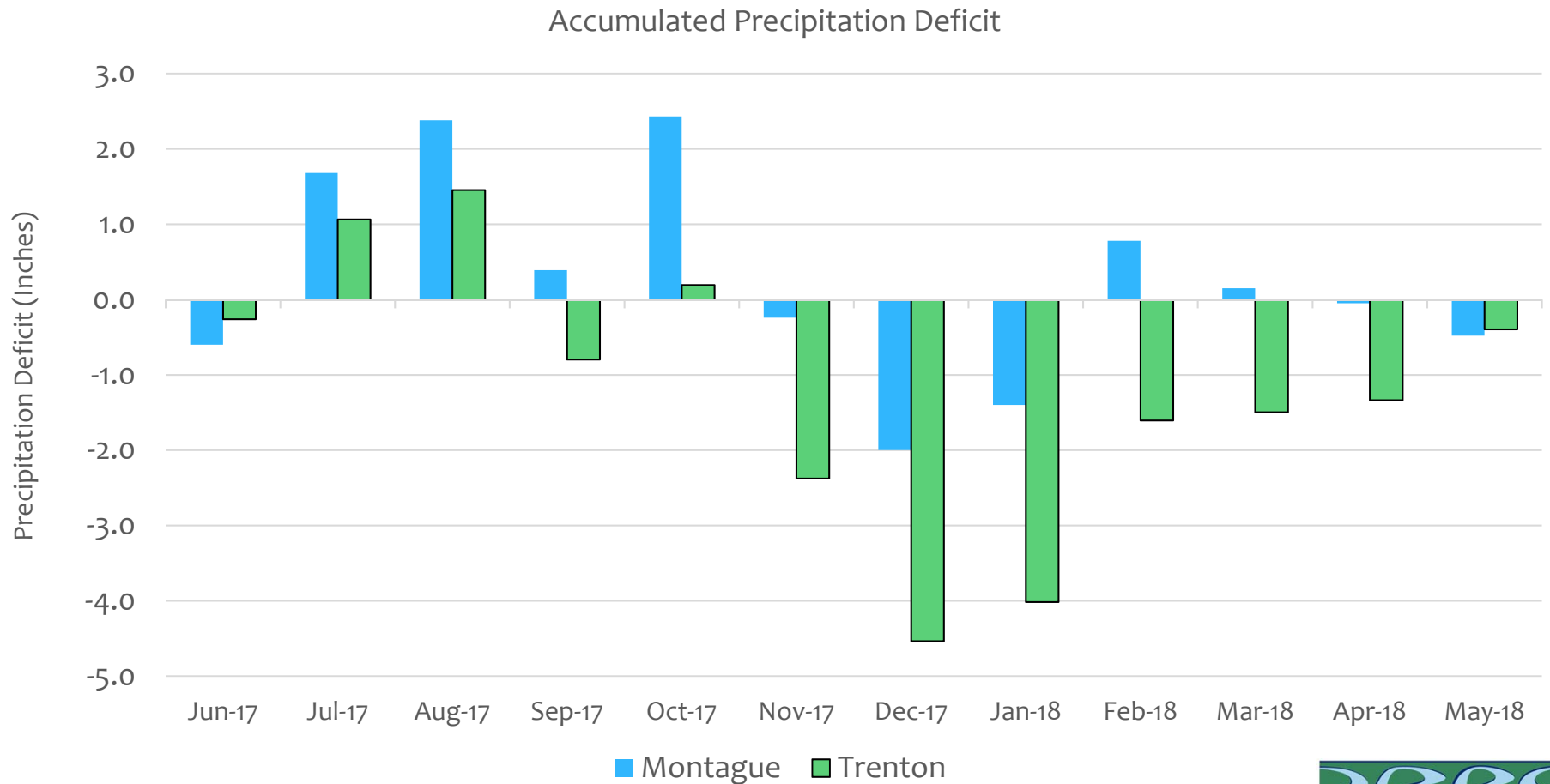
FFMP 2017 Interim Program Comparison

Component	Interim Program	FFMP 2017
Effective Period	6/1/17-10/21/2017	10/22/2017 – 5/31/2023
Excess Release Quantity	<ul style="list-style-type: none"> Based on D77-20-CP 12, 903 cfs-days (8.34 BG) Released as Seasonal Increment of 108 cfs 	<ul style="list-style-type: none"> 15,468 cfs-days (10 BG) Distributed to four banks* Not needed 10/22/27-5/31/3018
Conservation Releases	OST – Forecast Based Available Water – Tables Rev 1 and 4B-4E 6,000 cfs-days for thermal (9.3 BG)	OST – Forecast Based Available Water – Tables 4A-4G
Conditional Seasonal Storage Objective	90% September 1 – March 15	85% November 1 - February 1

Programs were similar, but the largest conservation releases were smaller.

* Trenton, Thermal, Rapid Flow Change, NJ Drought Diversion Offset

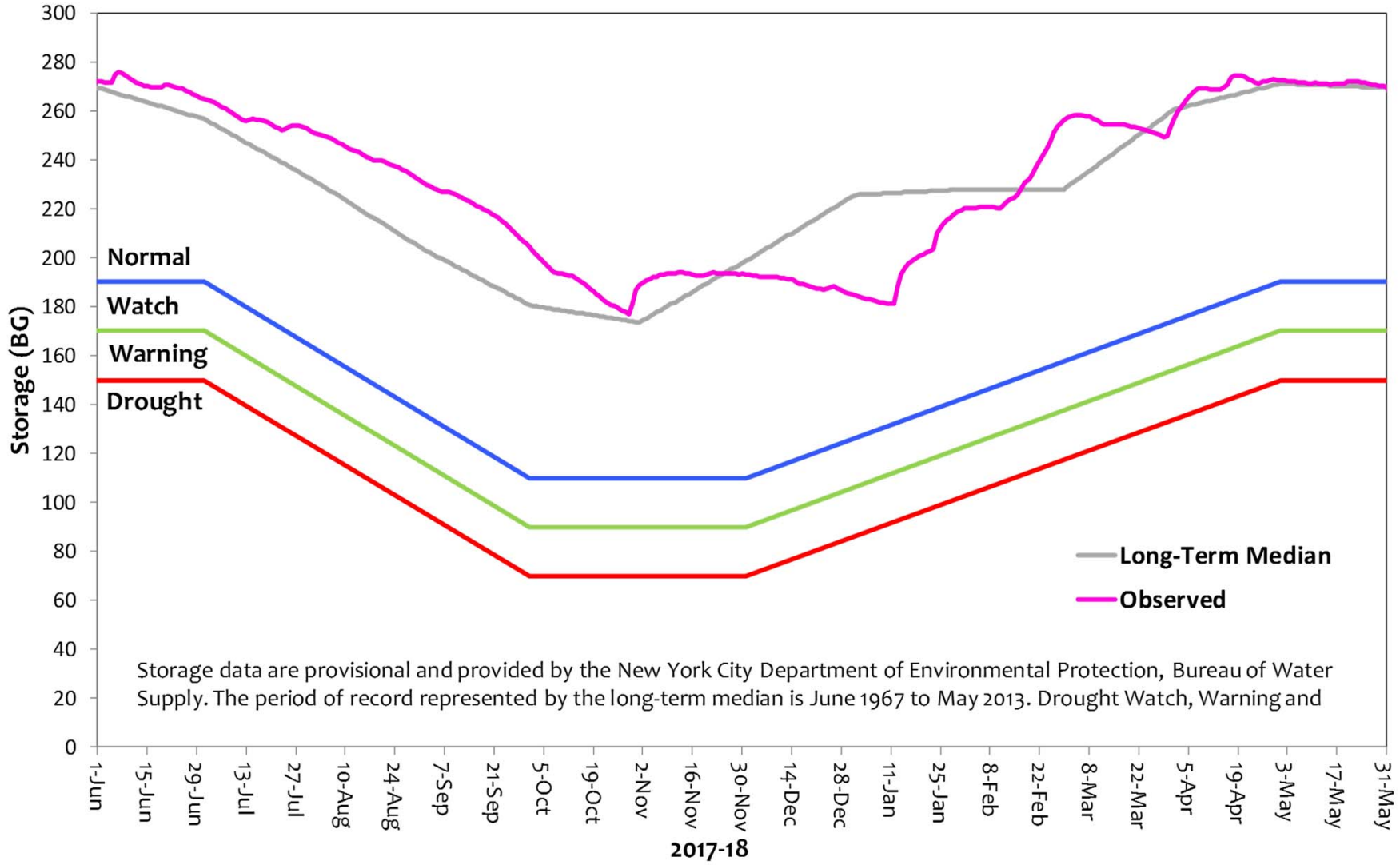
Precipitation Deficit



Data sources: ODRM, MARFC. Period of Record: 1981-2010



New York City Delaware River Basin Storage



Data Source: NYC
Generated by DRBC



Flow Objectives

Water Released from NYC Reservoirs to meet Montague Flow Objective (MG)

Montague	Trenton
33,166	0

Water Released From Lower Basin Reservoirs to Meet Trenton Flow Objective (MG)

Beltzville	Blue Marsh
0	0

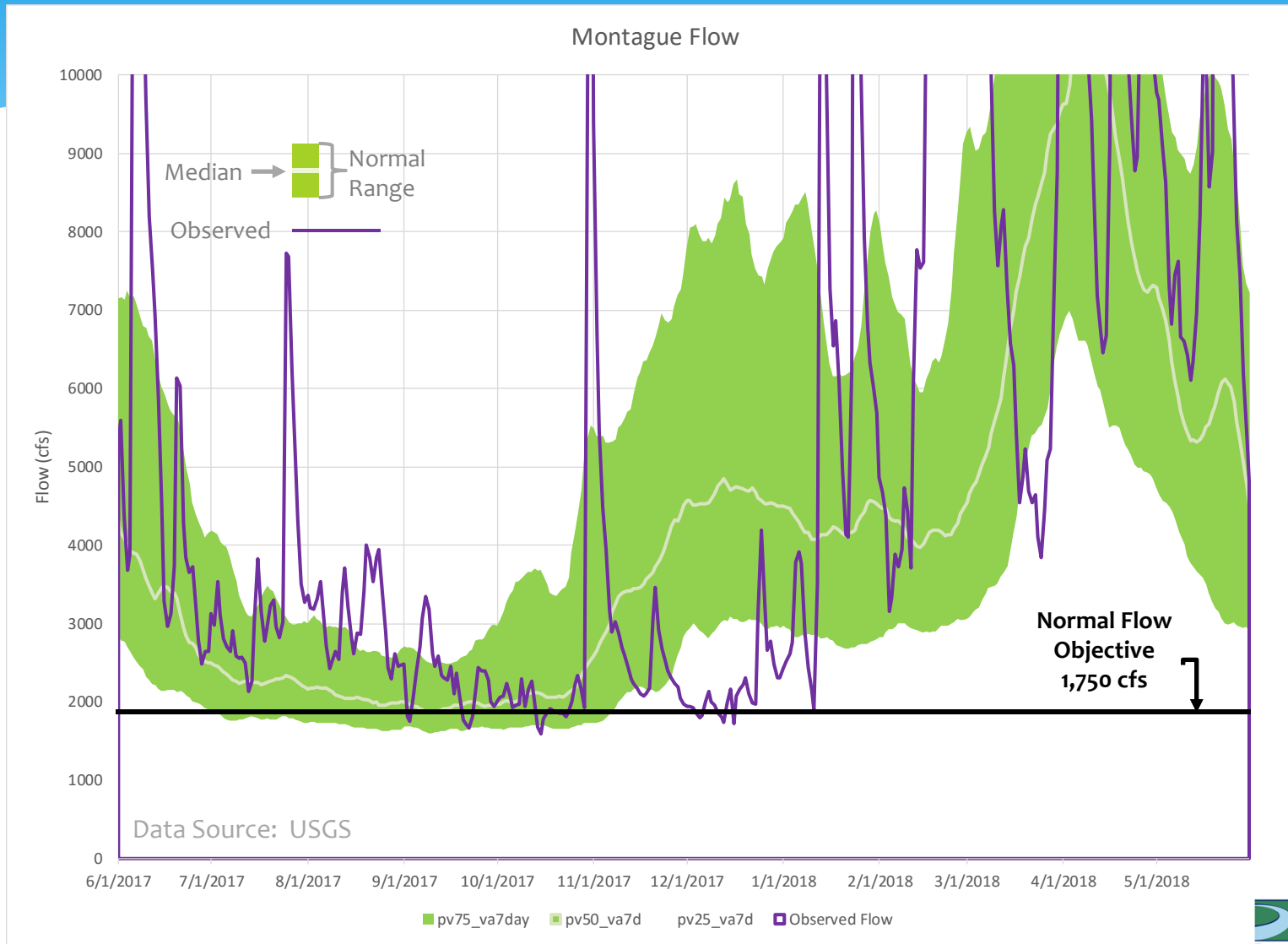
Water from DRBC Water Supply Storage

- 7.4 BG from the 8.34 BG ERQ was used for the seasonal increment on 41 days between 8/13 and 10/23 (the interim program).
- Additional releases of 3.2 BG (4,838 of 6,000 cfs-days) were made from the REV1 Thermal Bank.

Data Sources: DRBC, ODRM, NYC

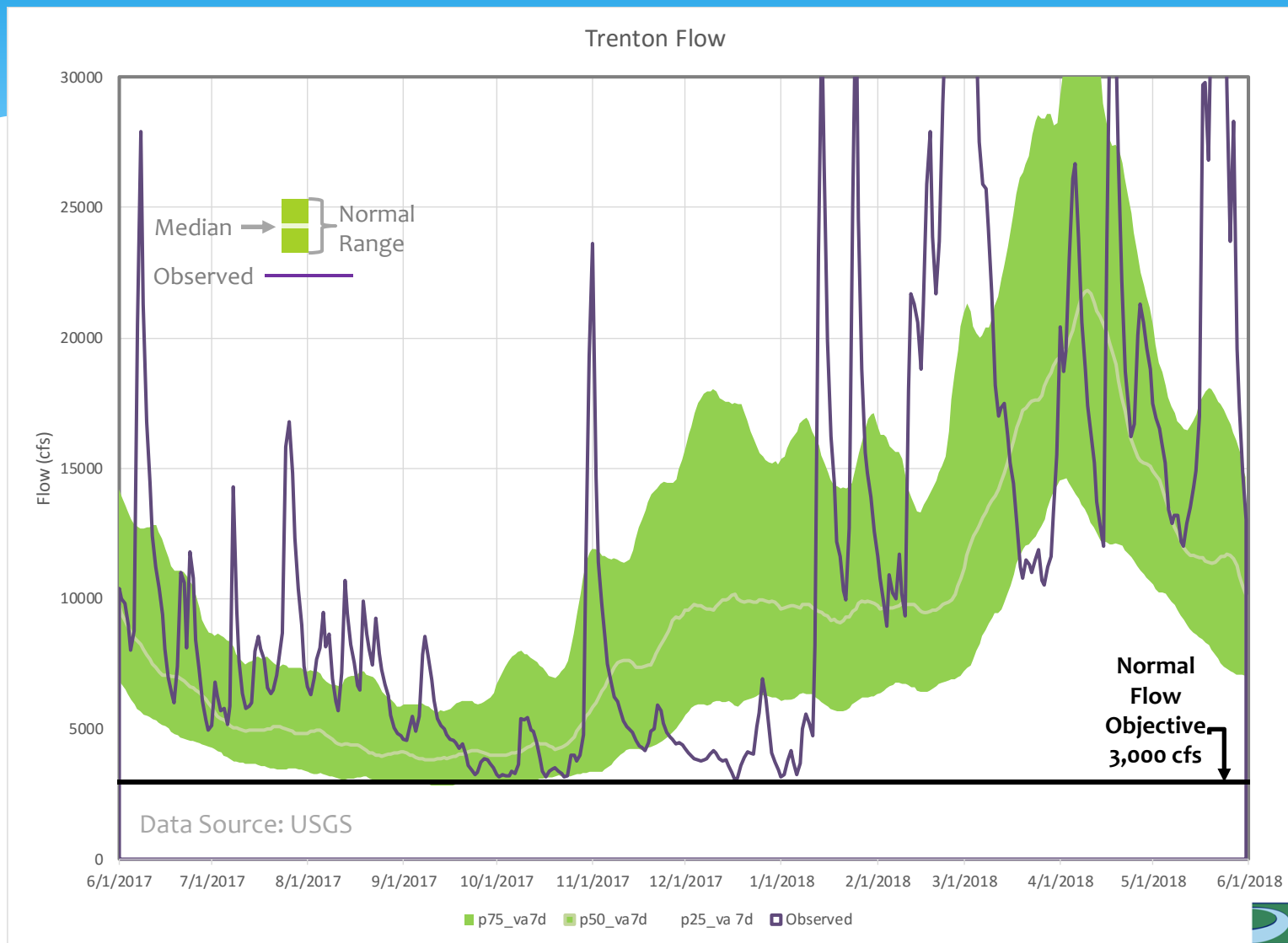


Montague Flow



All data are provisional. These observations were recorded on the following day and may not reflect the final published values from USGS.

Trenton Flow



All data are provisional. These observations were recorded on the following day and may not reflect the final published values from USGS.

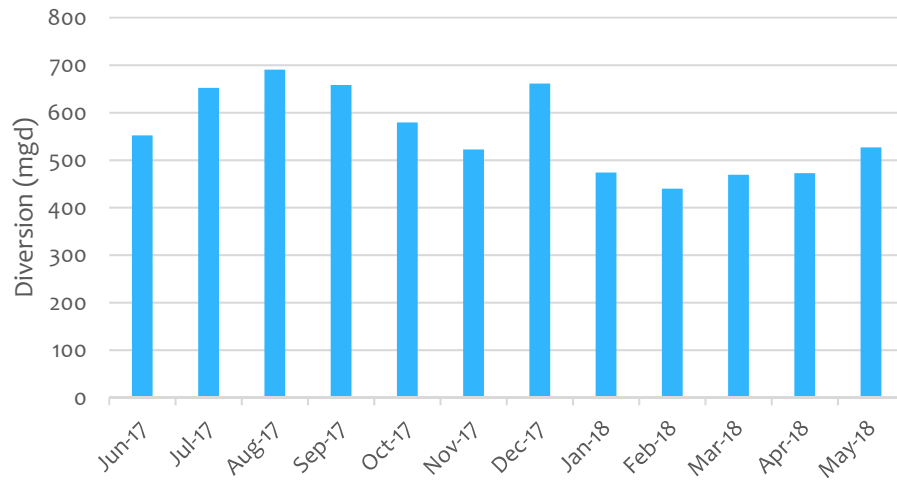
Diversions

Monthly Average Daily Diversion (June 1, 2017 - May 31, 2018)

New York	New Jersey
559 mgd	90.4 mgd

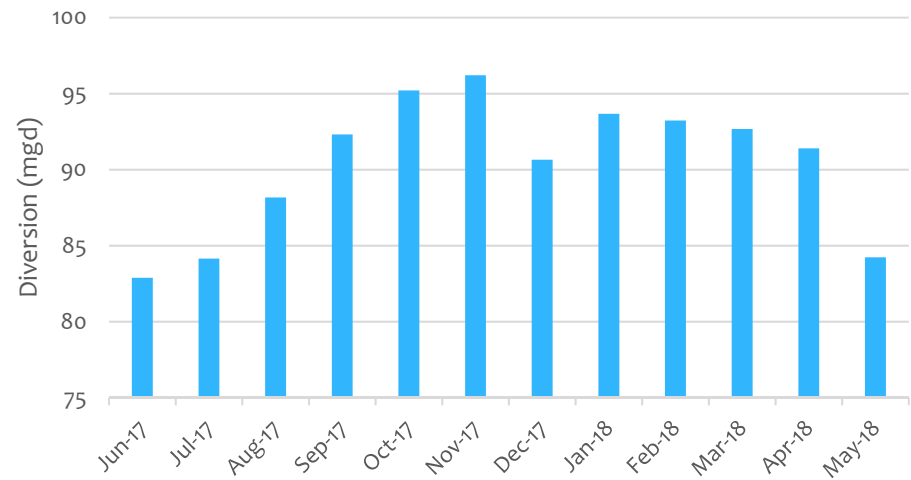
New York

NYC Average Monthly Diversion



New Jersey

NJ Diversion through the Delaware and Raritan Canal



Data Sources: NYC, USGS



Conservation Releases

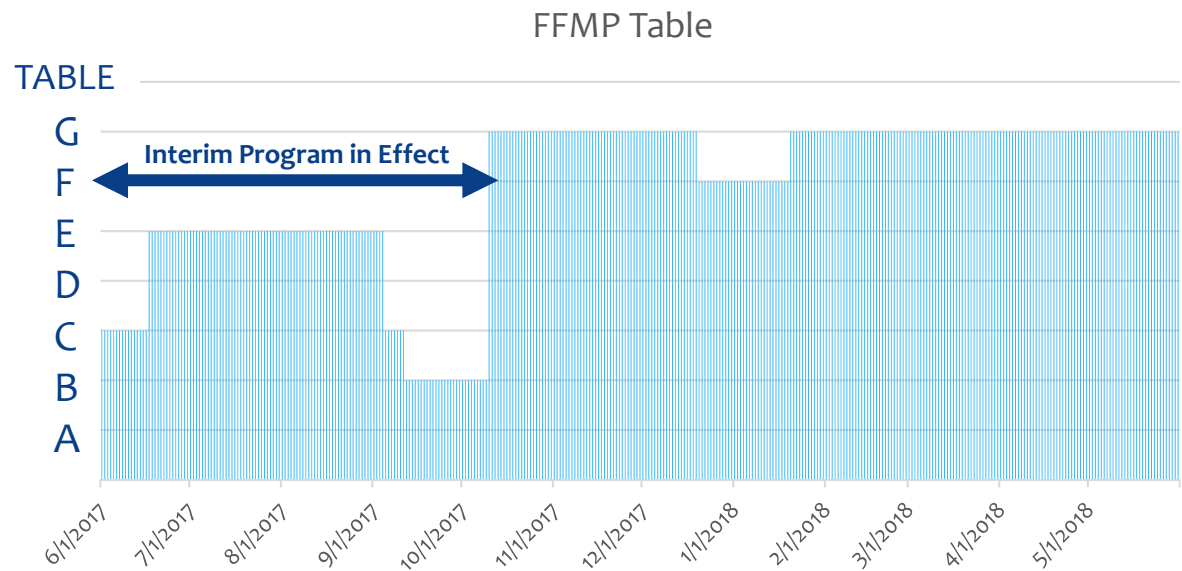
Volume of Conservation Releases (MG)

	FFMP 2017-2018	REV1	Multiple of Revision 1	FFMP 2016-2017
Cannonsville	87,052	20,655	4.2	82,510
Pepacton	37,697	14,554	2.6	33,152
Neversink	16,947	8,659	2.0	18,194

Values are the conservation releases required by the FFMP Tables **only**. All or a portion of the flow may have been used for meeting the Montague Flow Objective.

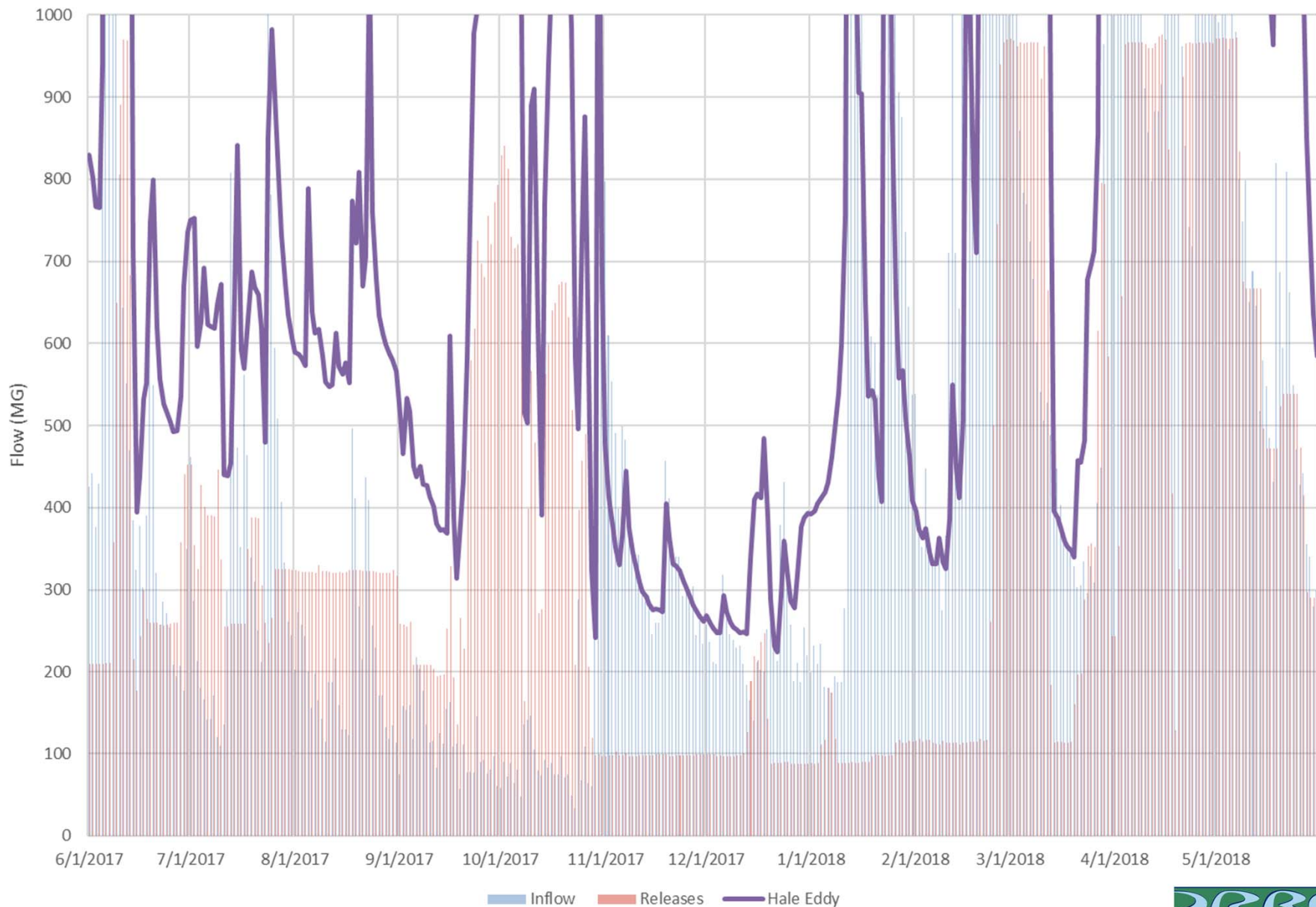
Release Tables

Release Tables		
FFMP Table	Number of Days	Percent
G	203	56
F	31	8
E	80	22
D	0	0
C	23	6
B	28	8
A	0	0



Raw Data Source: NYC
Compiled by DRBC

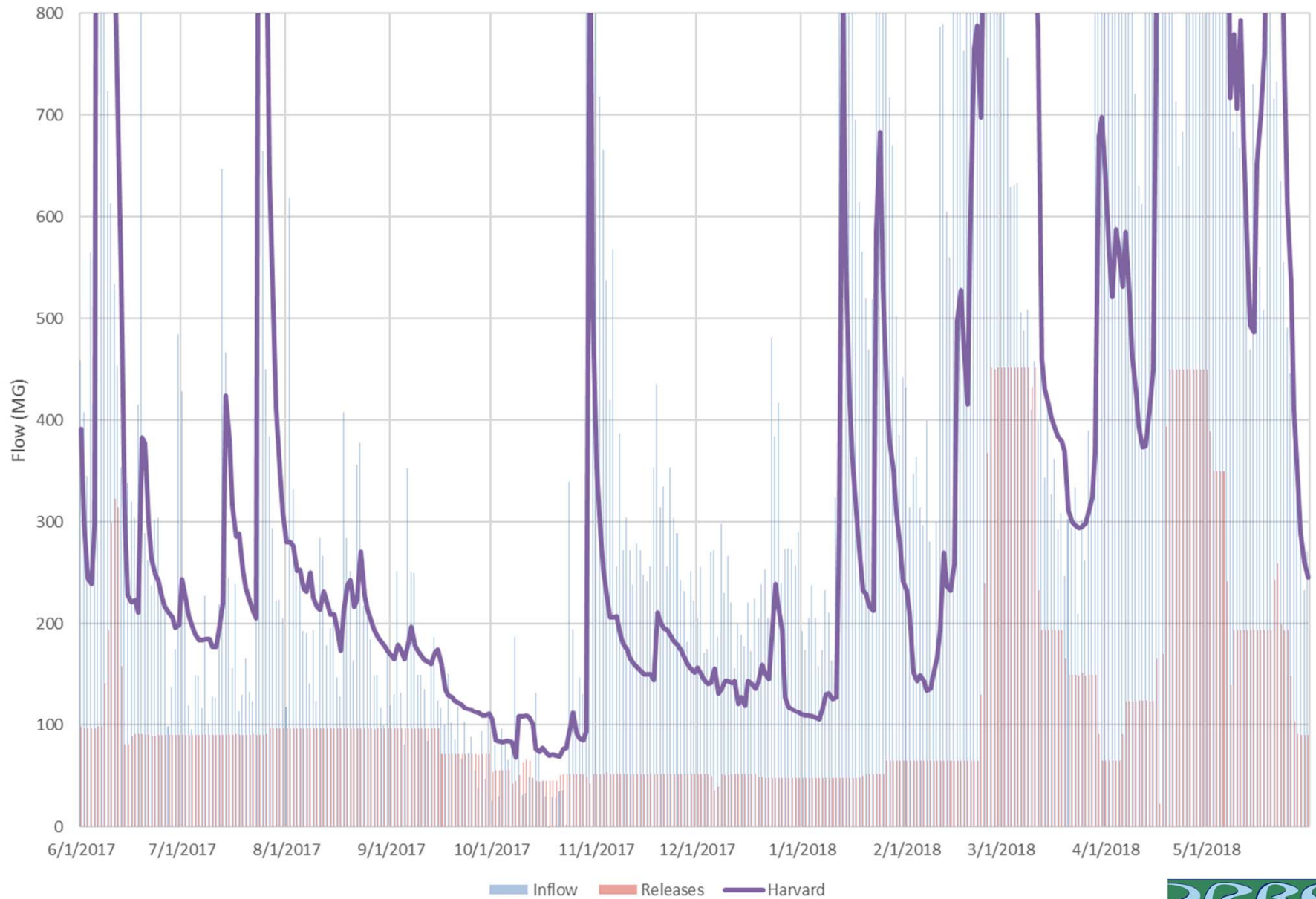
Cannonsville Inflow, Releases, Downstream Flow



Data Sources: USGS, NYC



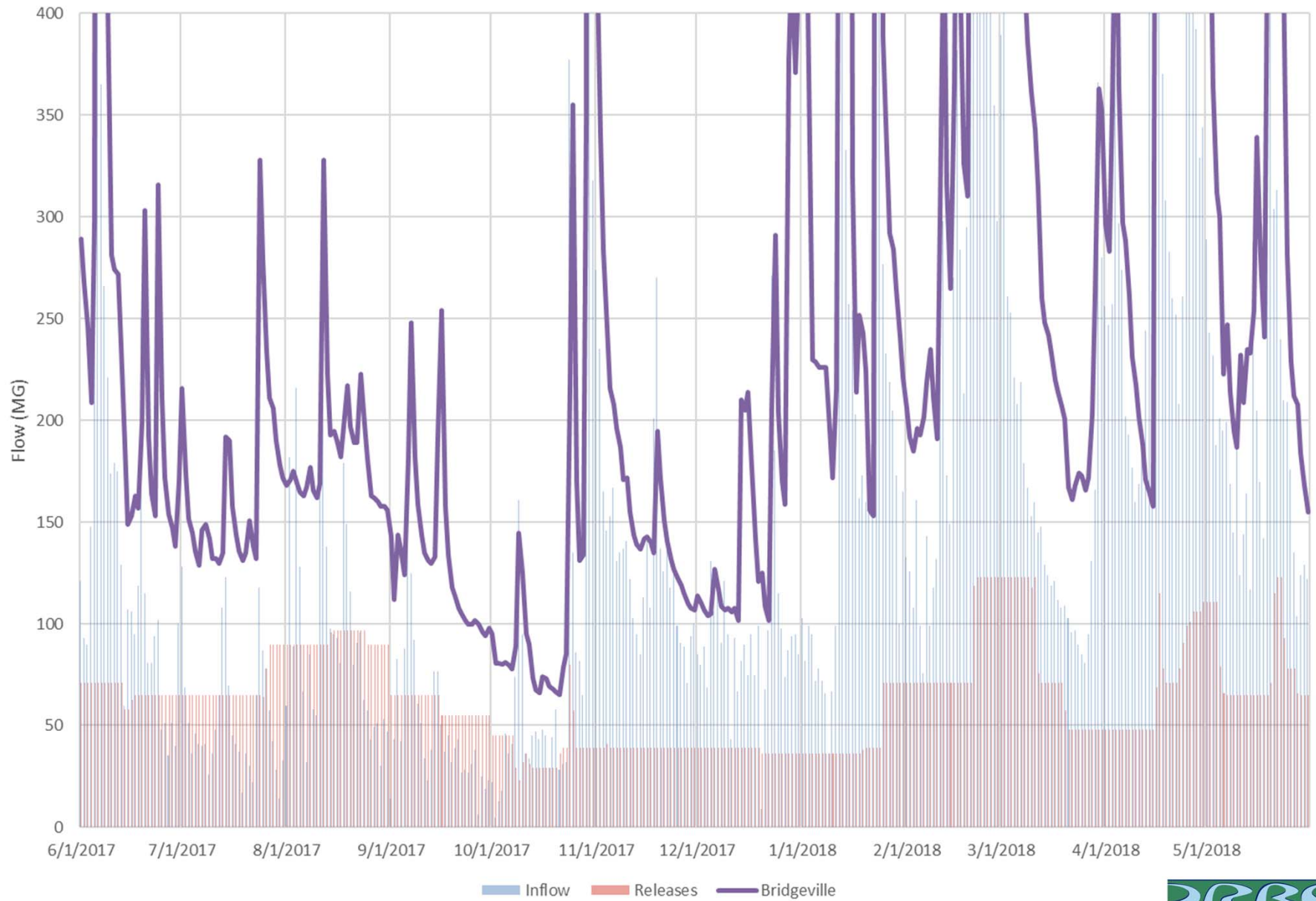
Pepacton Inflow, Releases and Downstream Flow



Data Sources: USGS, NYC



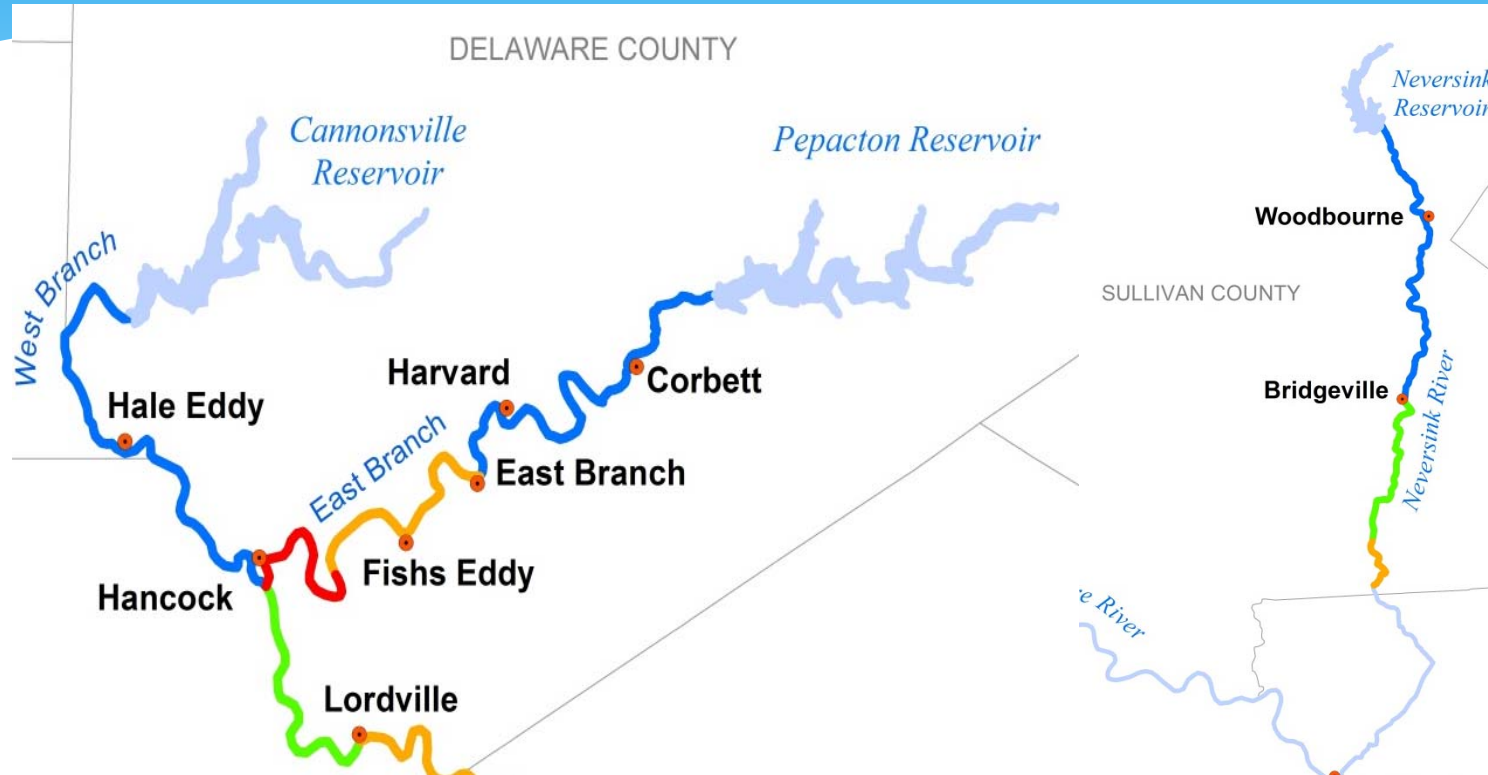
Neversink Inflow, Releases, Downstream Flow



Data Sources: USGS, NYC



Habitat Protection (Temperature)



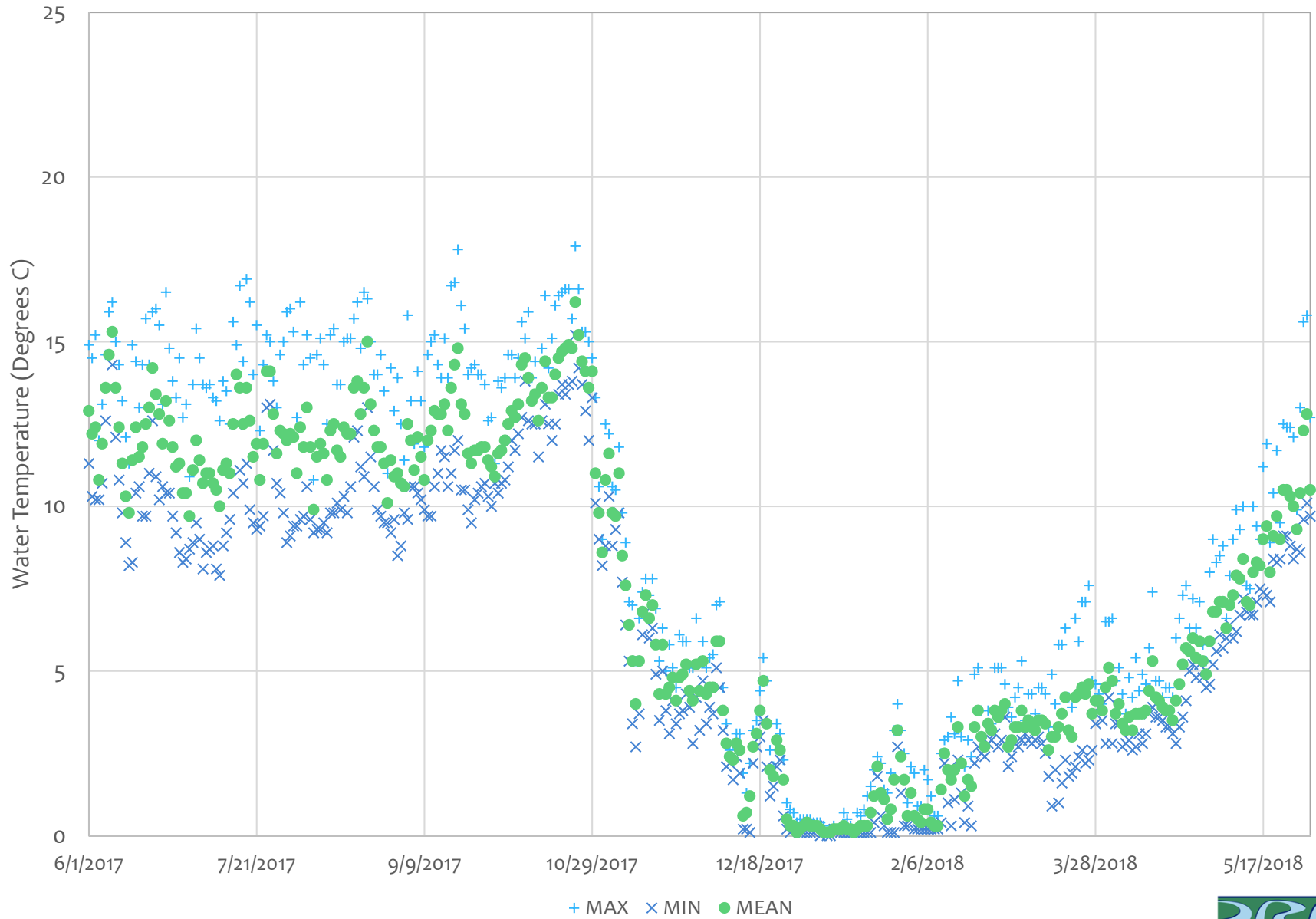
Coldwater Ecosystem Protection Level
For non-drought years; Includes flow & water temperature.

- Excellent
- Good
- Moderate
- Minimal

GOALS for Excellent Habitat:
Summer temperatures typically less than 20C
Rare exceedances of > 24C



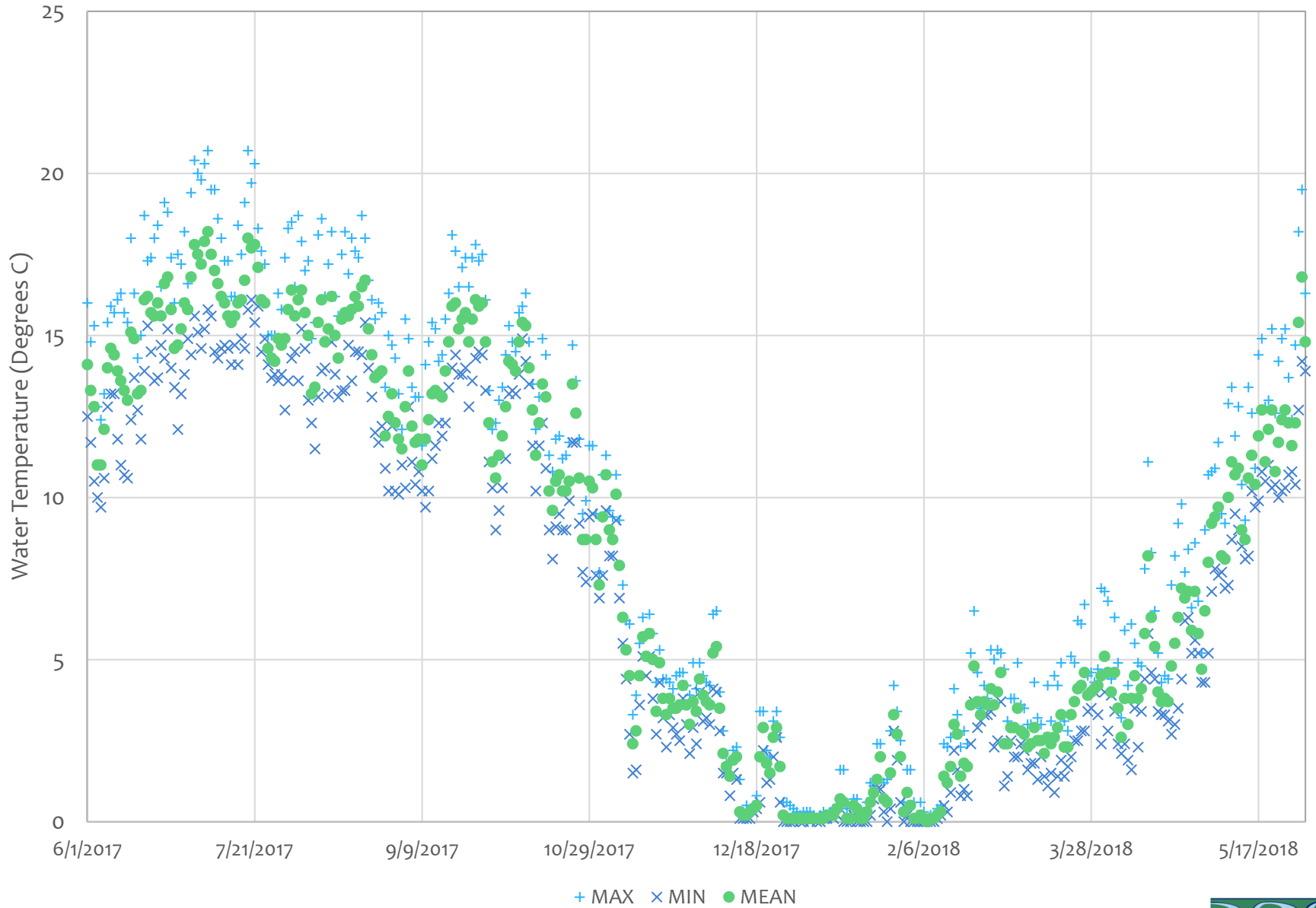
Temperature: West Branch Delaware River at Hale Eddy, NY



Data Source: USGS



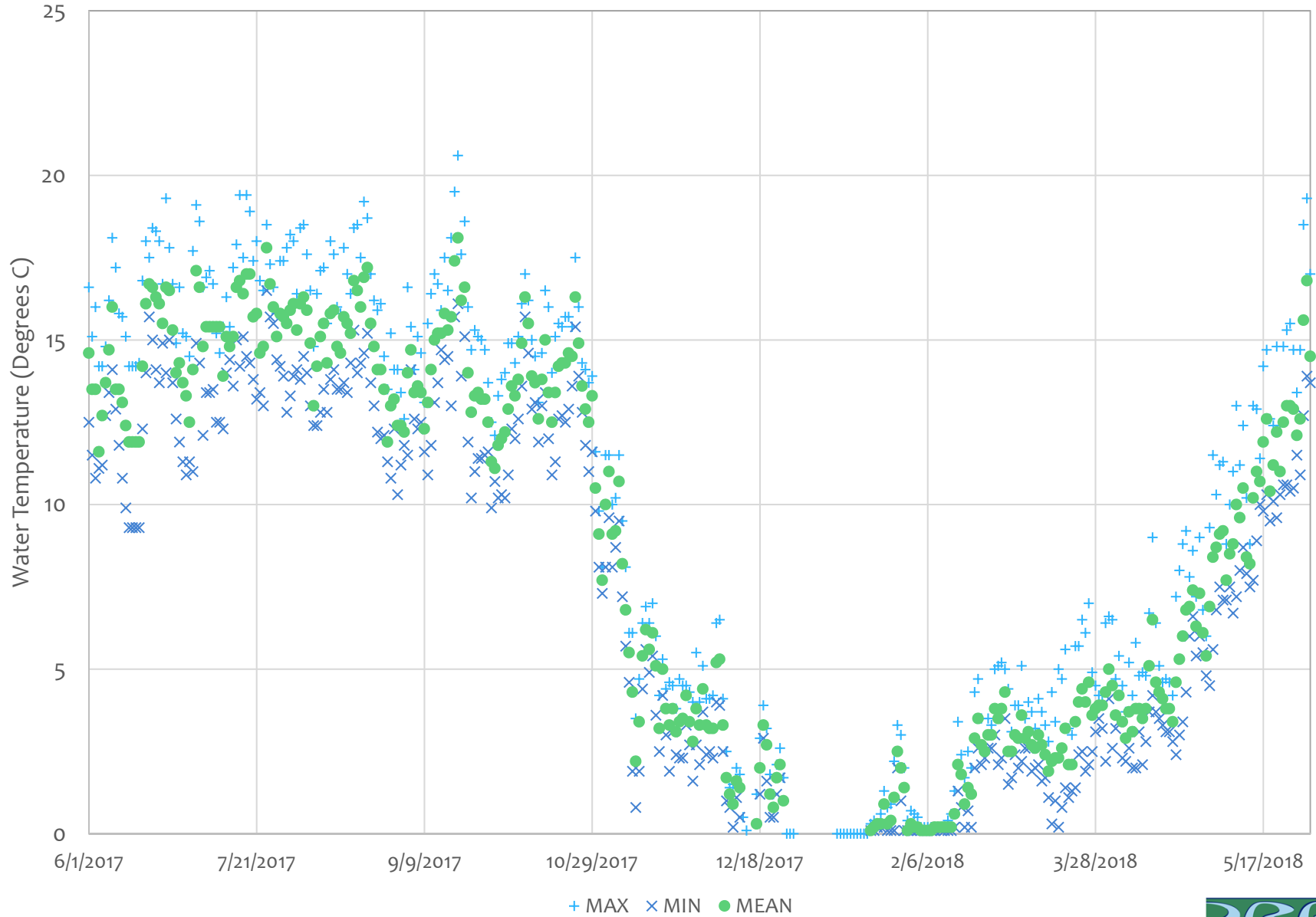
Temperature: East Branch Delaware River at Harvard, NY



Data Source: USGS



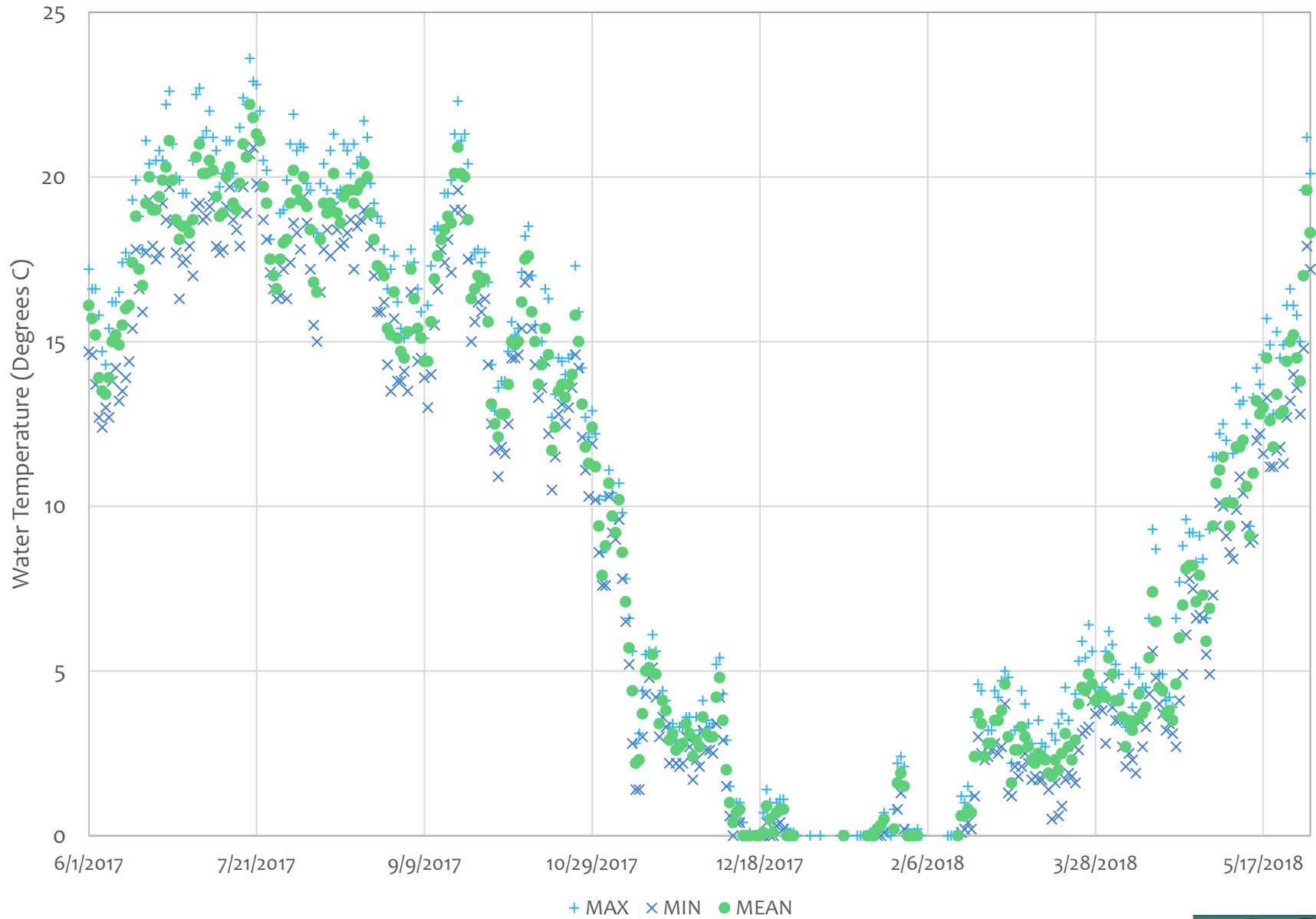
Temperature: West Branch Delaware River at Hancock, NY



Data Source: USGS



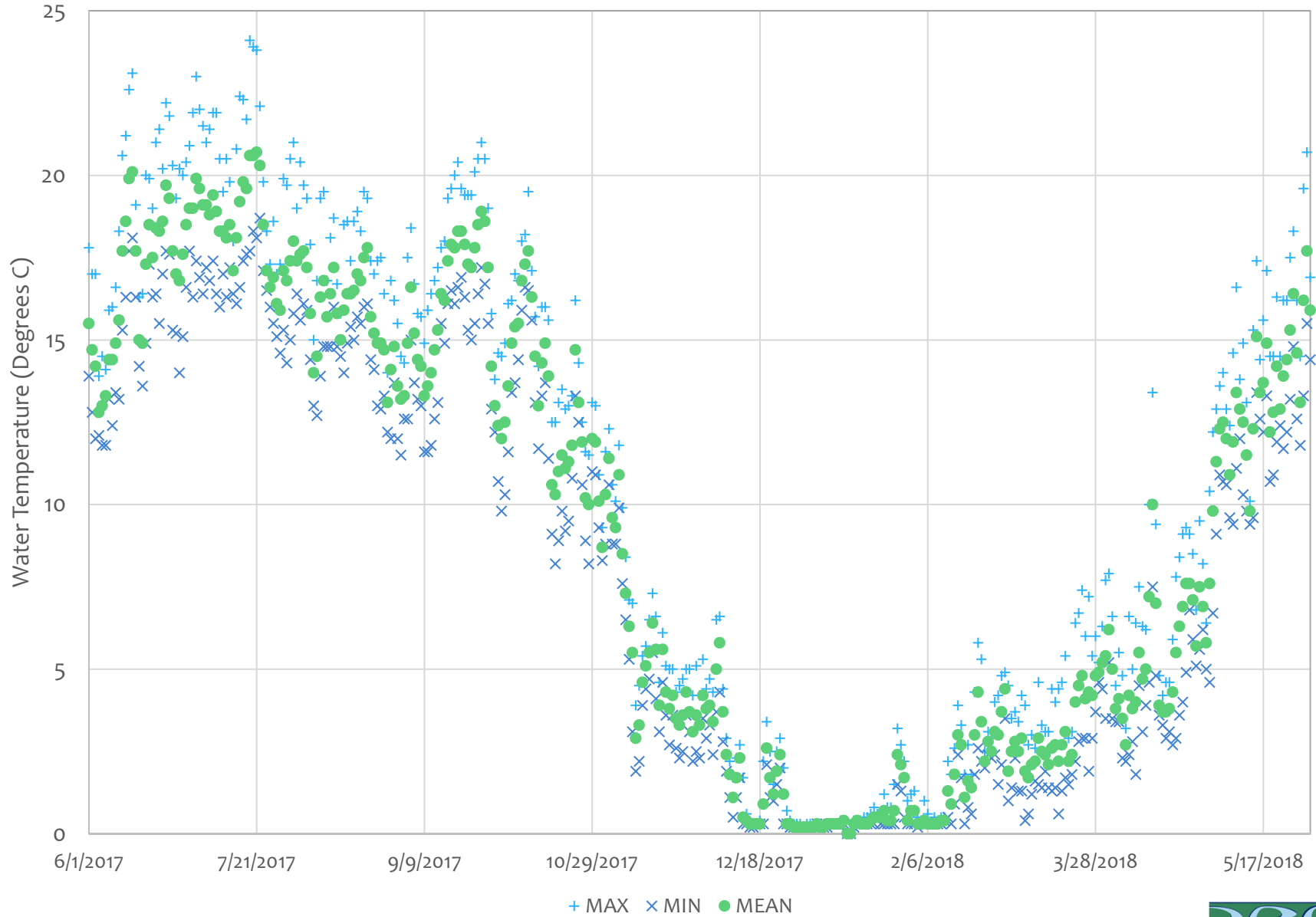
Temperature: Delaware River at Lordville, NY



Data Source: USGS



Temperature: Neversink River at Bridgeville, NY



Data Source: USGS



Temperature

GOALS for Excellent Habitat:

Summer temperatures typically less than 20C

Rare exceedances of > 24C

Locations	Exceedances of 24C		Exceedances of 20C	
	Days the Maximum Temperature was above 24C	Days the Average Temperature was above 24C	Days the Maximum Temperature was above 20C	Days the Average Temperature was above 20C
Hale Eddy	0	0	0	0
Harvard	0	0	5	0
Hancock	0	0	1	0
Lordville	0	0	50	21
Bridgeville	1	0	39	5

Data Source: USGS

New York Temperature Rankings June - October

Record Coolest	Bottom 1/10	Bottom 1/3	Normal	Top 1/3	Top 1/10	Record Warmest
PERIOD	VALUE	1901-2000 MEAN	ANOMALY	RANK (1895-2017)	WARMEST/COOLEST SINCE	RECORD

2016 – last release season

Jun-Oct 2016 5-Month	69.07°F (20.59°C)	66.63°F (19.24°C)	2.44°F (1.35°C)	123 rd Coolest	Coollest since: 2015	2018
				2 nd Warmest	Warmest to Date	2016

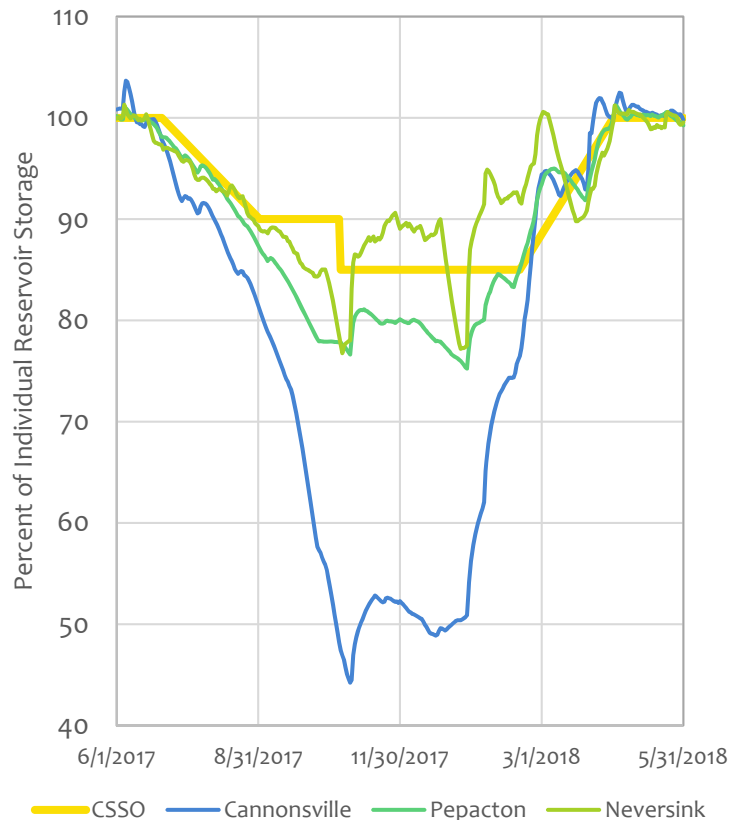
2017 – this release season

Jun-Oct 2017 5-Month	68.00°F (20.00°C)	66.64°F (19.24°C)	1.36°F (0.76°C)	111 th Coolest	Coollest since: 2014	2018
				14 th Warmest	Warmest since: 2016	2016

Data Source: NCDC. Note: NCDC Statistics were revised after the FFMP2016 Performance Report.

Discharge/Spill Mitigation

Useable Storage and Conditional Seasonal Storage Objective



Raw Data Source: NYC. Summarized by DRBC

	Spill Volume (MG)	Dates	Days
Cannonsville	18,200	June, April, May	69
Pepacton	12,263	June, April, May	50
Neversink	7,855	June, March, April, May	49

	L1 Discharge Mitigation Releases (MG)	Number of Days Above Conditional Seasonal Storage Objective
Cannonsville	96,320	102
Pepacton	33,383	87
Neversink	14,808	171
Total releases from the reservoirs when in L1		

The CSSO Changed on October 21, 2017 with the FFMP 2017 Agreement



Summary

- * Montague flow objective was met within operational constraints (weather forecasts, power generation)
- * No water was required to meet the Trenton Flow Objective.
- * Conservation releases were at Table 4E or greater for 86% of the time and Table 4G for 56% of the time.
- * Temperature goals were met for tailwaters (no exceedances of 24C except on one day at Bridgeville).
- * Cannonsville and Pepacton Reservoirs were below or near the CSSO for most of the year.

FFMP June 2017 – May 2018

Presentation Available on DRBC's Website:

[http://www.nj.gov/drbc/programs/
flow/FFMP_PerformanceRpts.html](http://www.nj.gov/drbc/programs/flow/FFMP_PerformanceRpts.html)