

# Delaware River Basin Commission

Presented to the DRBC Regulated Flow Advisory Committee on Feb. 16, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

## FFMP Implementation Performance

Release Year 2015

June 1, 2015 – May 31, 2016

**Amy L. Shallcross, PE**

Manager, Water Resource  
Operations

RFAC

February 16, 2017

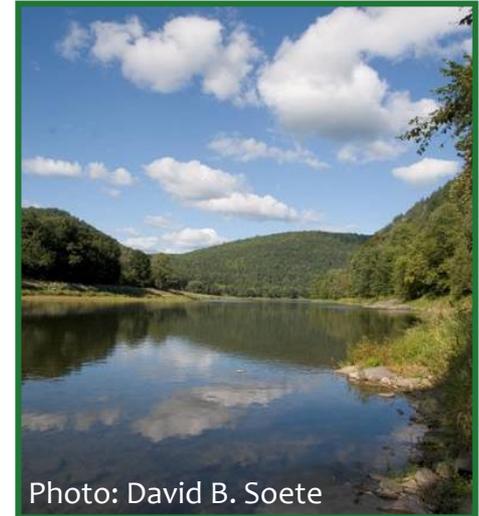


Photo: David B. Soete



**Delaware River Basin Commission**

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PENNSYLVANIA • NEW YORK  
UNITED STATES OF AMERICA

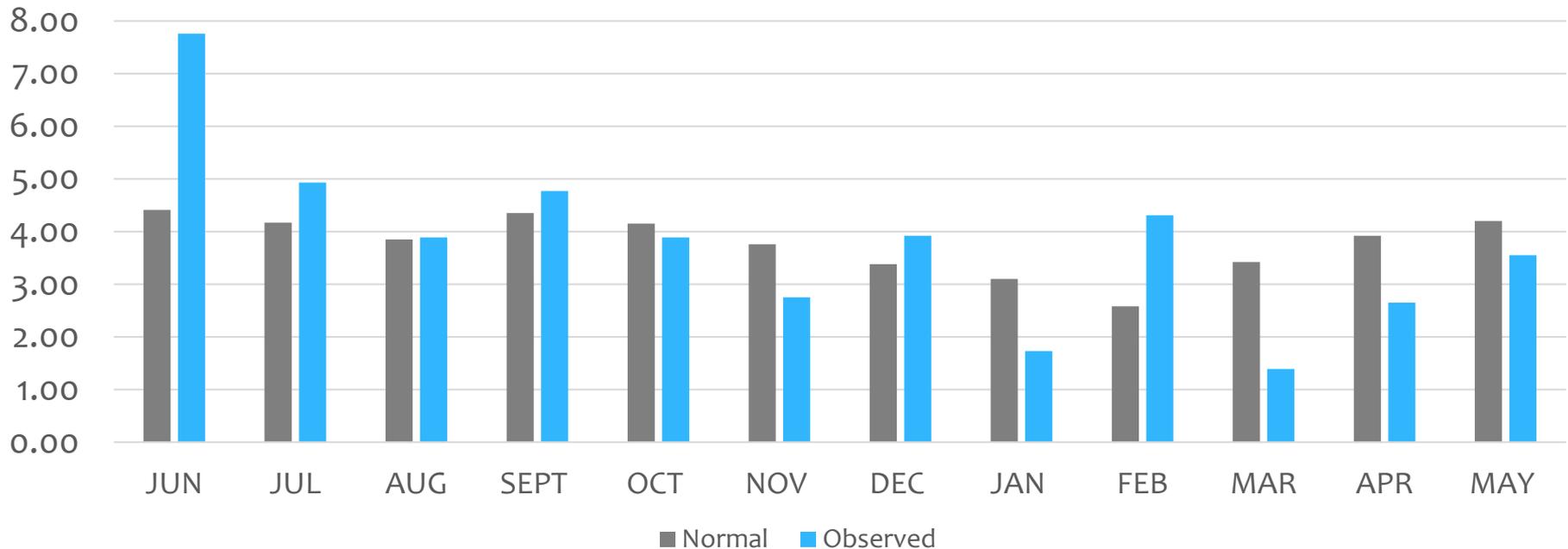
# FFMP Performance Goals

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- \* Maintain flow objectives
- \* Avoid droughts
- \* Provide enhanced conservation releases
- \* Maintain desirable tailwater temperatures
- \* Minimize spills using the Conditional Seasonal Storage Objective (CSSO)
- \* **CAVEAT:** Extra releases from Cannonsville

# Upper Basin Climate - Montague

Precipitation Above Montague  
June 2015 - May 2016



June had almost double the normal rainfall, while January and March had about half the normal rainfall.

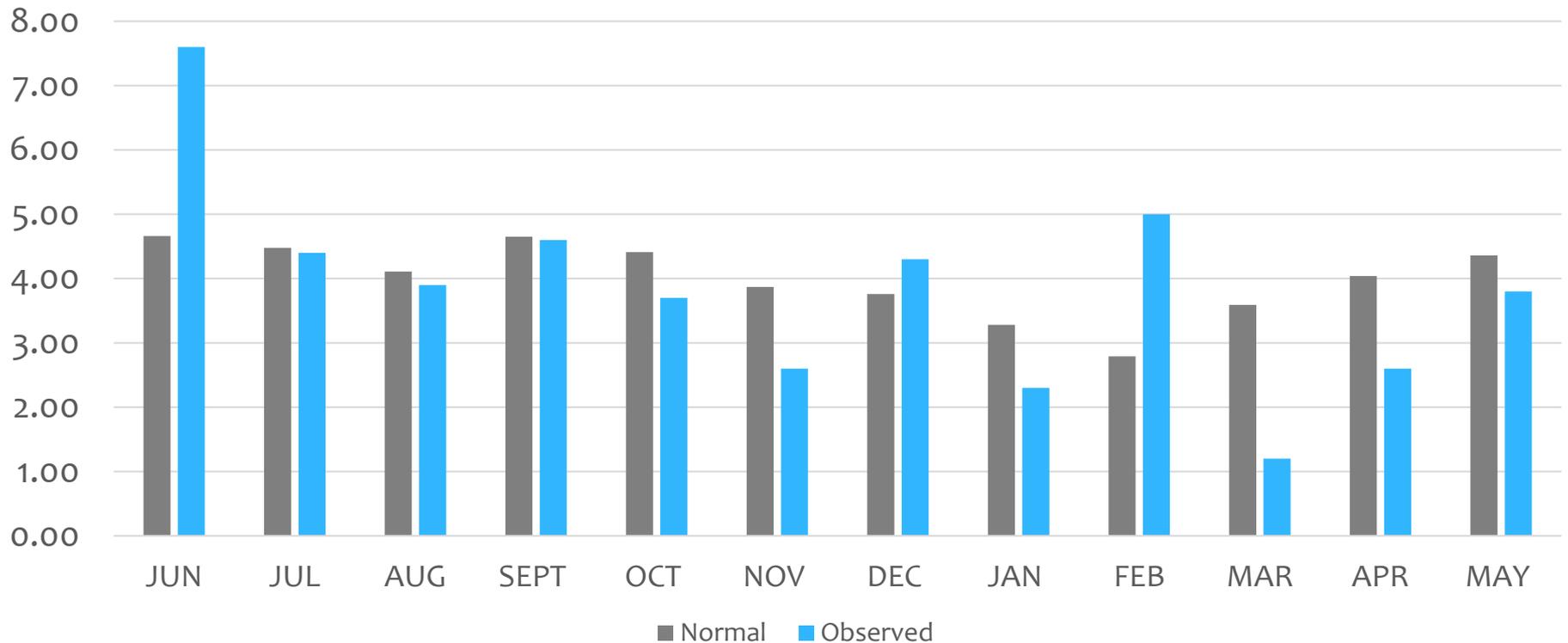
Data Source:  
NOAA/NWS



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# Lower Basin Climate - Trenton

Precipitation Above Trenton  
June 2015 - May 2016



June had almost double the normal rainfall, while March had about half the normal rainfall.

Source: NOAA/NWS

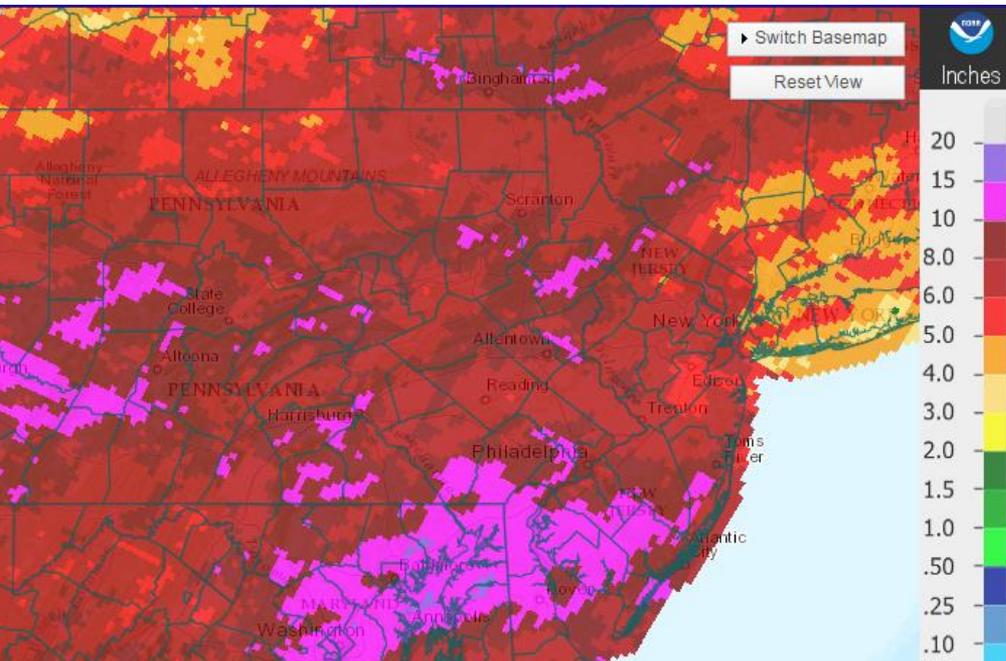


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# Precipitation and Snow

## June - 2015

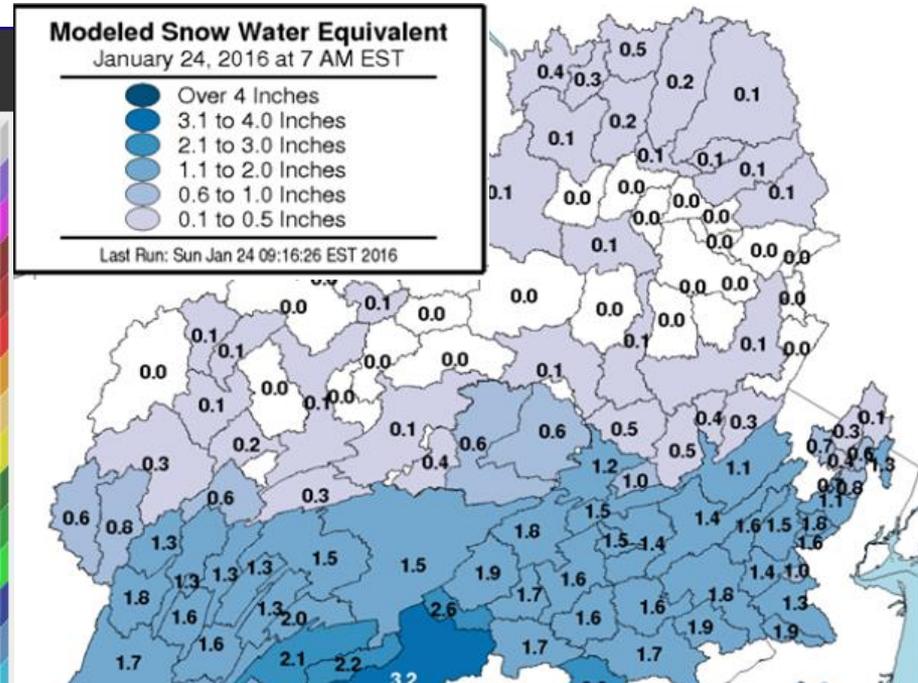
### Precipitation



Rainfall in June ranged from 6-15 inches.

## January 25, 2016

### Snow Water Equivalent



The snowpack did not build over the season

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Source: NOAA/NWS

# Flow Objectives

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## Water Released from NYC Reservoirs to meet Flow Objectives (MG)

Montague	Trenton*
37,012	0.6
*IERQ water	

5 days less than 1,700 cfs in September  
(accounts for balancing adjustment)  
Some during ice-affected period

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

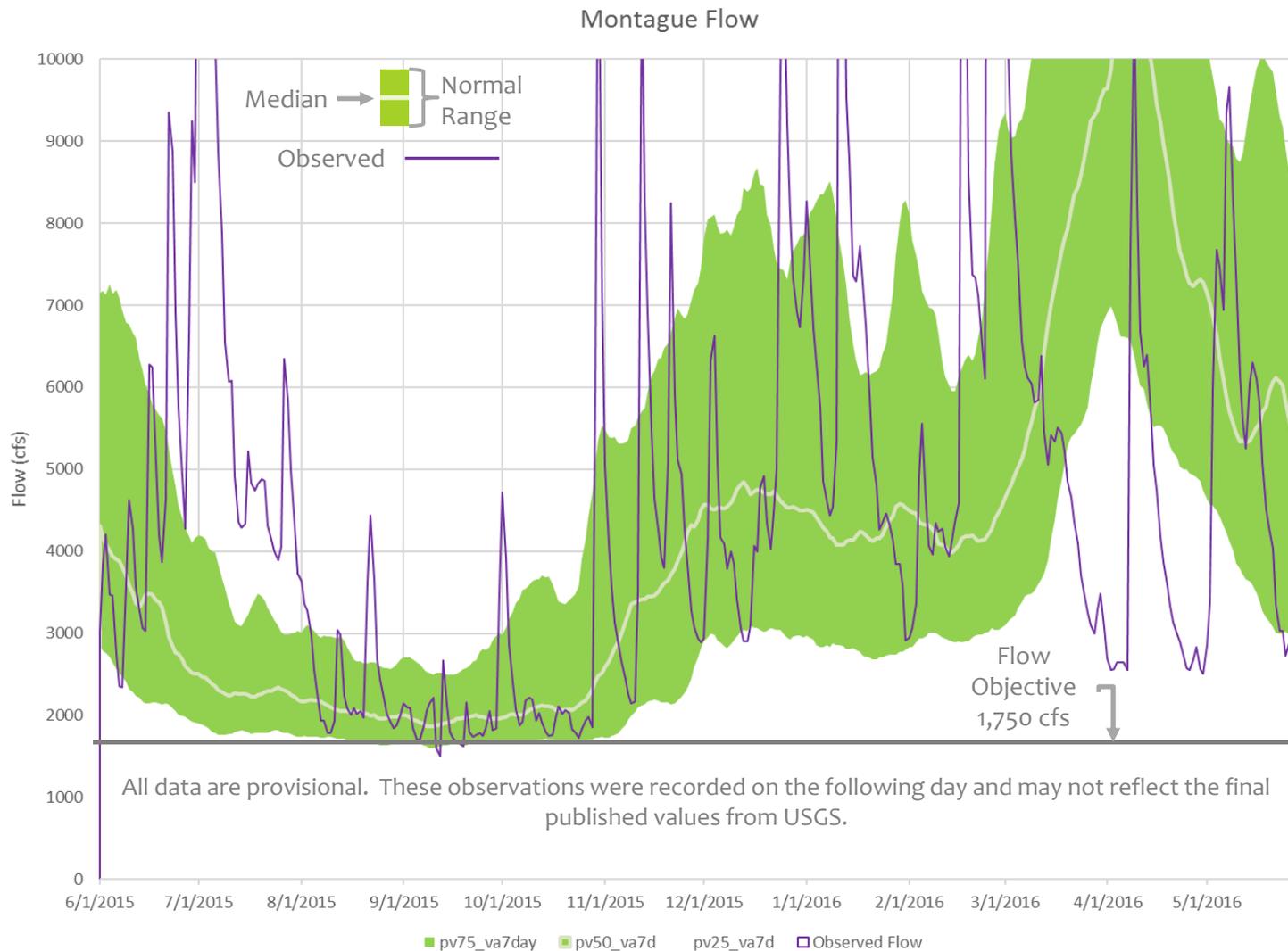
Beltzville	Blue Marsh
0	0
Water from DRBC Water Supply Storage	

No days less than 3,000 cfs

Challenges to meeting flow objectives include changes to weather predictions and power generation schedules.

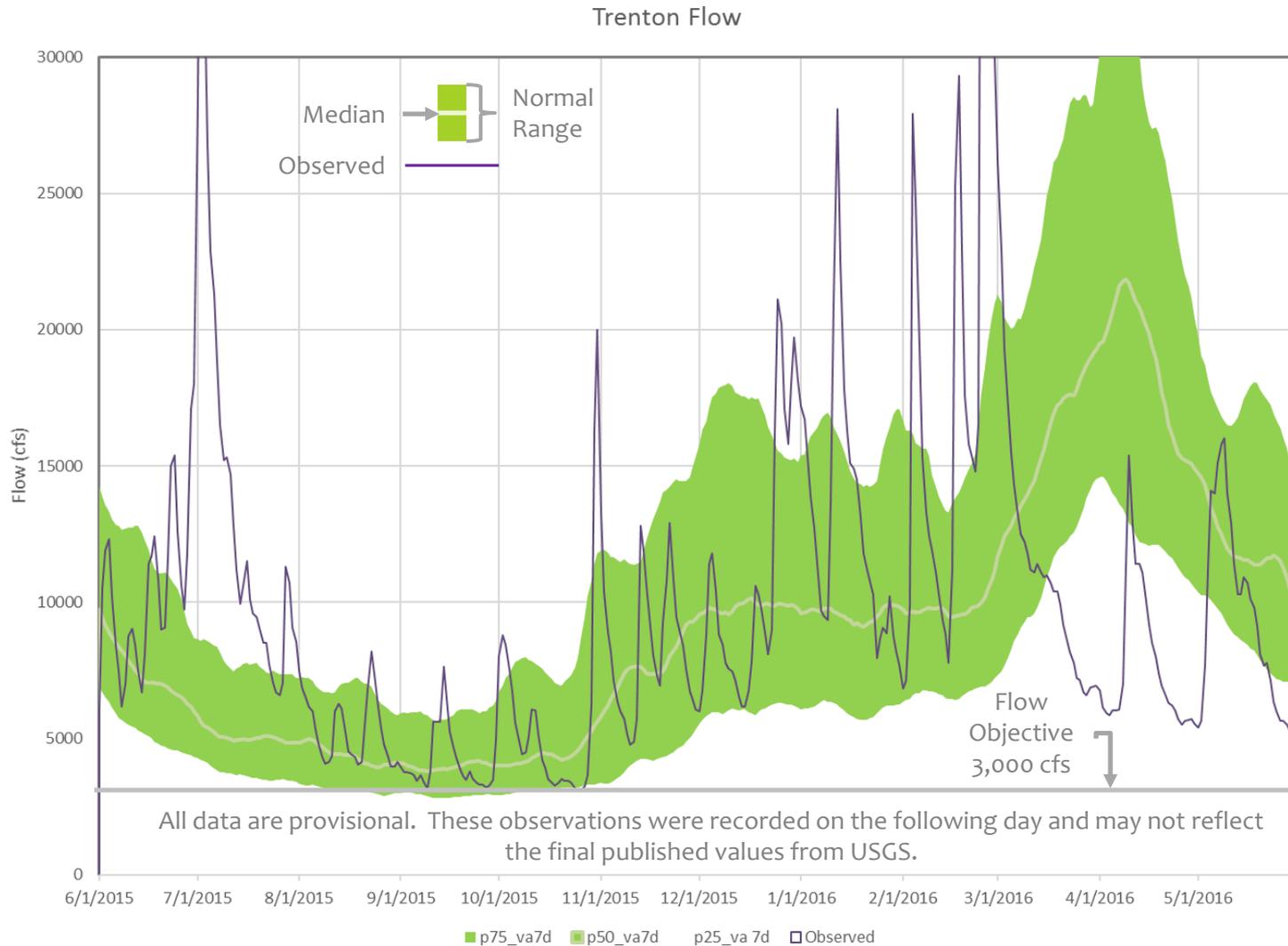
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# Montague Flow



Data Source: USGS

# Trenton Flow

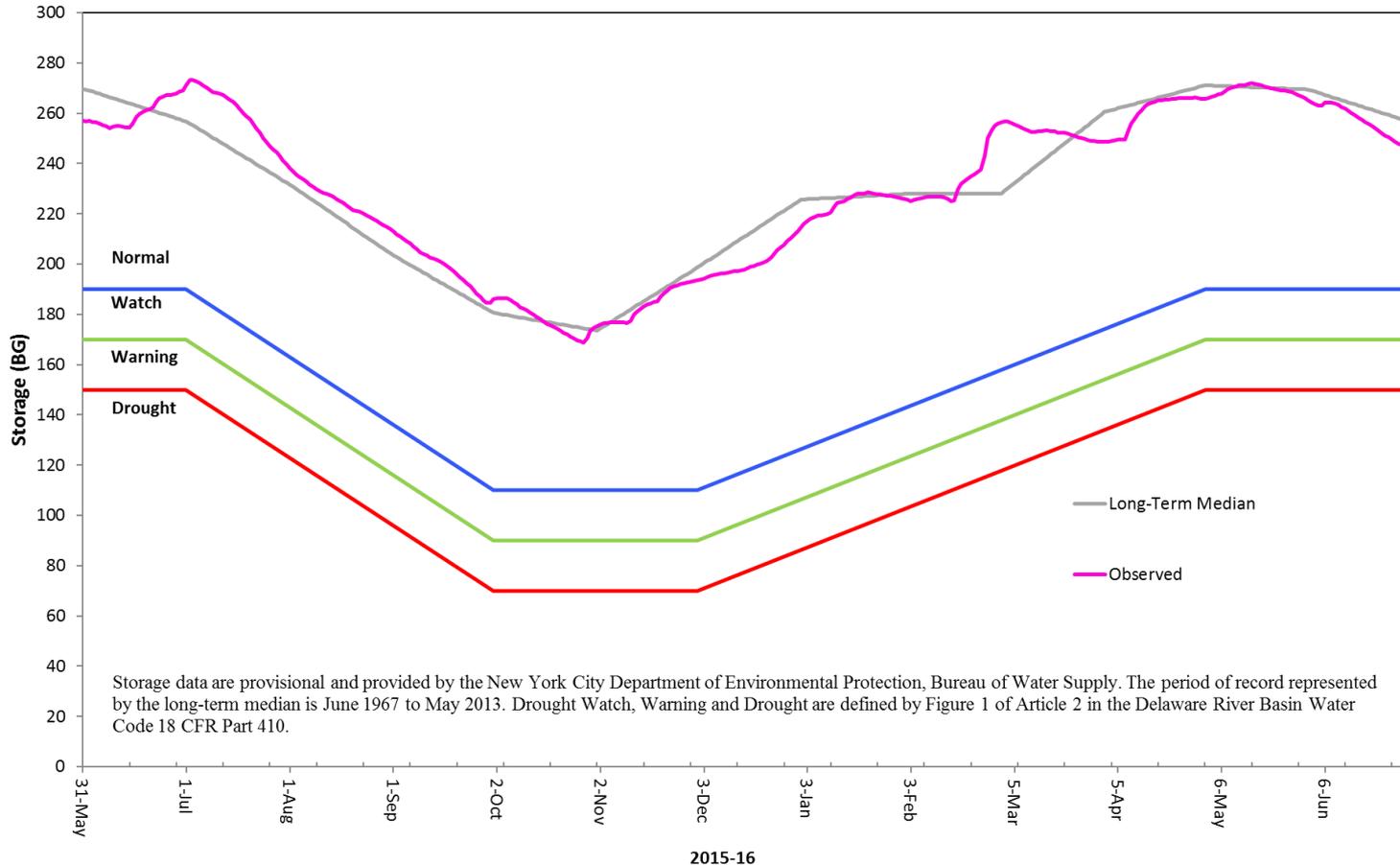


Data Source: USGS

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# Combined NYC Storage

New York City Delaware River Basin Storage



Storage data are provisional and provided by the New York City Department of Environmental Protection, Bureau of Water Supply. The period of record represented by the long-term median is June 1967 to May 2013. Drought Watch, Warning and Drought are defined by Figure 1 of Article 2 in the Delaware River Basin Water Code 18 CFR Part 410.

Data Source: NYC  
Generated by DRBC

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# Diversions

## Monthly Average Daily Diversion (June 1, 2015 - May 31, 2016)

**New York**

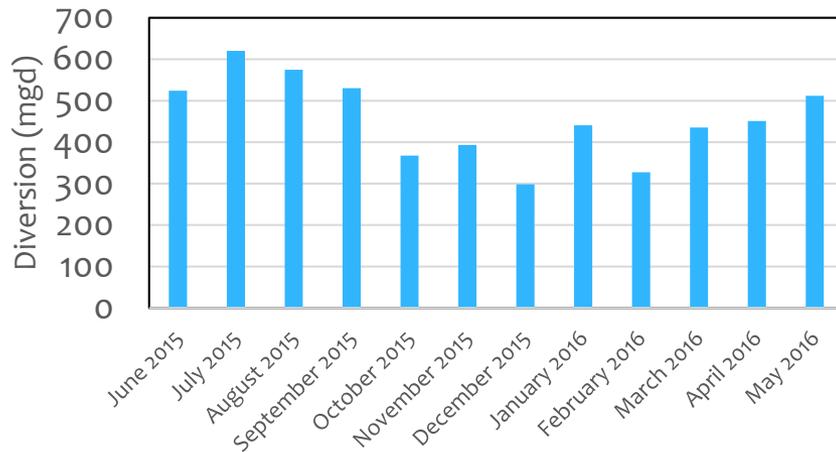
458 mgd

**New Jersey**

89.8 mgd

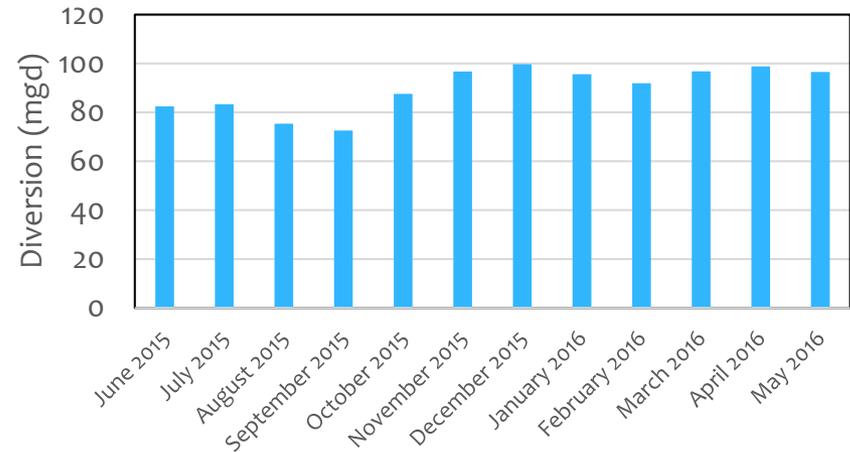
### New York

NYC Combined Diversion from PCN



### New Jersey

NJ Diversion through D&R Canal



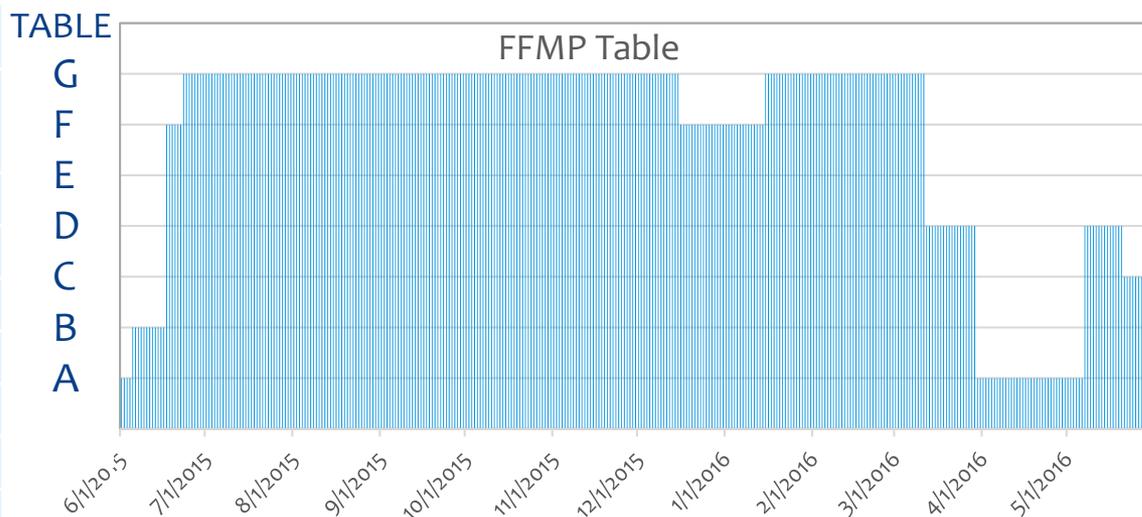
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# Conservation Releases

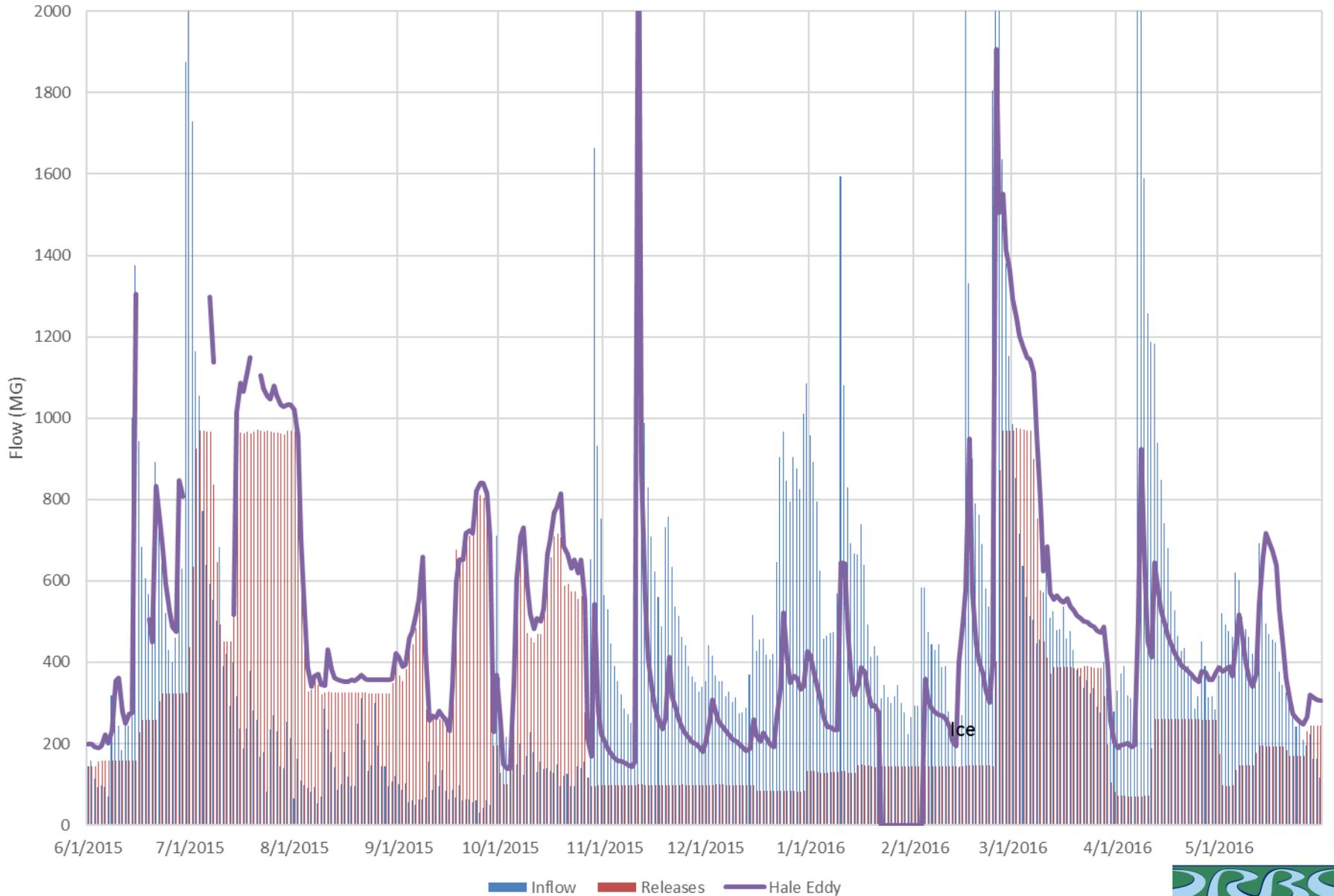
	Volume of Conservation Releases (MG)			
	FFMP	REV1	Difference	Percent over REV1
Cannonsville	86,196	20,655	65,541	317%
Pepacton	37,855	14,554	23,301	160%
Neversink	22,267	8,660	13,608	157%

Values are the conservation releases required by the FFMP Tables **only** and do not include the volume above conservation for directed or Cannonsville incident releases (in L1c releasing at L1a).

Release Tables		
FFMP Table	Number of Days	Percent
G	233	64 %
F	36	10 %
E	0	0 %
D	32	9 %
C	11	3 %
B	12	3 %
A	42	11 %



# Cannonsville Inflow, Releases and Downstream Flow

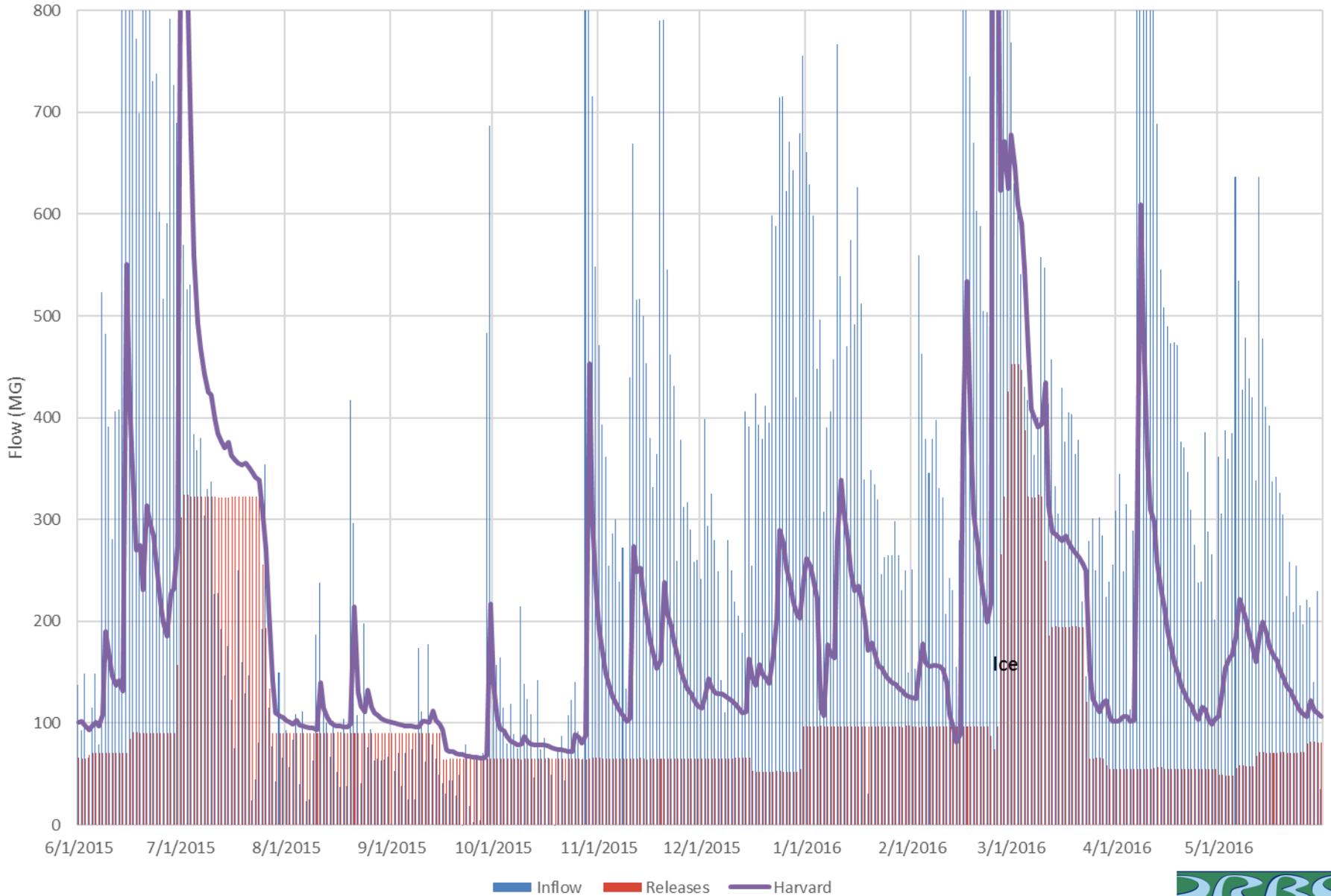


Data Sources: USGS, NYC

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# Pepacton Inflow, Releases and Downstream Flow

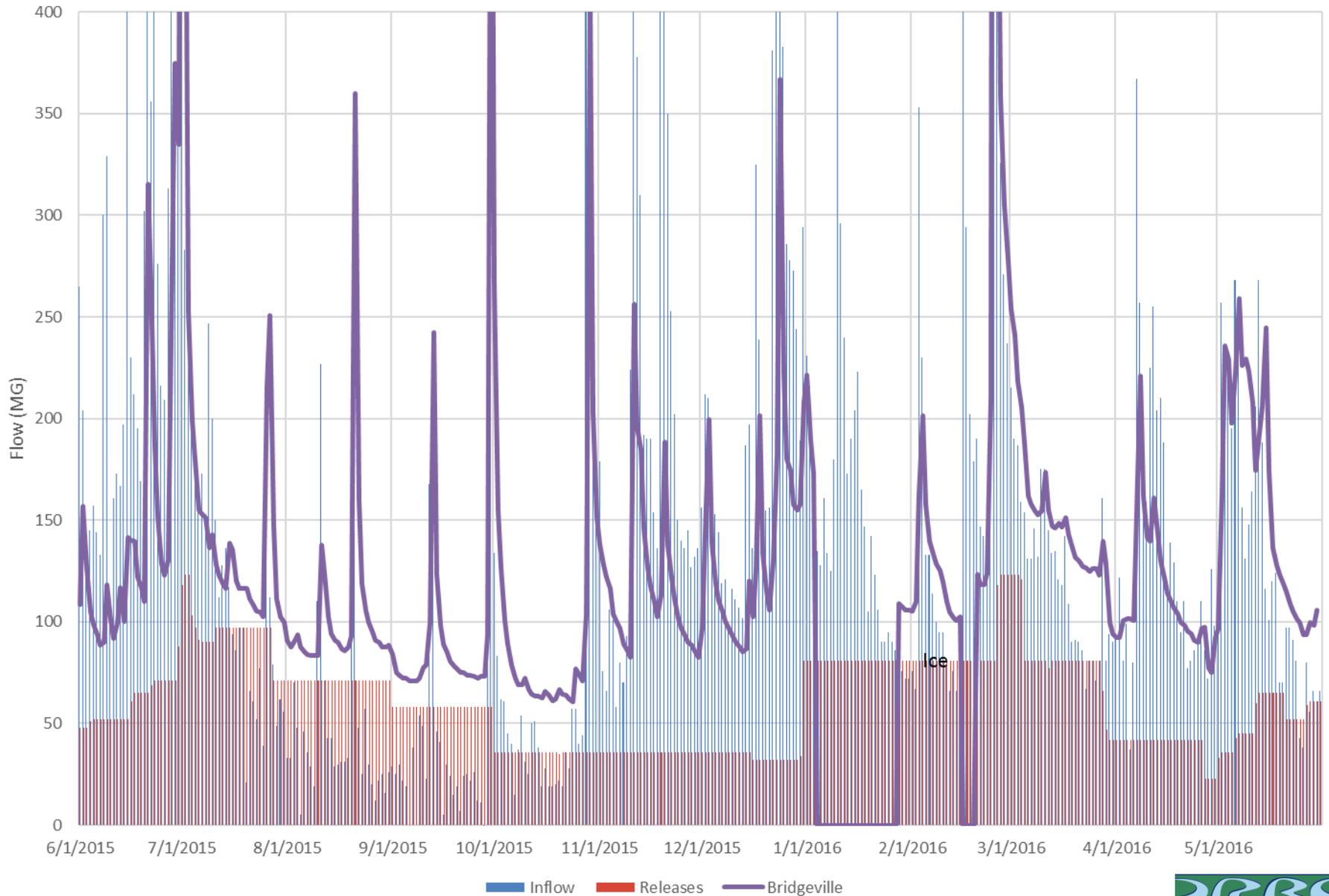


Data Sources: USGS, NYC

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# Neversink Inflow, Releases, Downstream Flow

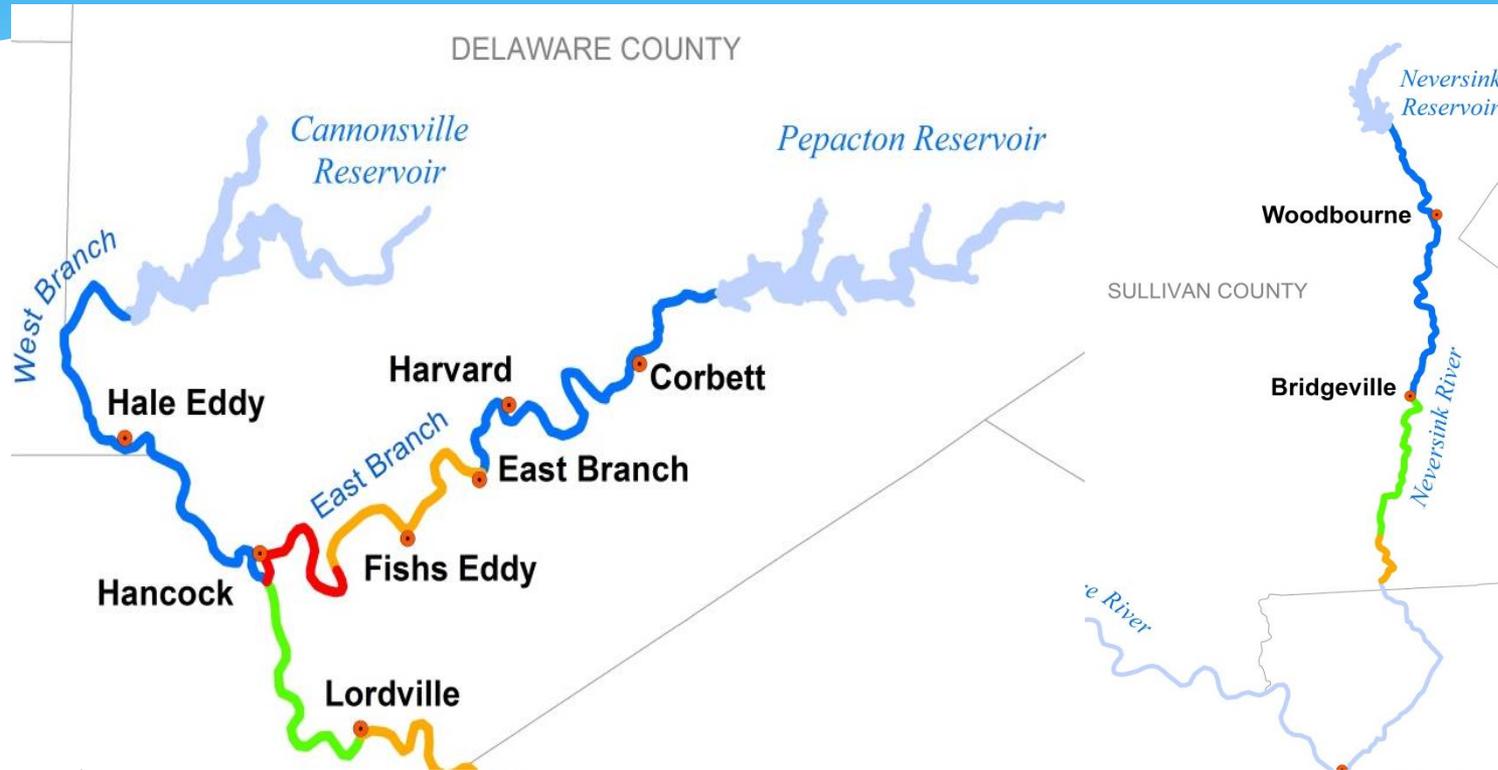


Data Sources: USGS, NYC

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# Habitat Protection (Temperature)



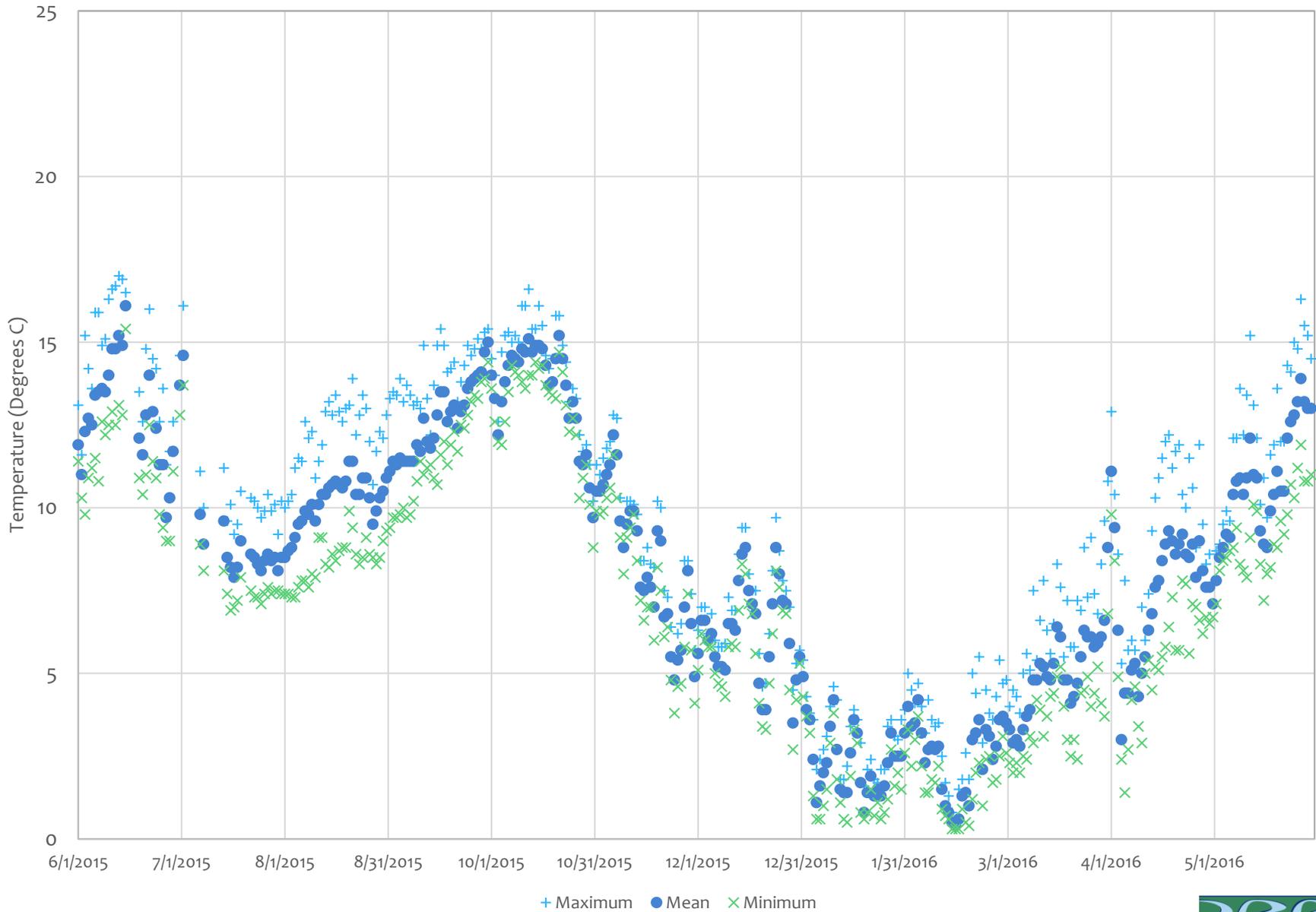
## Coldwater Ecosystem Protection Level

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 at Hale Eddy

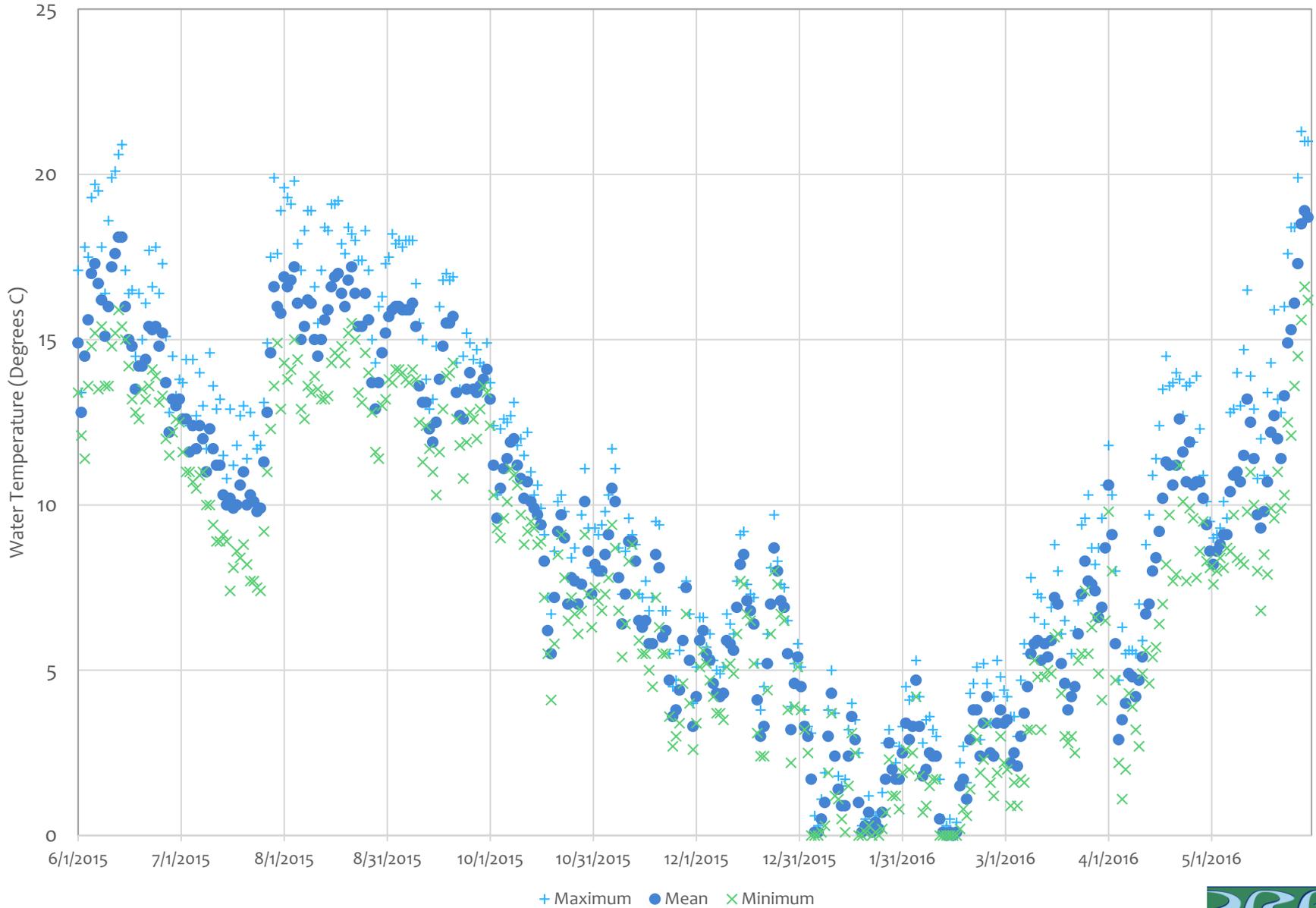


Data Source: USGS

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# Temperature at Harvard



Data Source: USGS

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# Temperature at Hancock

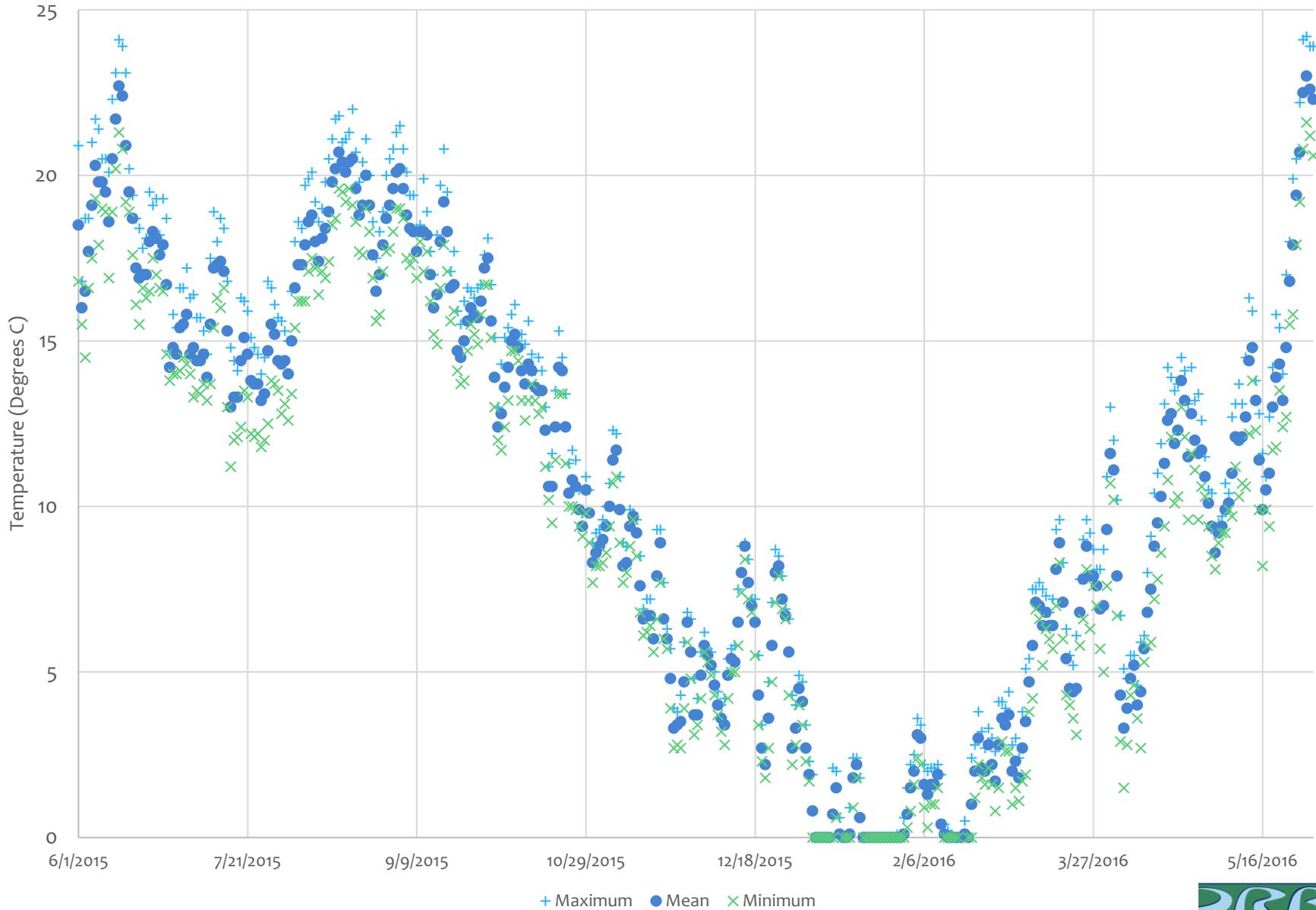


Data Source: USGS

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# Temperature at Lordville

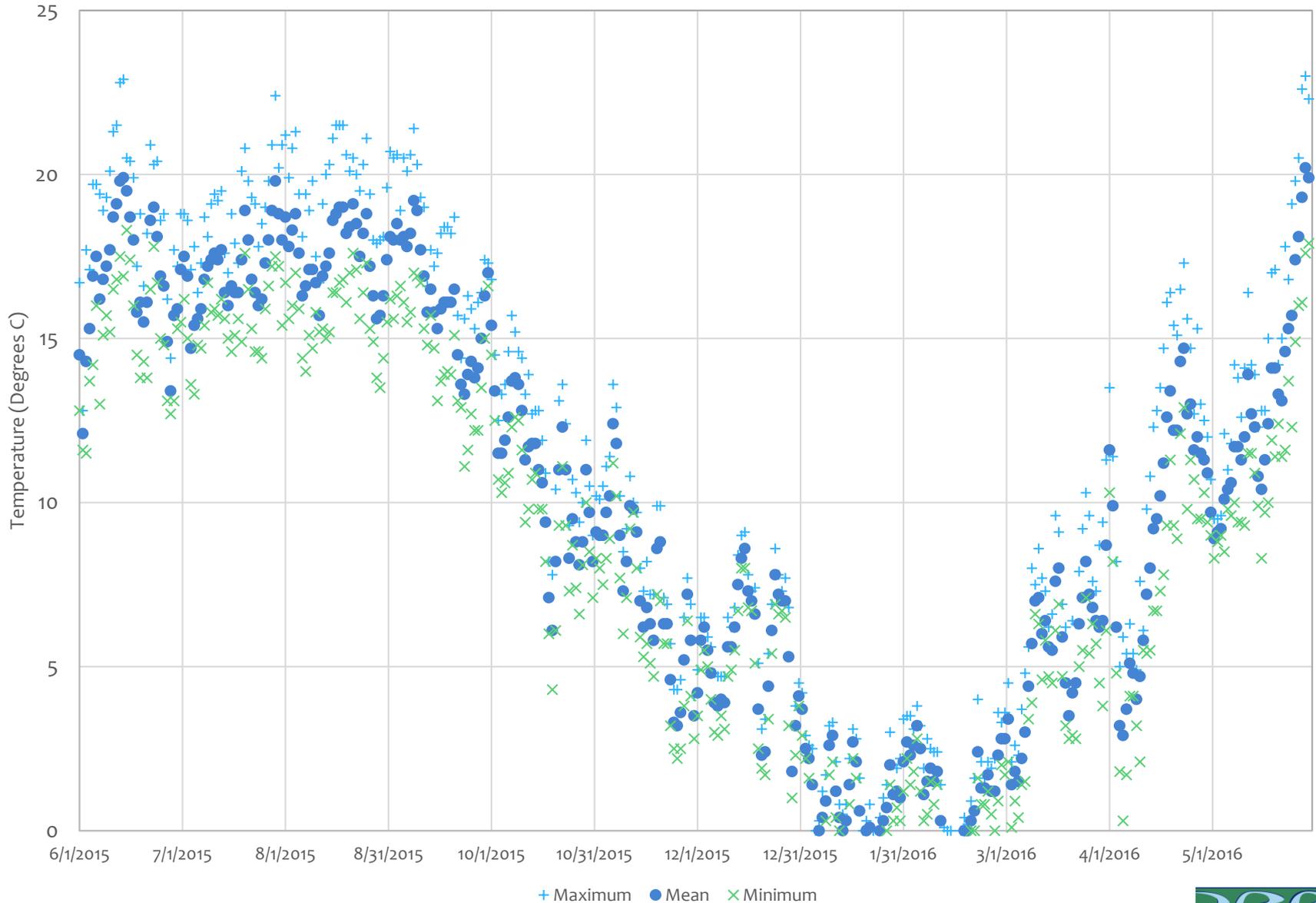


Data Source: USGS

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# Temperature at Bridgeville



Data Source: USGS

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# Temperature

## GOALS for Excellent Habitat:

Summer temperatures typically less than 20C

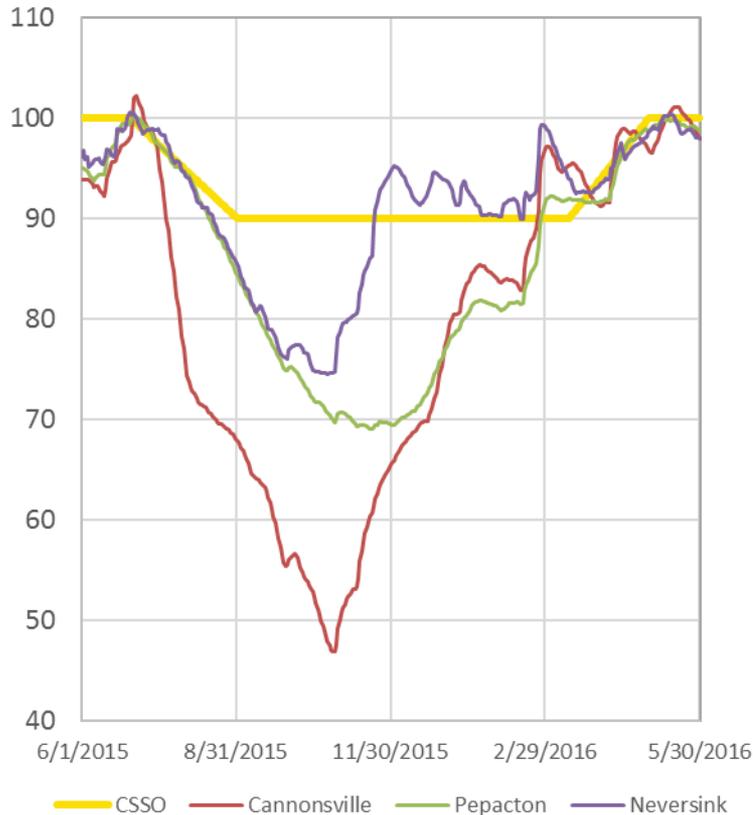
Rare exceedances of > 24C

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	7	0
Hancock	0	0	7	0
Lordville	3	0	38	19
Bridgeville	0	0	42	1

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# Discharge/Spill Mitigation

Useable Storage and Conditional Seasonal Storage Objective



	Spill Volume (MG)	Dates	Days
Cannonsville	4,463	7/2015, 5/2016	20
Pepacton	101	7/2015	4
Neversink	1,779	7/2015, 5/2016	15

	L1 Discharge Mitigation Releases (MG)	Number of Days Above Conditional Seasonal Storage Objective
Cannonsville	62,423*	72
Pepacton	23,378	45
Neversink	11,949	163

\* Includes releases for Cannonsville Incident

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# Summary

- \* Montague and Trenton flow objectives were met within operational constraints (weather forecasts, power generation)
- \* Table 4g conservation releases (larger than REV1) – were made July through December
- \* Temperature goals met for tailwaters (no exceedances of 24C except 3 days at Lordville).
- \* Storage was below the Conditional Seasonal Storage Objective (CSSO) for much of the year.

# Supplemental Materials

Information to date from June 1, 2016 – February 15, 2017

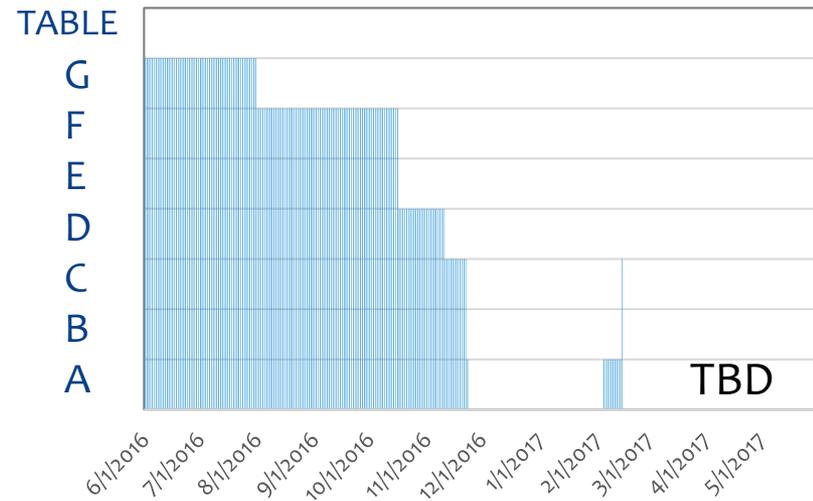
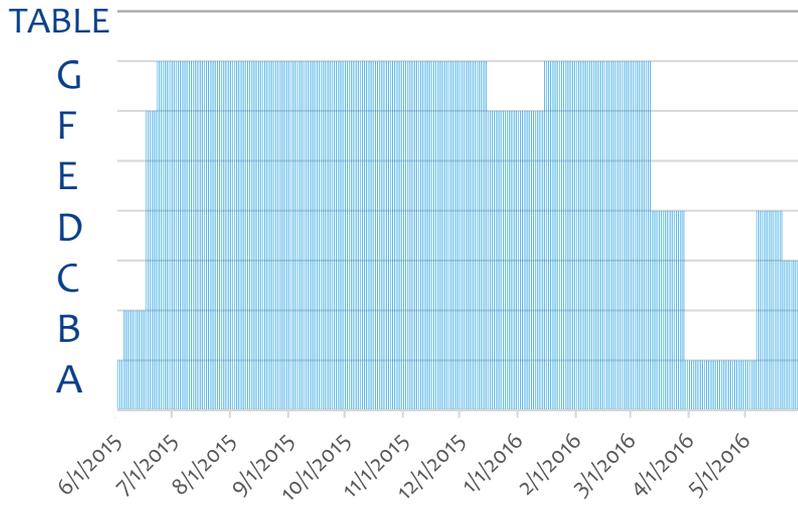
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# Conservation Releases

June 2015 – May 2015

June 2016 – February 2017



# Temperature

## 6/1/2016 – 1/31/2017

### 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	16	0
Hancock	0	2	0	0
Lordville	1	0	77	53
Bridgeville	0	0	65	7

# New York Temperature Rankings June - October



Source: NOAA

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## 2015

PERIOD	AVG TEMP	20 <sup>TH</sup> CENTURY AVERAGE	DEPARTURE	RANK	WARMEST/COOLEST SINCE	RECORD
Jun - Oct 2015 5-month period	62.2°F (16.8°C)	60.9°F (16.1°C)	1.3°F (0.7°C)	99 <sup>th</sup> Coolest	Coollest since: 2014	1992
				24 <sup>th</sup> Warmest	Warmest since: 2012	2005
Ties: 1906						

## 2016

PERIOD	AVG TEMP	20 <sup>TH</sup> CENTURY AVERAGE	DEPARTURE	RANK	WARMEST/COOLEST SINCE	RECORD
Jun - Oct 2016 5-month period	63.7°F (17.6°C)	60.9°F (16.1°C)	2.8°F (1.5°C)	119 <sup>th</sup> Coolest	Coollest since: 2015	1992
				4 <sup>th</sup> Warmest	Warmest since: 2005	2005



More information on Climatological Rankings