

Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

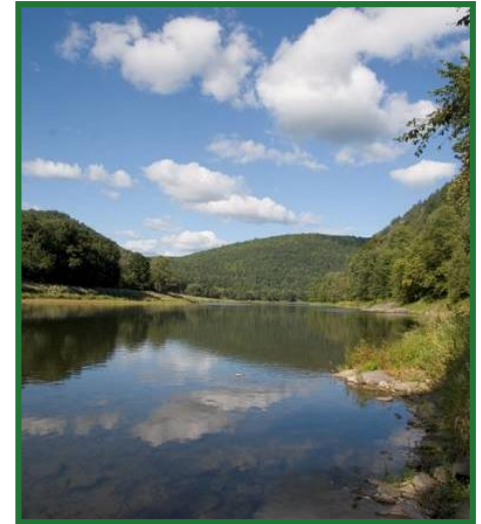
# Delaware River Basin Commission

## Proposed New Flow Management Program

### Model Results

Regulated Flow Advisory  
Committee  
September 28, 2017

**Amy L. Shallcross, PE**  
Manager, Water Resource  
Operations



**Delaware River Basin Commission**

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

Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# Proposed New Program

- \* Conditional Seasonal Storage Objective – 85 percent
- \* Release tables
- \* Thermal Bank
- \* Rapid Flow Change Bank
- \* NJ Amelioration Bank
- \* NJ Diversion Offset bank accumulated based on FAW

Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# New IERQ Banks

- \* Habitat Protection Release rates based on FAW
- \* Interim Excess Release Quantity: 10 BG (15,468 cfs-days)
- \* Thermal Mitigation 1.62 BG (2,500 cfs-days)
- \* Rapid Flow Change Mitigation: 0.65 BG (1,000 days)
- \* Trenton Equivalent Flow Objective: 6.09 BG (9,423 cfs-days) – normal conditions
- \* NJ Diversion Amelioration: 1.65 BG (2,545 cfs-days) – reserved for use during drought

Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# Approach

- \* Incorporate operational code language (provided by NYC)
- \* Evaluate the logic and model outcomes
- \* Modify code as needed
- \* Perform independent simulations
- \* Review results
- \* Compare FFMP 2017 results with FFMP 2016 with PST

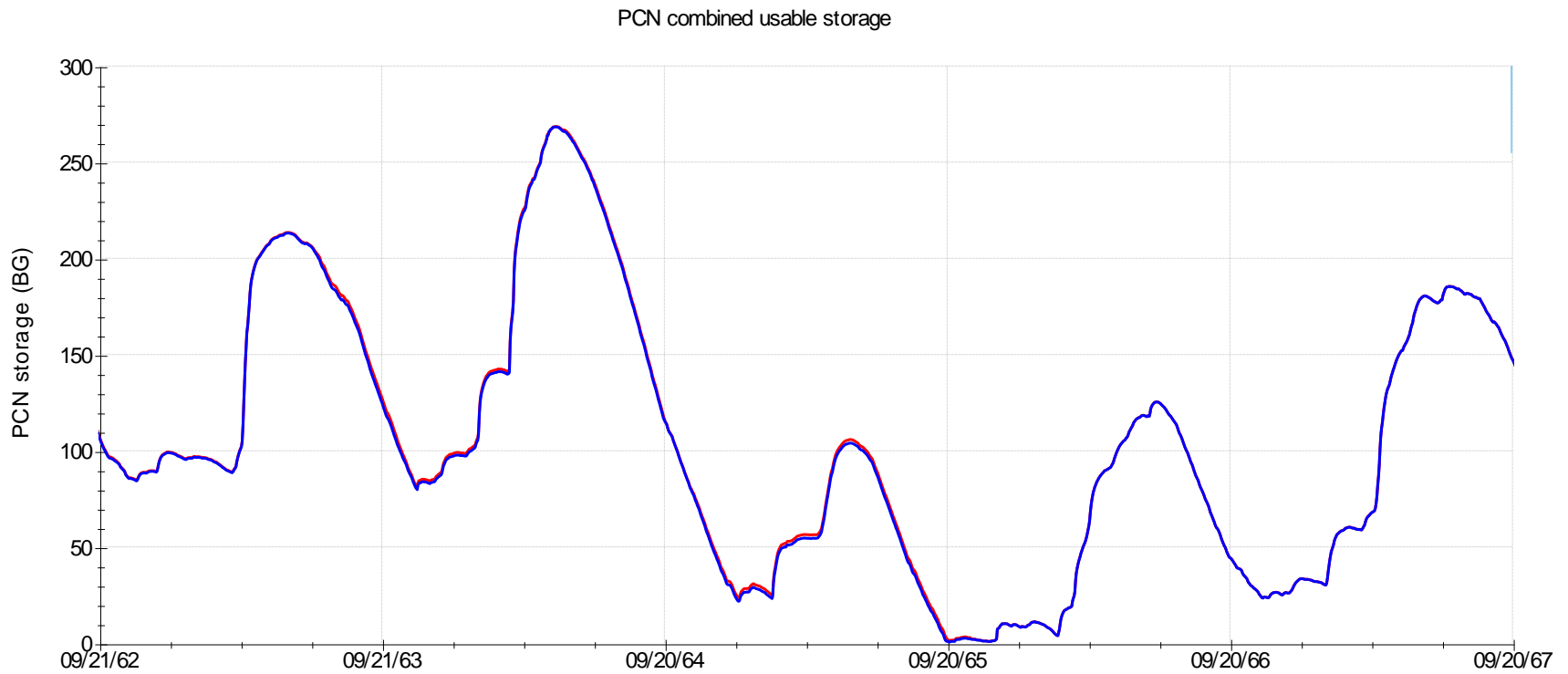
Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# Drought Risk/Upper Basin Storage

FFMP Version/Alternative		FFMP2016	Proposed Program
ISSUE	METRIC		
Drought Risk	Total Basinwide Drought Days	2888	2970
	Basinwide Watch	782	624
	Basinwide Warning	644	809
	Basinwide Emergency	1462	1537
	Total Lower-Basin-only Drought Warning/Emergency Days (while basin-wide conditions are normal)	387	343
NYC Storage	Days PCN Combined Storage <10%	257	279
	Min Usable PCN Combined Storage (BG)	0.84	0.51
NYC Diversions	Average for entire simulation (mgd)	507	507
NJDOB	Maximum Accumulated in any one year	1825	1470

Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# NYC Combined Storage

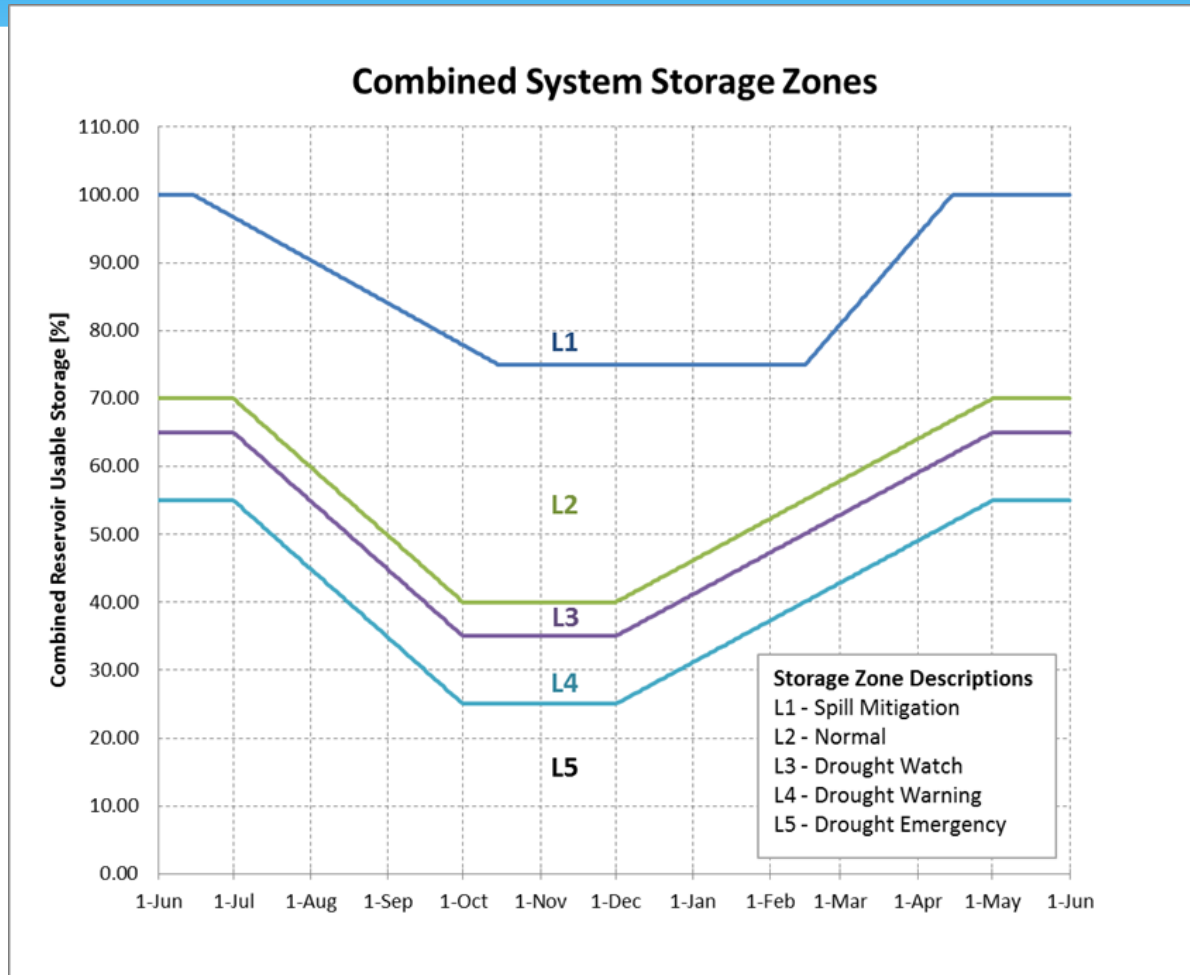


FFMP 2016

Proposed Program

Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# Flood Mitigation

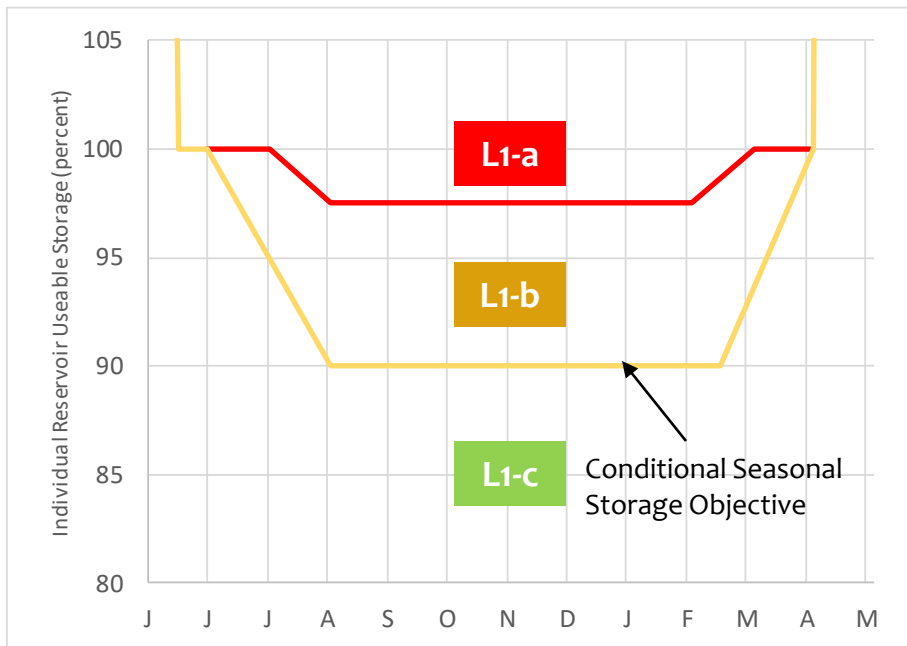


Flood Mitigation Releases are made when Combined Storage is in L1 Zone

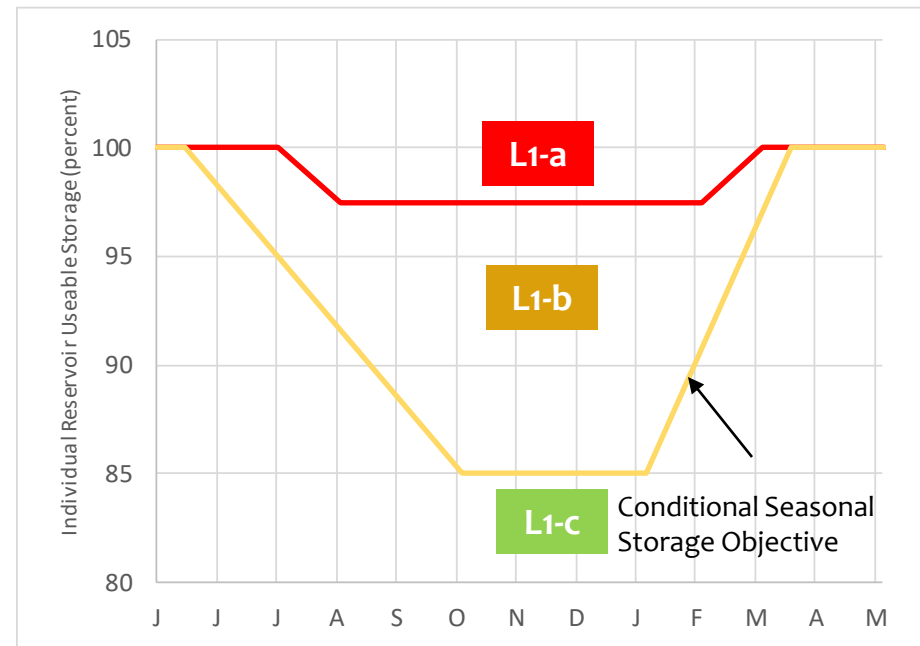
Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# Flood Mitigation

## FFMP 2016



## Proposed Program



Storage in individual reservoirs determines the release rate from that reservoir



Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

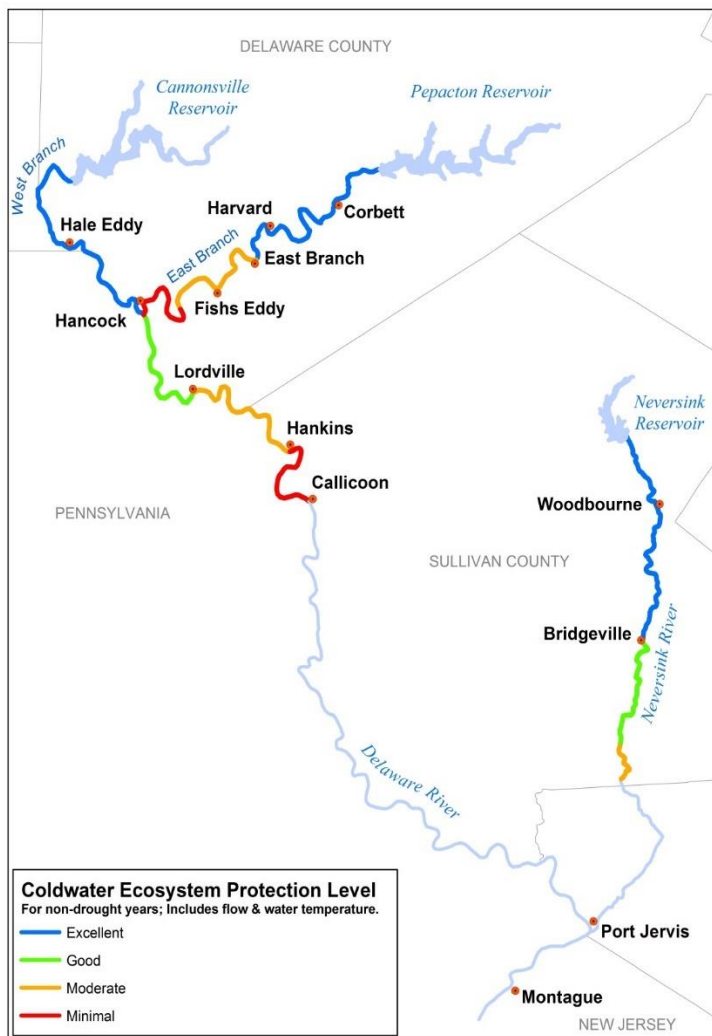
# Flood Mitigation

FFMP Version/Alternative			FFMP2016	Proposed Program
ISSUE	METRIC			
Conditional Seasonal Storage Objective	Percent of Days PCN storage is below 90% usable threshold	P	64.8%	65.1%
		C	64.5%	65.1%
		N	50.9%	51.7%
	Percent of Days PCN storage is below 85% usable threshold	<b>P</b>	<b>52.5%</b>	<b>53.9%</b>
		C	51.2%	53.4%
		N	43.1%	43.9%

For the period of the simulation, 1 percent represents 310 days.

Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# Habitat Protection



## GOALS for Excellent Habitat:

Summer temperatures typically less than 68F  
Rare exceedances of > 75F

### Coldwater Ecosystem Protection Level

For non-drought years; Includes flow & water temperature.

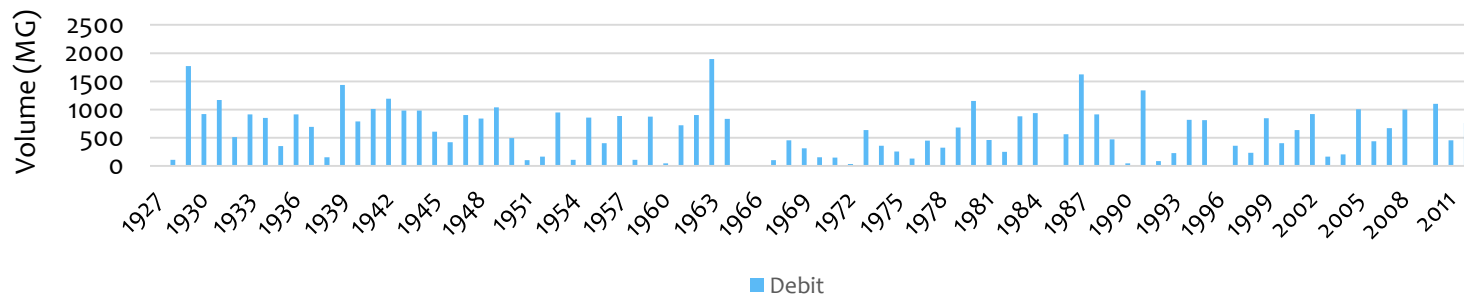
- Excellent
- Good
- Moderate
- Minimal

# Habitat Protection

FFMP Version/Alternative		FFMP2016	Proposed Program
ISSUE	METRIC		
Percent of time in Tables	Tables 4G and 4F	50.6%	51.9%
	Tables 4g and 4F - 4/1 - 9/30	44.2%	47.0%
Non-drought Days Temperature > 75 degrees	Bridgeville	535	386
	Hale Eddy	12	4
	Hancock	22	8
	Harvard	221	233
	Hankins	1642	1615

Values for temperature are of 28,072 non-drought days

Annual Thermal Bank Debits



Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

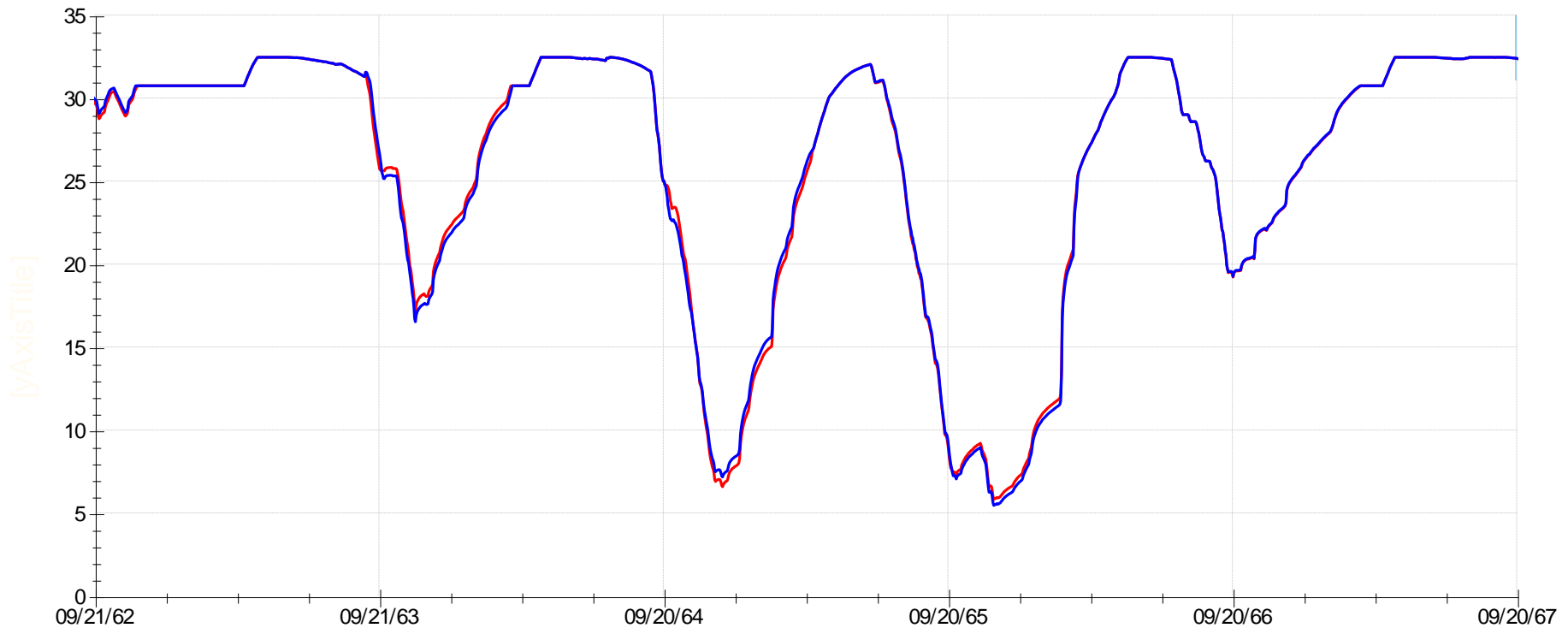
# Lower Basin Storage

FFMP Version/Alternative		FFMP2016	Proposed Program
ISSUE	METRIC		
NJDOB	Maximum Accumulated in any one year	1825	1470
Lower Basin Storage	Days usable BBN storage < 20%	22	33
	Beltzville MIN usable storage (BG)	1.00	1.00
	Blue Marsh MIN usable storage (BG)	1.00	1.00
	Nockamixon MIN usable storage (BG)	3.81	3.44

Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# Lower Basin Storage

Lower-Basin Combined {Beltz; Nock; BlueM} Usable Storage (BG)



FFMP 2016

Proposed Program

Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# Flows

FFMP Version/Alternative		FFMP2016	Proposed Program
Low Flows [Aug-Nov 1964 average]	Montague Flow (cfs)	1748	1755
	Trenton Flow (cfs)	2803	2803
	Trenton Equivalent Flow (cfs)	2880	2880
Low Flows [Jun-Sep 1965 average]	Montague Flow (cfs)	1592	1589
	Trenton Flow (cfs)	2737	2737
	Trenton Equivalent Flow (cfs)	2824	2824

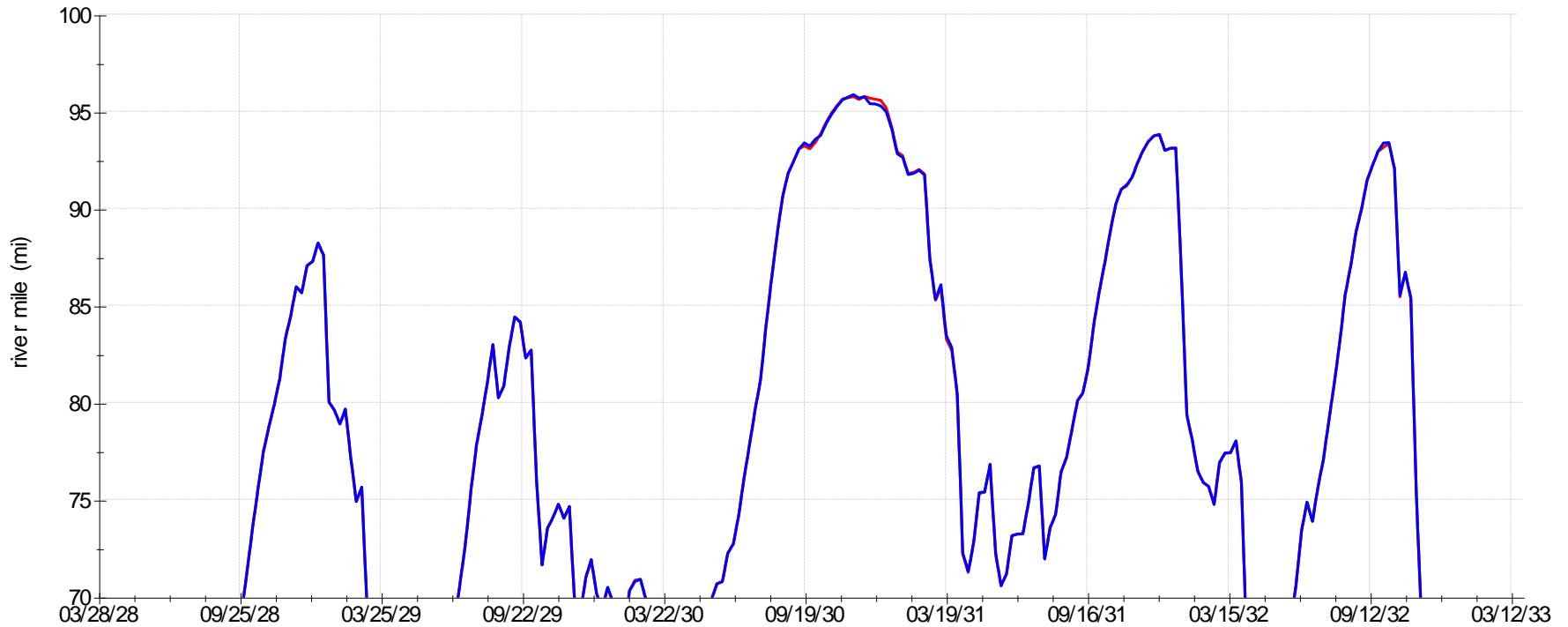
# Salt Front

FFMP Version/Alternative		FFMP2016	Proposed Program
Salt Front	Maximum Location (RM)	95.8	95.8
	Days above RM 92.5	763	770
	Days above RM 92.5 during basinwide drought emergency	256	268
	Days above RM 82.9 during basinwide drought emergency	673	726

Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# Salt Front

Salt Front seven-day average location



FFMP 2016

Proposed Program



Presented to the DRBC Regulated Flow Advisory Committee on September 28, 2017. Contents should not be published or re-posted in whole or in part without the permission of DRBC.

# Summary

- \* Similar values for metrics between programs
- \* Drought days 2888 v 2970
- \* Minimum storage in the NYC Reservoirs 0.84 BG vs 0.51 BG
- \* Slight increase in the amount of time below CSSO
- \* Minimum storage in Nockamixon 3.8 BG v 3.4 BG
- \* Maximum location of salt front is unchanged
- \* Time in tables 4G and 4F is increased slightly\*
- \* Fewer days with temperatures above 75 degrees

\* Different release rates but more efficient use of FAW