



# SETTLEMENT AGREEMENT QUARTERLY REPORT

October – December 2022

**Chelsea Qiu, P.E., Ph.D.**

Lead Engineer

Compliance Assessment & Reporting Section

Water Quality Bureau

Technical Oversight Committee

June 27, 2023



# SUMMARY

Month	Geometric Mean TP Concentration (ppb)	Long-Term Level (ppb)	Mean Stage (ft NGVD29)	Number of Samples	
<b>Arthur R. Marshall Loxahatchee National Wildlife Refuge</b>					
Oct 2022	6.5	7.2	17.16	14	
Nov 2022	6.7	7.2	17.20	14	
Dec 2022	5.9	7.2	17.39	14	
12-Month Period Ending	Total Flow (kac-ft)	12-Month TP FWMC (ppb)	Long-Term Limit (ppb)	Percent of Sampling Events Greater than 10 ppb	
				Observed (%)	Guideline (%)
<b>Everglades National Park – Shark River Slough – <i>PROVISIONAL DATA and RESULTS</i></b>					
Oct 2022	1,090.7	9.9	7.6	50.0	40.1
Nov 2022	1,096.6	9.8	7.6	50.0	40.1
Dec 2022	1,088.7	9.8	7.6	50.0	40.1
<b>Everglades National Park – Taylor Slough and Coastal Basins</b>					
Oct 2022	329.0	5.1	11.0	4.2	53.1
Nov 2022	321.1	5.2	11.0	4.1	53.1
Dec 2022	321.3	5.1	11.0	4.1	53.1

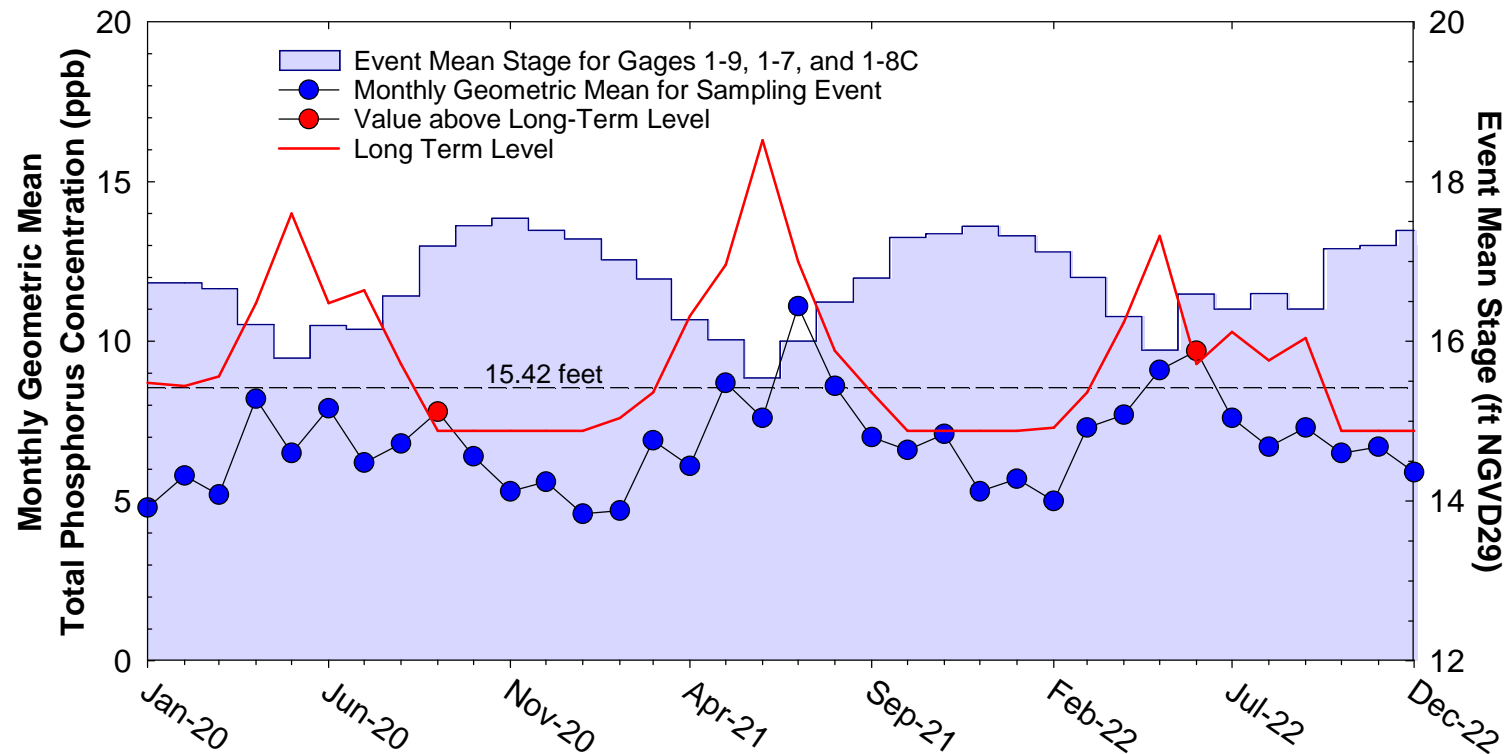
**FWMC for SRS - computed as  $S12s + [S333 + S333N + S355A + S355B + \min(S356, S335) - S334]$ .**

**S334 flow is not excluded from the total flow for long-term limit calculations.**

**FWMC for TS and CB – computed as  $(S332D - S332DX1 - S328) + S328 + G737 + S18C$ .**

# A.R.M Loxahatchee National Wildlife Refuge

## Monthly Total Phosphorus Geometric Mean Concentrations

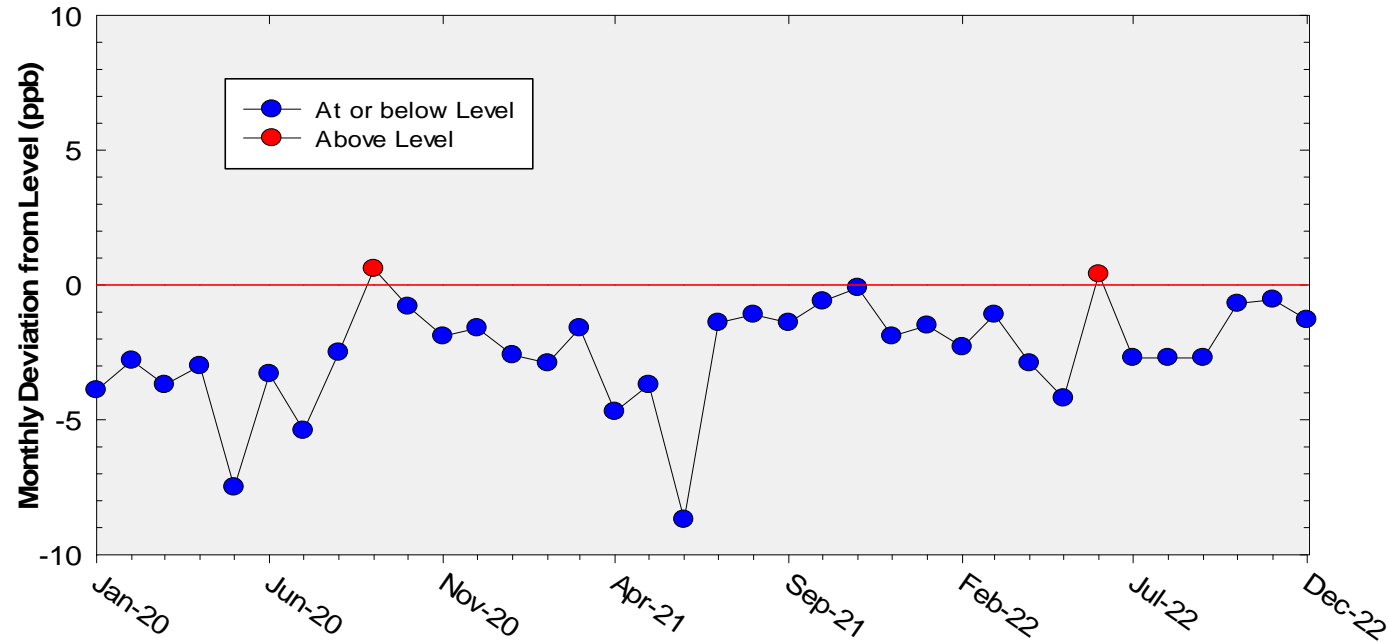


**36-Month Average TP Geometric Mean = 6.8 ppb**

**36-Month Average TP Long-term Level is = 9.3 ppb**

# A.R.M Loxahatchee National Wildlife Refuge

## Deviation of monthly geometric mean total phosphorus concentrations with calculated long-term levels



**36-Month Average TP geometric mean = 2.6 ppb below the Long-Term Level**

## Refuge TP Compliance Tracking

### For October 2022 – May 2023

Month	Geometric Mean TP Concentration (ppb)	Long-Term Level (ppb) Effective 12/31/2006	Average Stage (feet NGVD29)	Number of Samples
<b>4th Quarter 2022 Compliance Tracking</b>				
<b>Oct-2022</b>	<b>6.5</b>	<b>7.2</b>	<b>17.16</b>	<b>14</b>
<b>Nov-2022</b>	<b>6.7</b>	<b>7.2</b>	<b>17.20</b>	<b>14</b>
<b>Dec-2022</b>	<b>5.9</b>	<b>7.2</b>	<b>17.39</b>	<b>14</b>
<b>Preliminary Data Outlook</b>				
<b>Jan-2023</b>	<b>5.5</b>	<b>7.2</b>	<b>17.25</b>	<b>14</b>
<b>Feb-2023</b>	<b>5.3</b>	<b>7.8</b>	<b>16.95</b>	<b>14</b>
<b>Mar-2023</b>	<b>6.3</b>	<b>9.5</b>	<b>16.53</b>	<b>13</b>
<b>Apr-2023</b>	<b>7.9</b>	<b>11.1</b>	<b>16.22</b>	<b>10</b>
<b>May-2023</b>	<b>7.1</b>	<b>11.0</b>	<b>16.24</b>	<b>14</b>

Note: 17.14 ft NGVD29 was used for the long-term level calculation for the period from October 2022 to January 2023, as the average stage of each month exceeded the threshold of 17.14 ft.

# Shark River Slough

## TP Concentration Compliance Tracking

WY2023 (October 1, 2022, to December 31, 2022) Flow Data for S12s are Provisional.

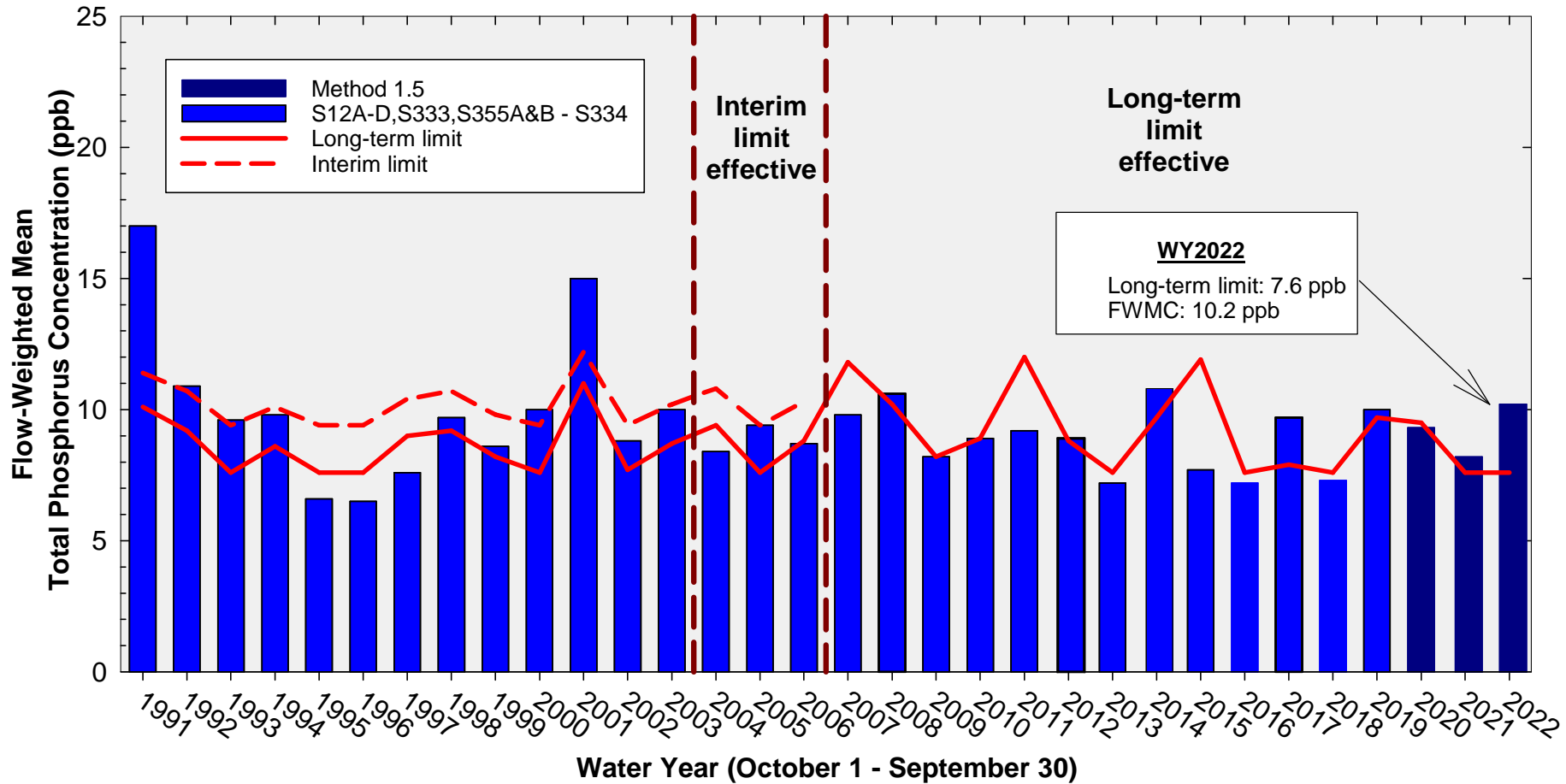
12-Month Period	Total Flow (kac-ft)	Flow-Weighted Mean TP Concentration (ppb)	Long-Term Limit (ppb) <i>Effective 12/31/2006</i>	Percent of Sampling Events Greater than 10 ppb	
				Observed (%)	Guideline (%)
Nov 2021 - Oct 2022	1,090.7	9.9	7.6	50.0	40.1
Dec 2021 - Nov 2022	1,096.6	9.8	7.6	50.0	40.1
Jan 2022 - Dec 2022	1,088.7	9.8	7.6	50.0	40.1

### Shark River Slough PROVISIONAL RESULTS:

FWMC computed as S12s + [S333 + S333N + S355A + S355B + minimum of (S356, S335) – S334] using all flow and TP grabs on bi-weekly compliance sampling dates.

S334 flow was not excluded from the flow for long-term limit calculations.

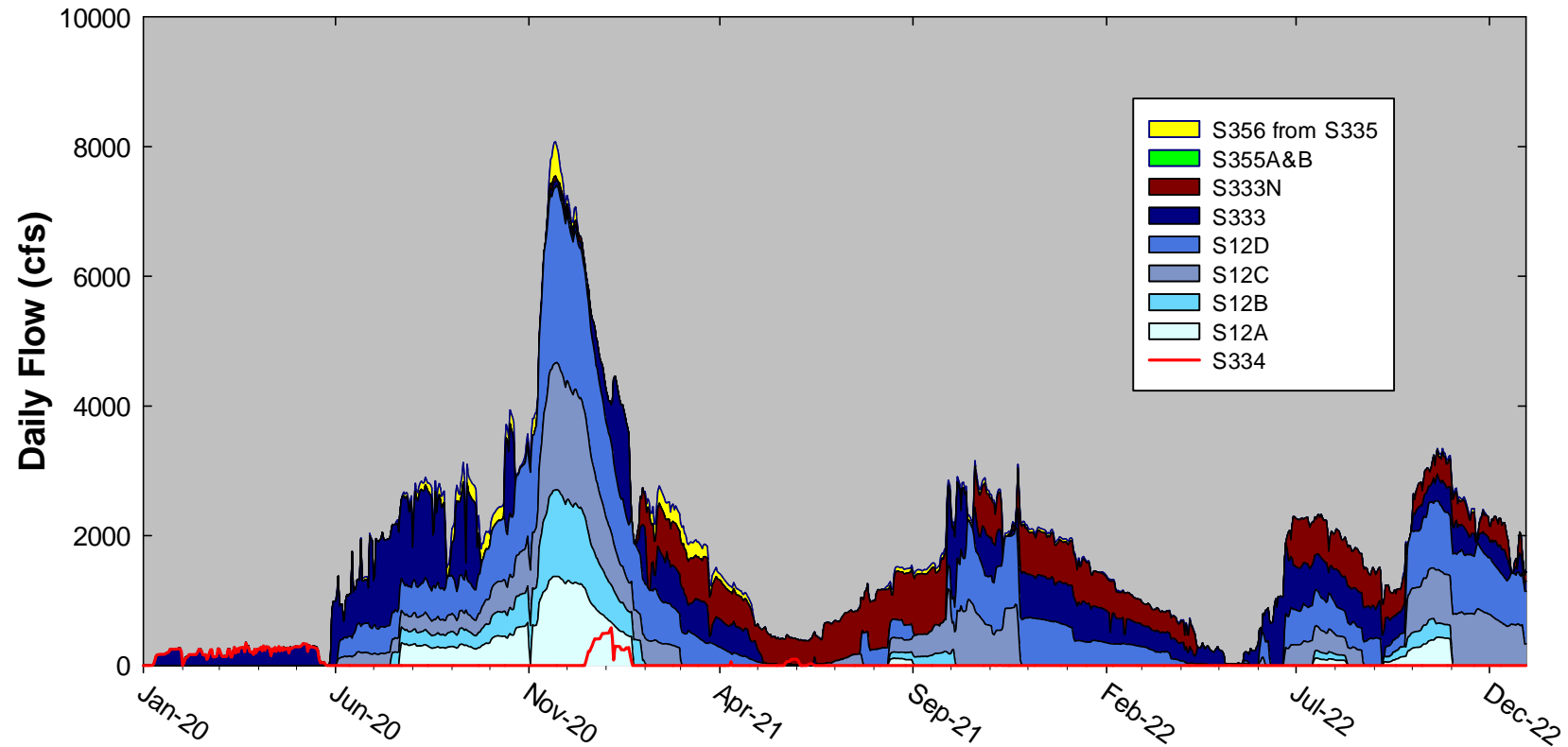
# Annual Flow-weighted Mean Concentrations Inflows to ENP through Shark River Slough



**12-month FWMC at the end of each water year compared to the TP interim and long-term limits**

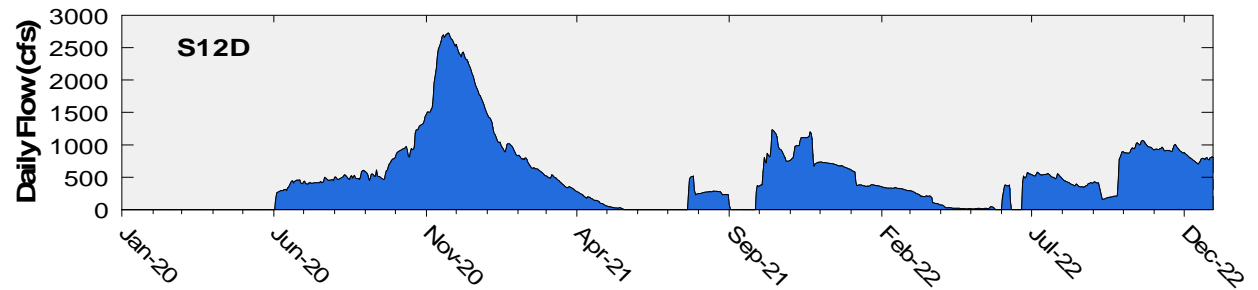
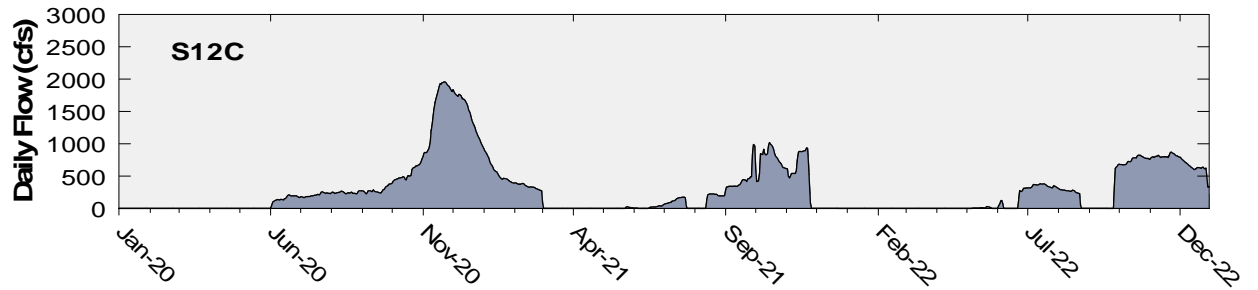
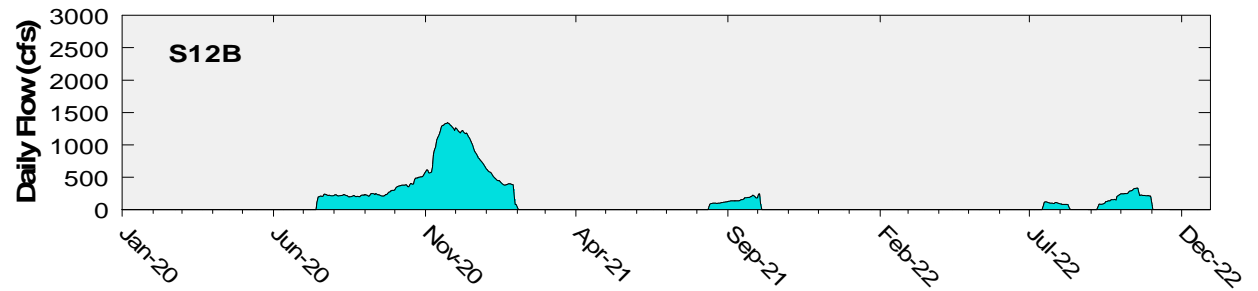
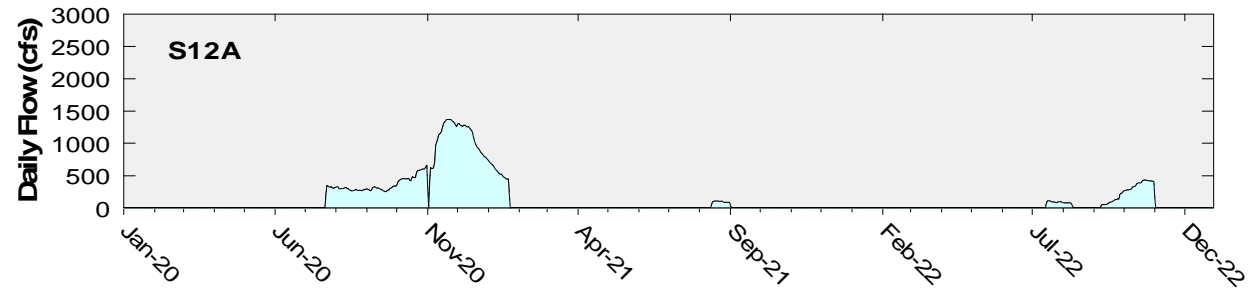
# Shark River Slough Structure Daily Flows

WY2023 (October 1, 2022 – December 31, 2022) Flow Data for S12s are Provisional.



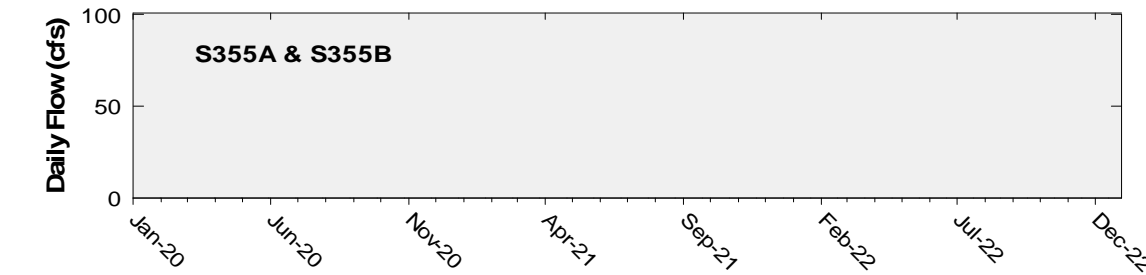
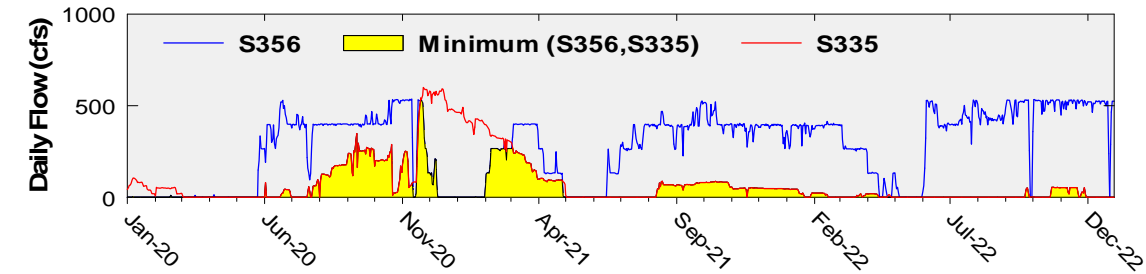
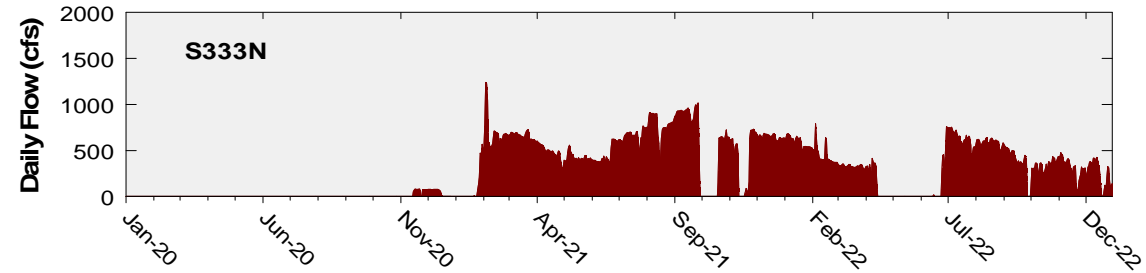
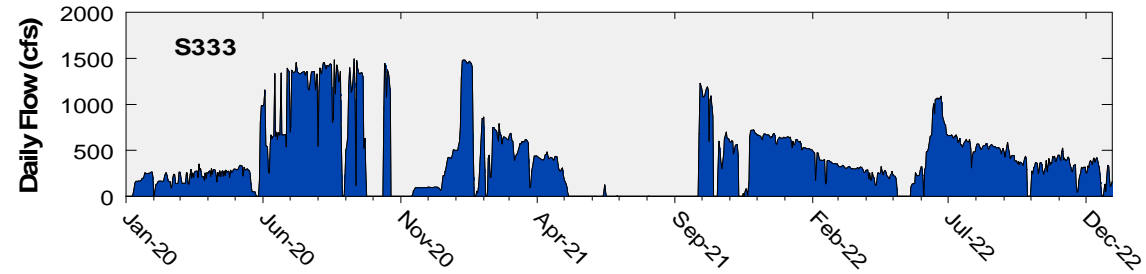


# Daily Flows at S12 Structures to Shark River Slough

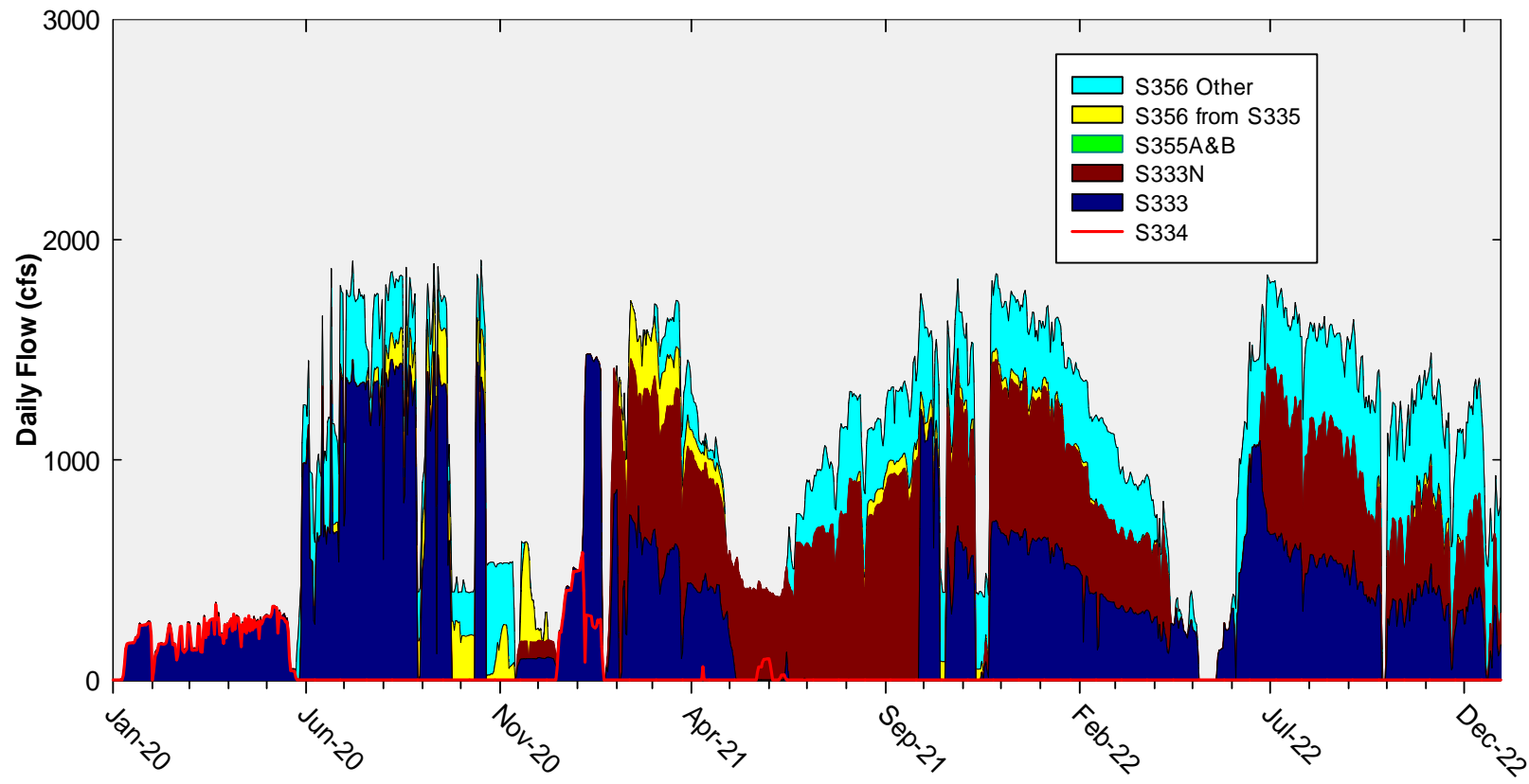


# Daily Flows at Individual Inflow Structures to Shark River Slough

(Note: There was no flow at S355A or S355B during the period.)

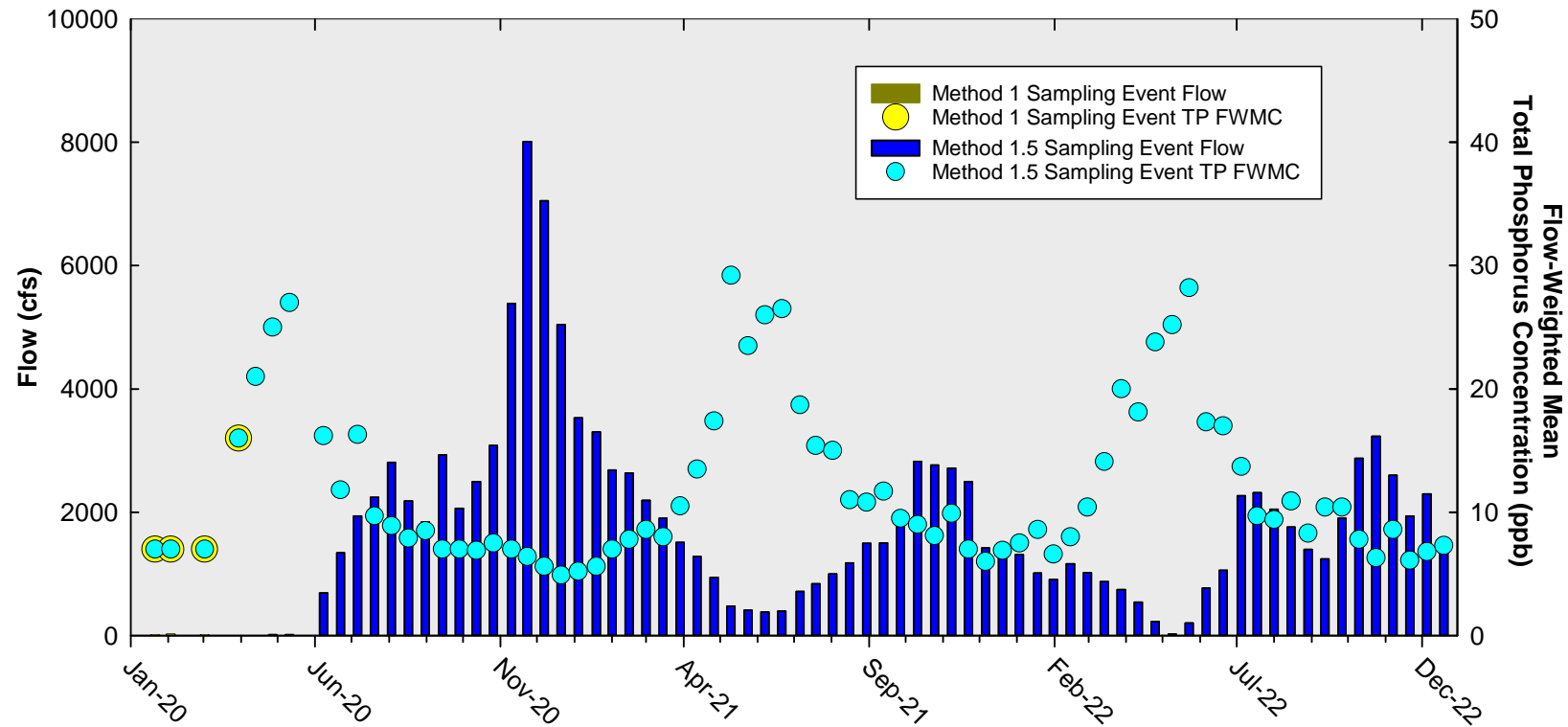


## Daily Flows Into Shark River Slough through S333&S333N, S355A&B, and S356 and Out through S334



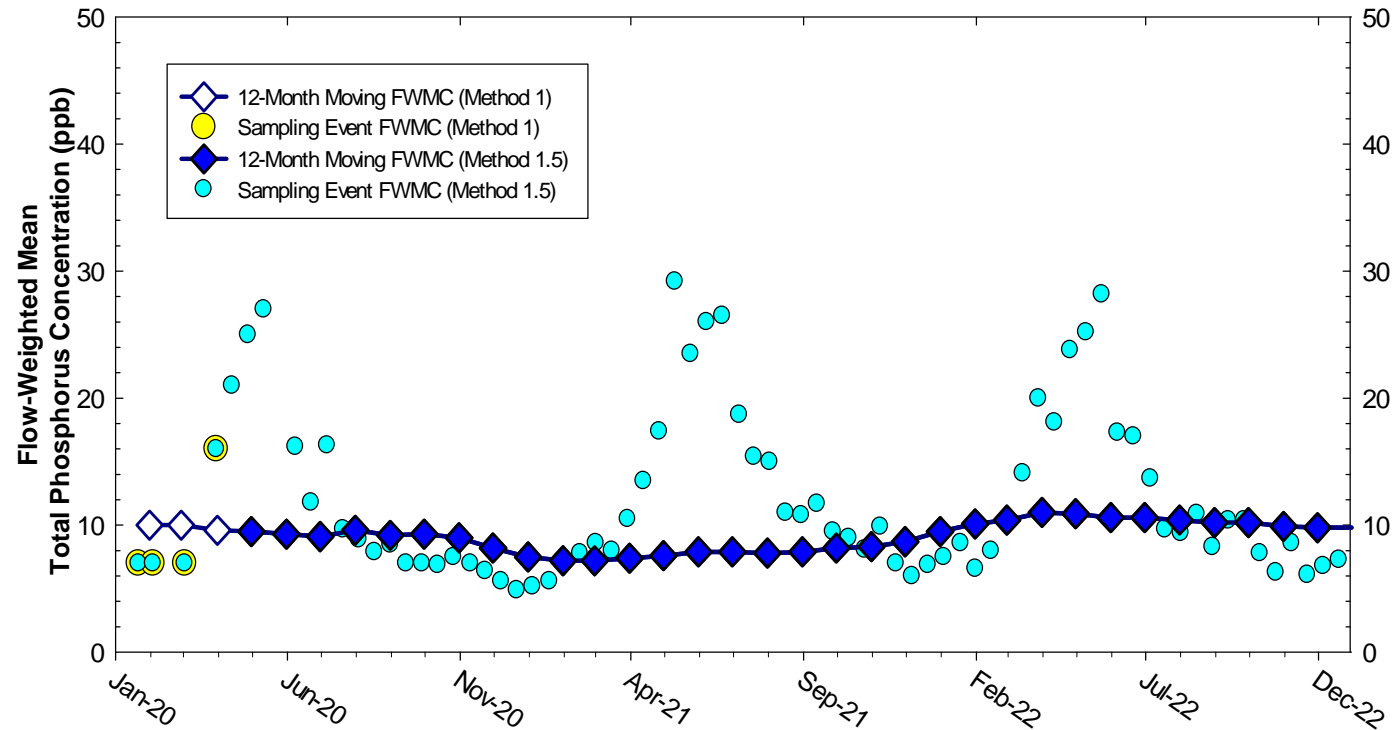
# Shark River Slough

## Sampling Event Flow and FWMC



**Flow to Shark River Slough and the corresponding TP FWMCs for individual sampling events**

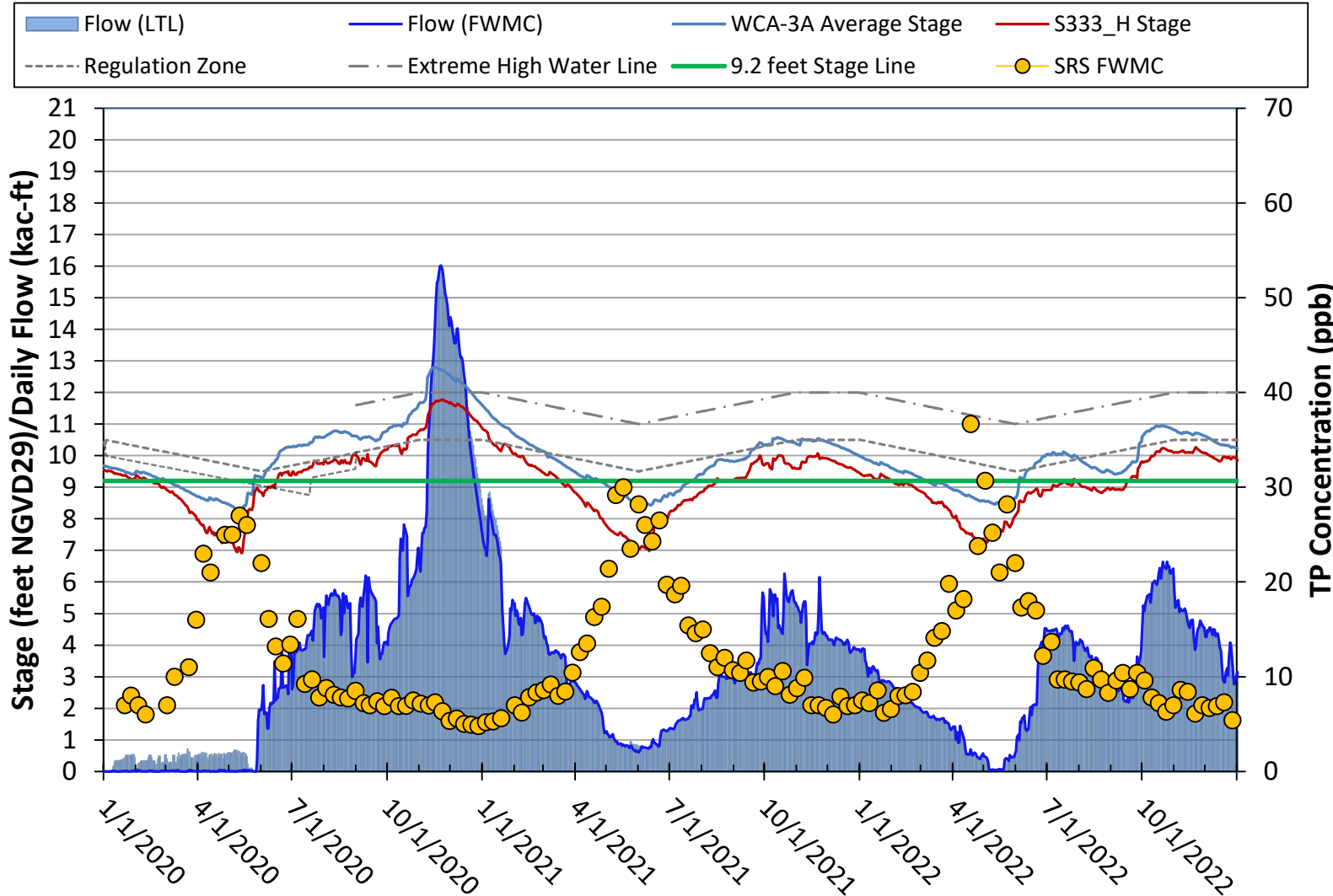
# Flow-Weighted Mean Concentrations Inflows to ENP through Shark River Slough



**The composite TP concentration and 12-month FWMC at the end of each month for each sampling event**

# Stage, Flow, and TP FWMC

## Inflows to ENP through Shark River Slough



## Taylor Slough and Coastal Basins

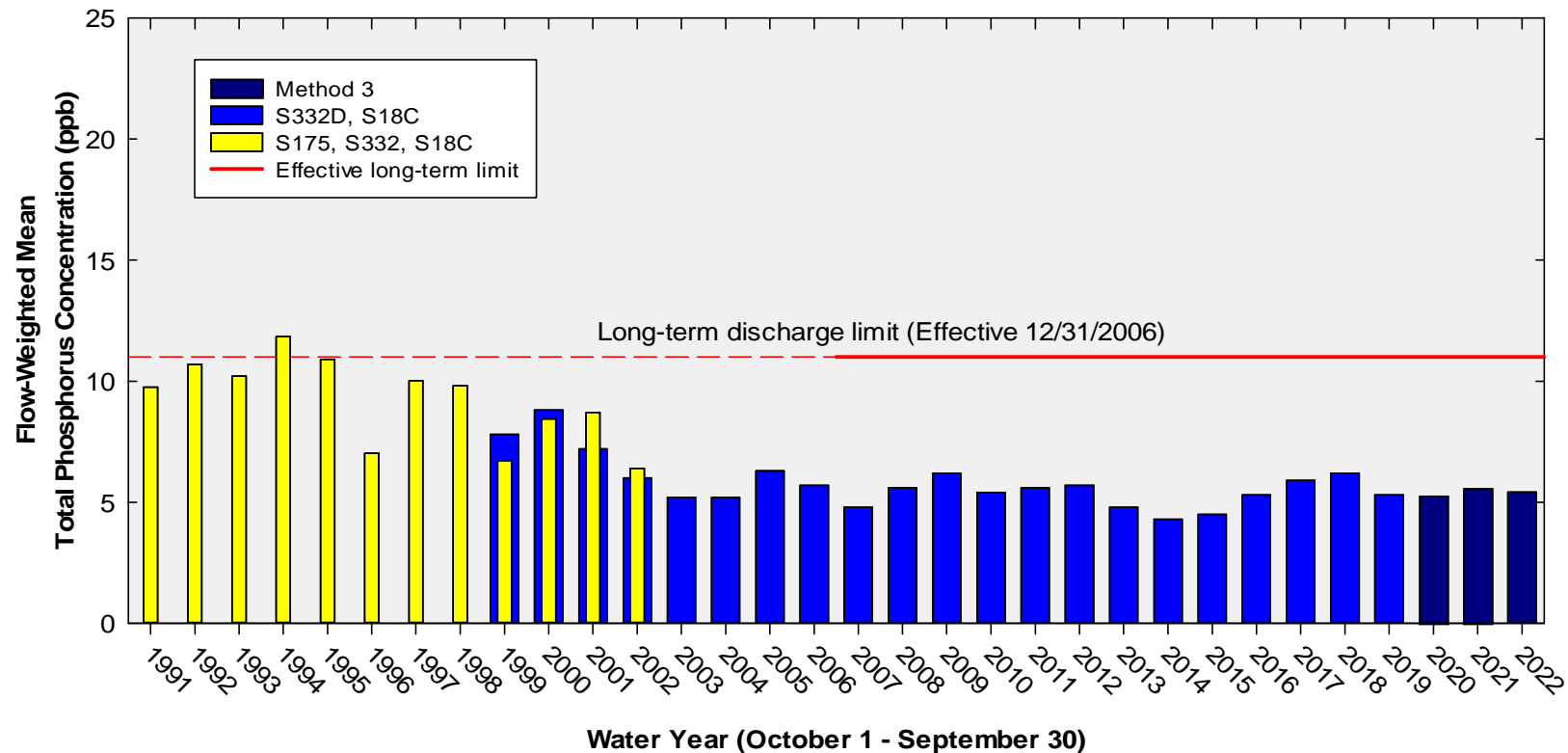
### TP Concentration Compliance Tracking

12-Month Period	Total Flow (kac-ft)	Flow-Weighted Mean TP Concentration in ppb LTL = 11.0 ppb Effective 12/31/2006	Observed Percent of Sampling Events Greater than 10 ppb Guideline = 53.1%
<b>Nov 2021 - Oct 2022</b>	<b>329.0</b>	<b>5.1</b>	<b>4.2</b>
<b>Dec 2021 - Nov 2022</b>	<b>321.1</b>	<b>5.2</b>	<b>4.1</b>
<b>Jan 2022 - Dec 2022</b>	<b>321.3</b>	<b>5.1</b>	<b>4.1</b>

FWMC computed as [(S332D-S332DX1-S328)+S328+G737+S18C] using all flow and TP grabs on weekly compliance sampling.

Total flow is (S332D-S332DX1)+G737+S18C]

# Annual Flow-Weighted Mean Concentrations Inflows to the ENP through Taylor Slough and Coastal Basins

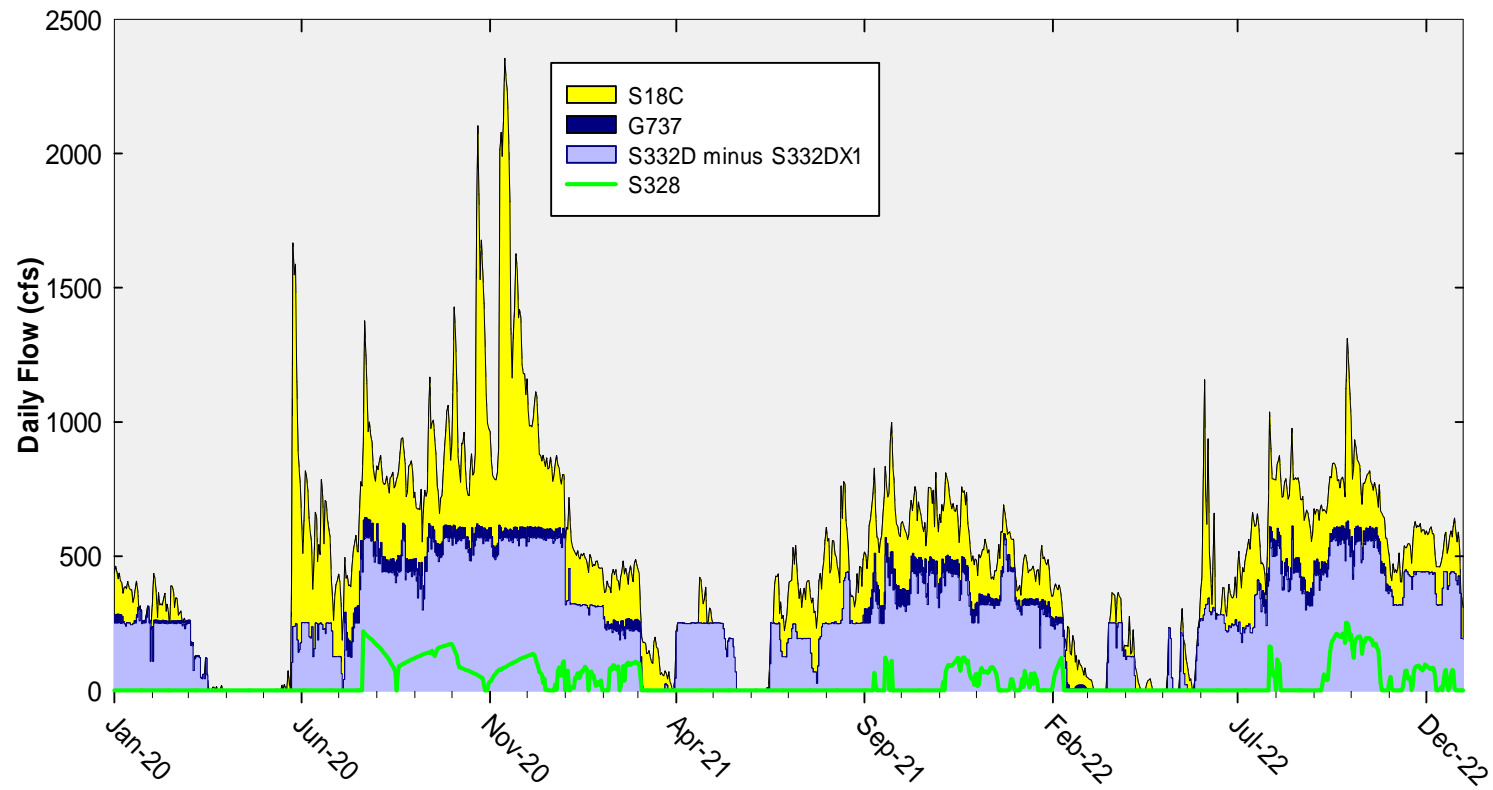


**The 12-month FWMC at the end of each water year  
compared to the 11 ppb long-term TP limit**

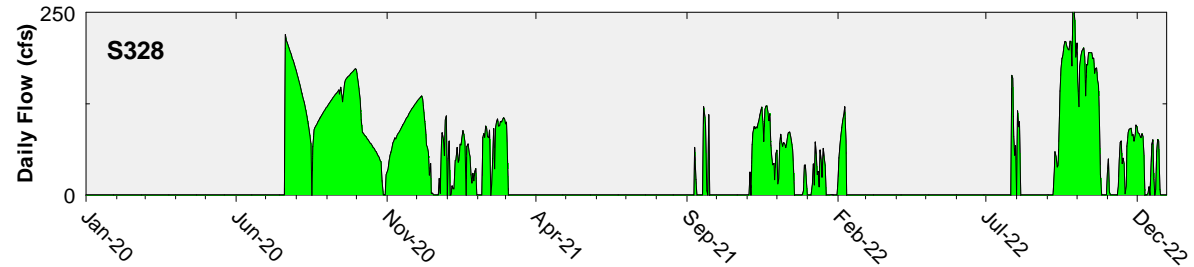
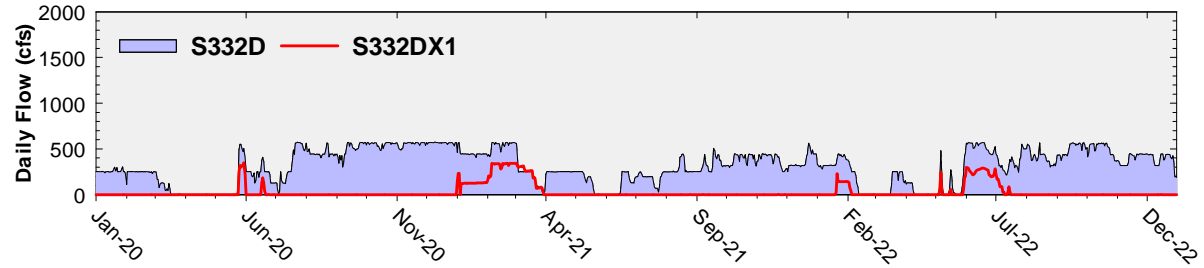
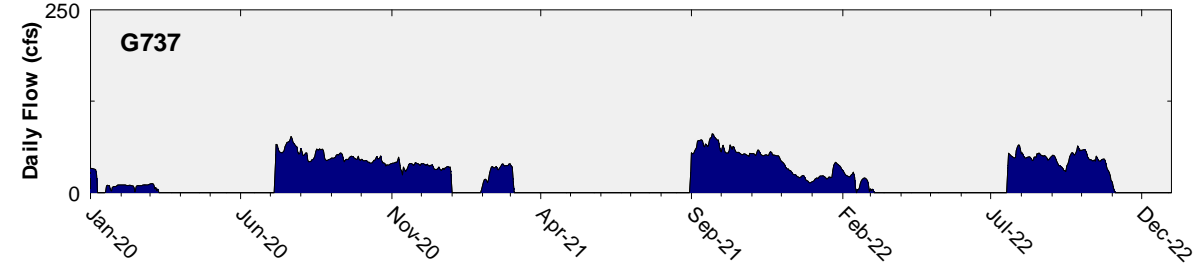
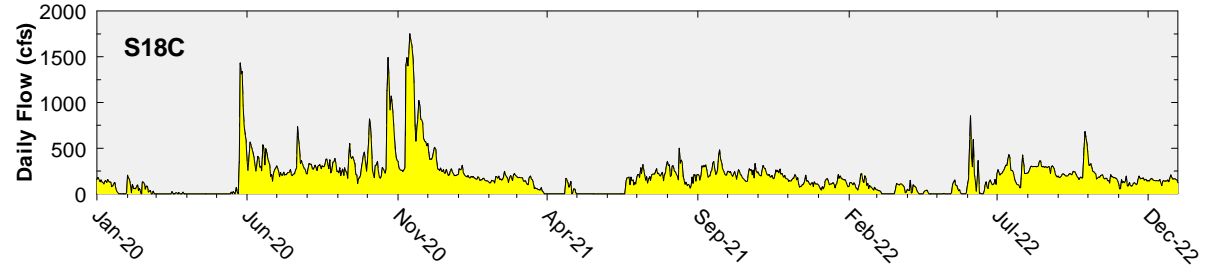
Note: Blue bars show S332D, S18C, & S174 until September 2007 when S174 was plugged.



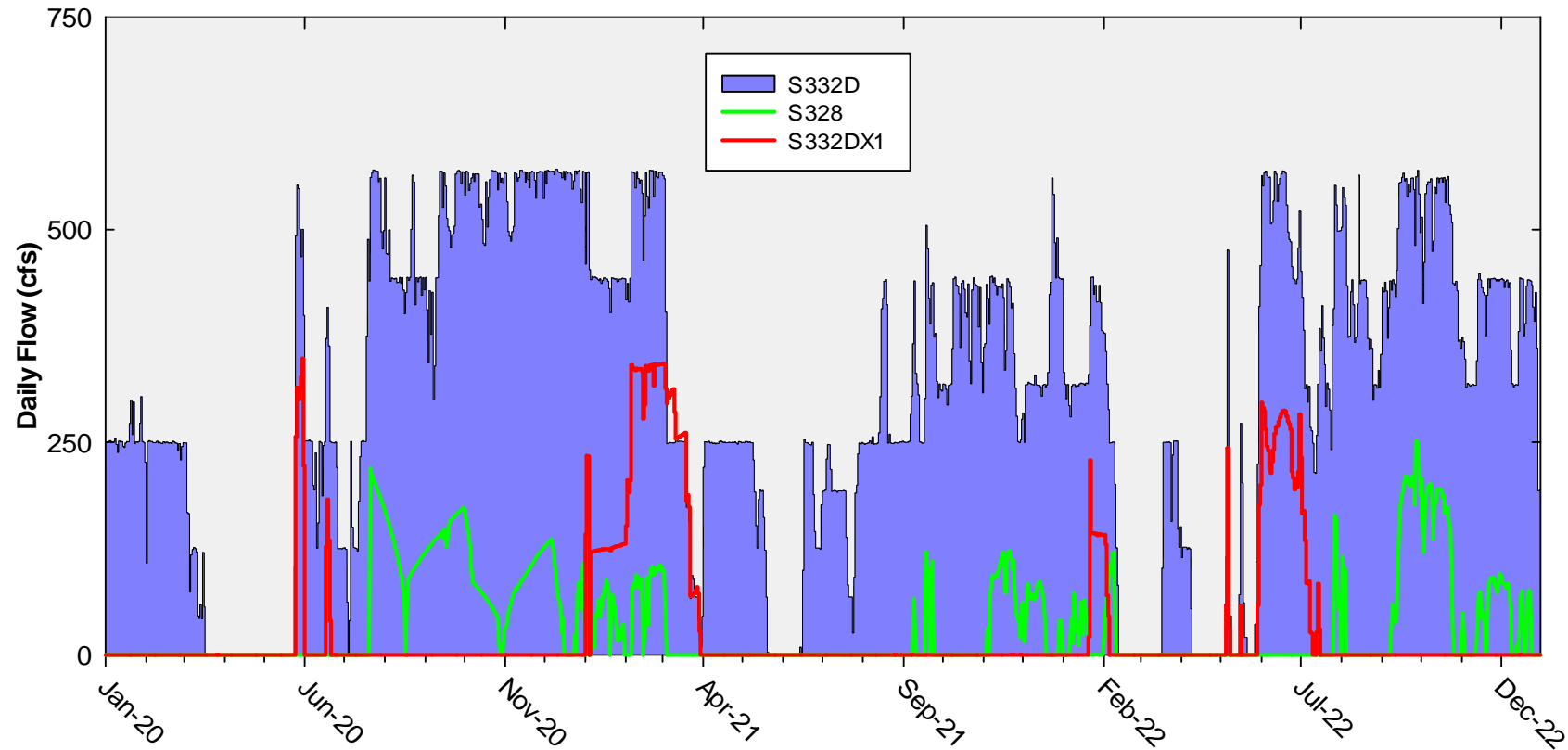
## Daily Flows at Taylor Slough and Coastal Basins Structures into ENP



# Daily Flows at Individual Taylor Slough and Coastal Basins Structures

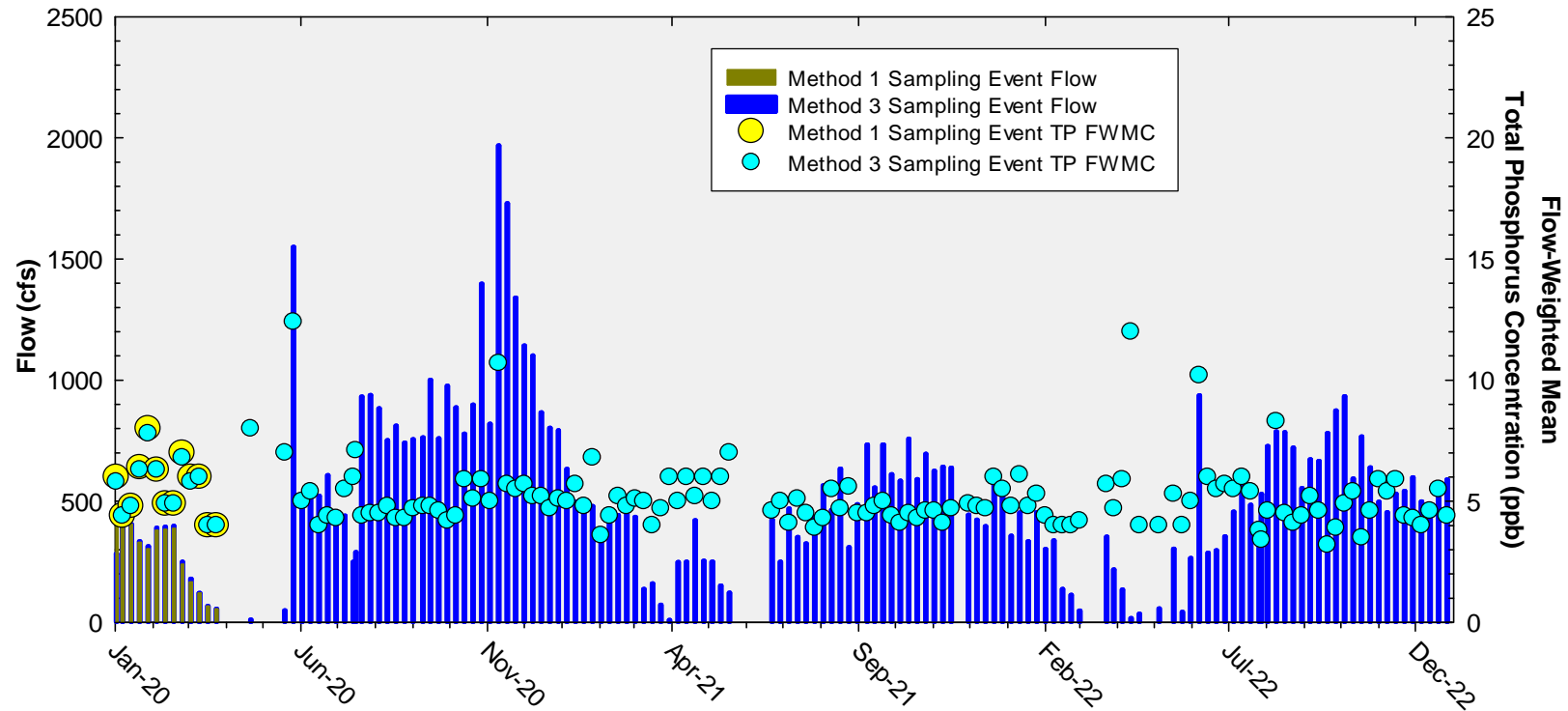


## Daily Flows In and Out of S332D Flowway



# Taylor Slough and Coastal Basins

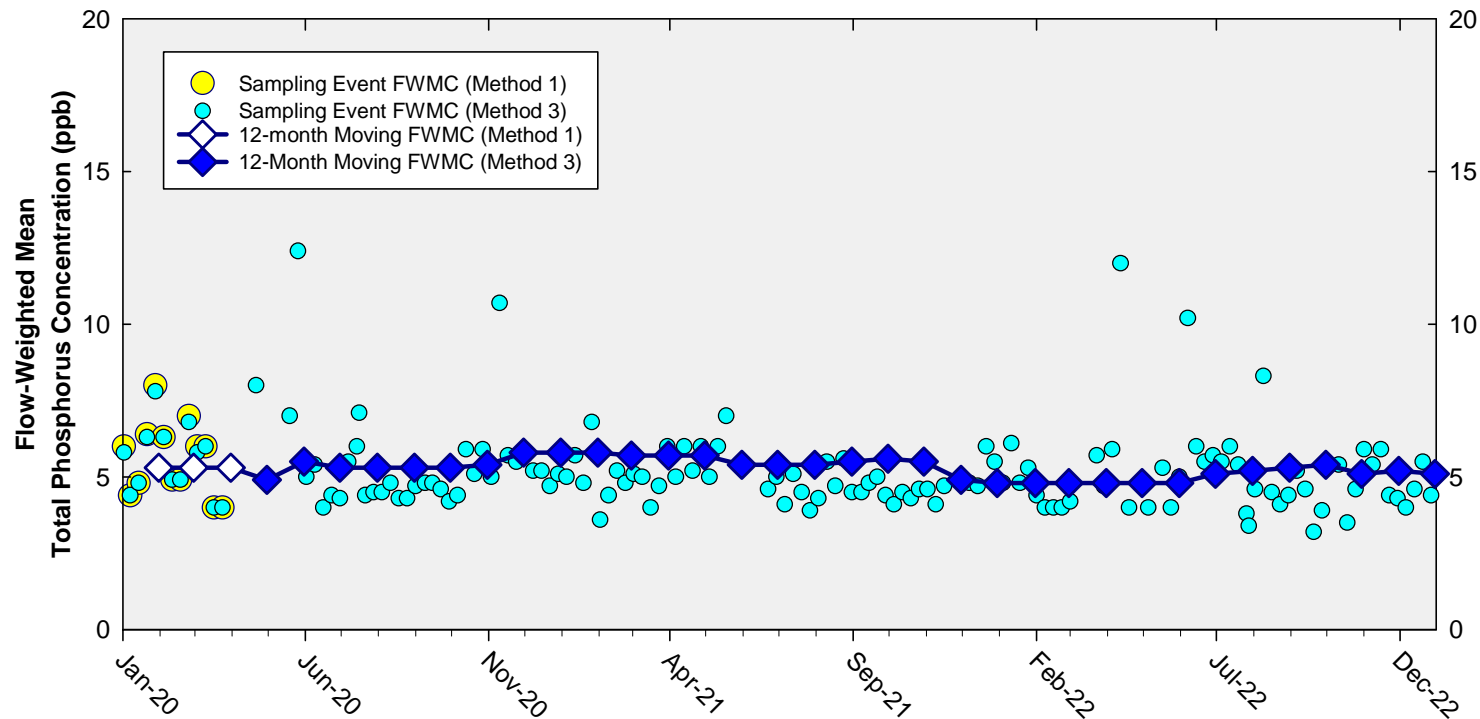
## Sampling Event Flow and FWMC



**Flow at Taylor Slough and Coastal Basins structures and the corresponding TP FWMCs for individual sampling events**

# Flow-Weighted Mean Concentrations

## Inflows to the ENP through Taylor Slough and Coastal Basins



**The 12-month FWMC at the end of each month and the composite TP concentration for each sampling event**

Thank You

