

# Water Quality Conditions for Everglades National Park, Water Year 2022 Shark River Slough

Technical Oversight Committee Quarterly Meeting  
June 27, 2023

# SRS Water Quality Conditions – Final Results

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 (%)
<b>Aug 2021 - Jul 2022</b>	<b>1,055.2</b>	<b>10.4</b>	<b>7.7</b>	<b>53.8</b>	<b>40.2</b>
<b>Sep 2021 - Aug 2022</b>	<b>1,081.9</b>	<b>10.2</b>	<b>7.6</b>	<b>46.2</b>	<b>39.7</b>
<b>Oct 2021 - Sep 2022</b>	<b>1,066.0</b>	<b>10.2</b>	<b>7.6</b>	<b>50.0</b>	<b>40.1</b>

## FINAL WY2022 RESULTS

SRS FWMC- 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.

# SRS Water Quality Conditions – Outline

## Evaluation of the WY2022 Exceedance

<b>Evaluation under the Consent Decree</b>	Data errors?
	Extraordinary natural phenomena?
<b>What occurred throughout the year?</b>	System operations
	Upstream conditions
<b>Identified the major drivers to compliance results</b>	

# SRS Water Quality Conditions – Data Errors?

## Evaluation of Data Errors

Potential Data Issues	Flow	Water Quality	Effects on Compliance Results
Missing data	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> 5 samples	Influence detected but did not affect compliance results
Suspicious (Qualified) data	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> 0 event	

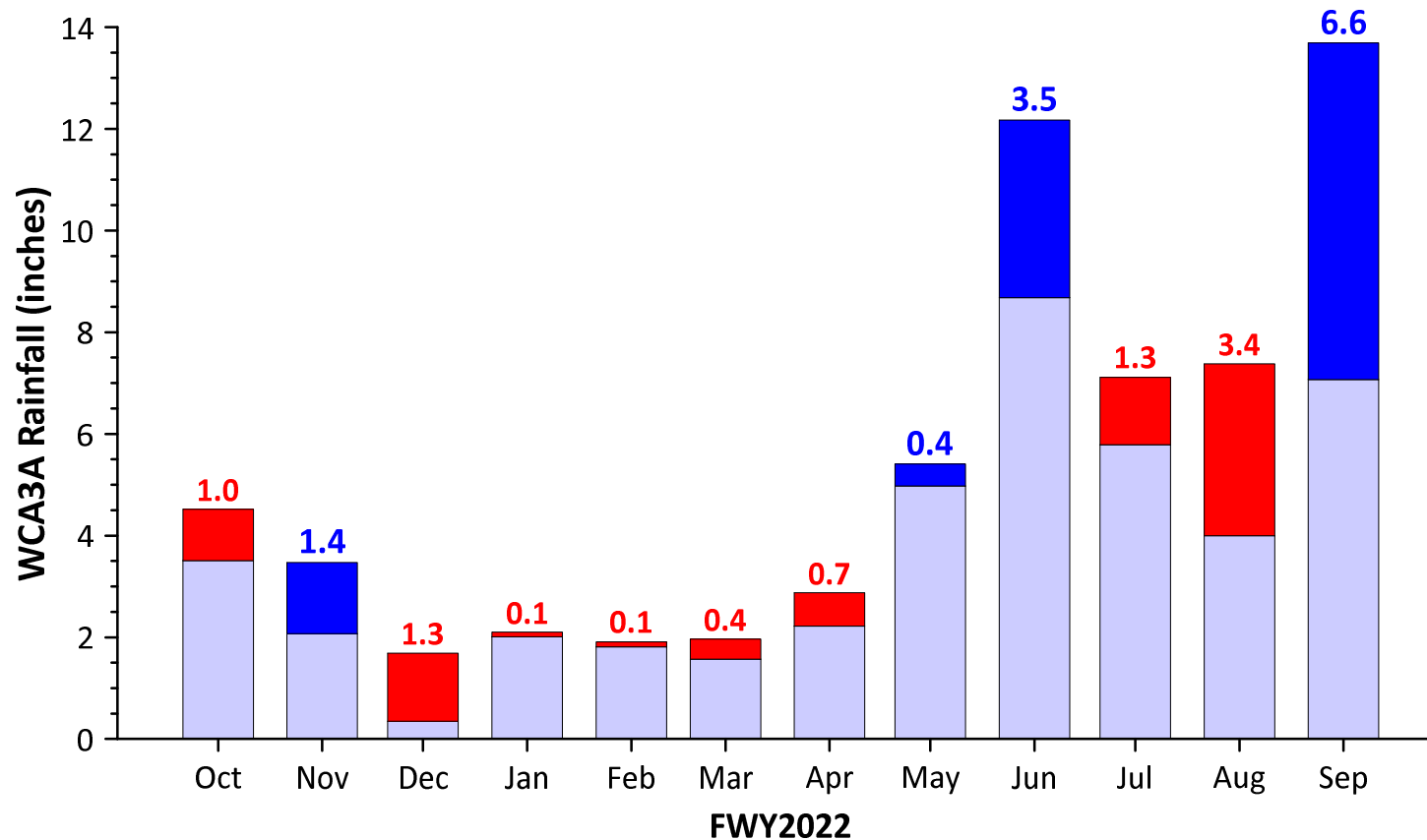
# SRS Water Quality Conditions – Data Errors?

## Influence of Missing Water Quality Data

Case	Location	Annual SRS FWM (ppb)
5 missing samples	S333 *	10.2
5 substitute samples for S333	S333N or S12D	10.0 or 9.9

\* Five compliance event samples were not taken at S333 from 12/6/2021 to 1/31/2022 due to unsafe sampling platform.

# SRS Water Quality Conditions - Extraordinary Natural Phenomena?

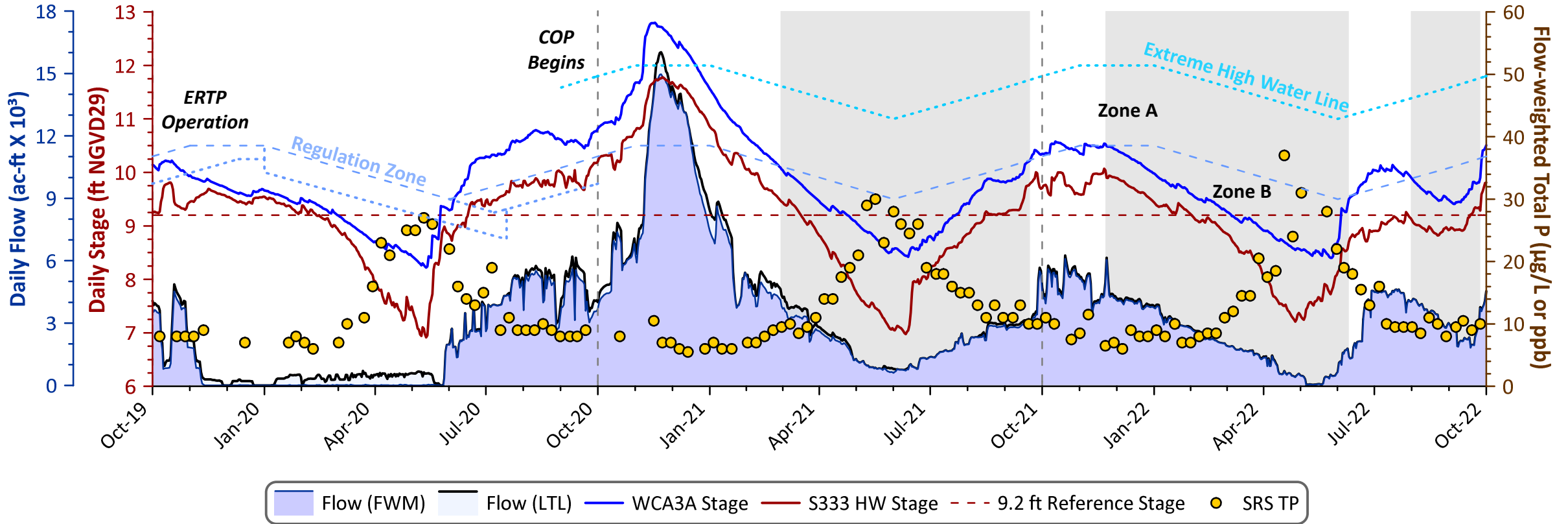


■ Deficit from 30-Year Mean
 ■ Surplus from 30-Year Mean

- Low rainfall from October 2021 to mid-September 2022 (45")
- More rainfall in the latter half of September 2022 (Hurricane Ian).
- The annual total: 56.0" (52.3" for 30-year mean)

# System Operations – 80% of Days in Zone B

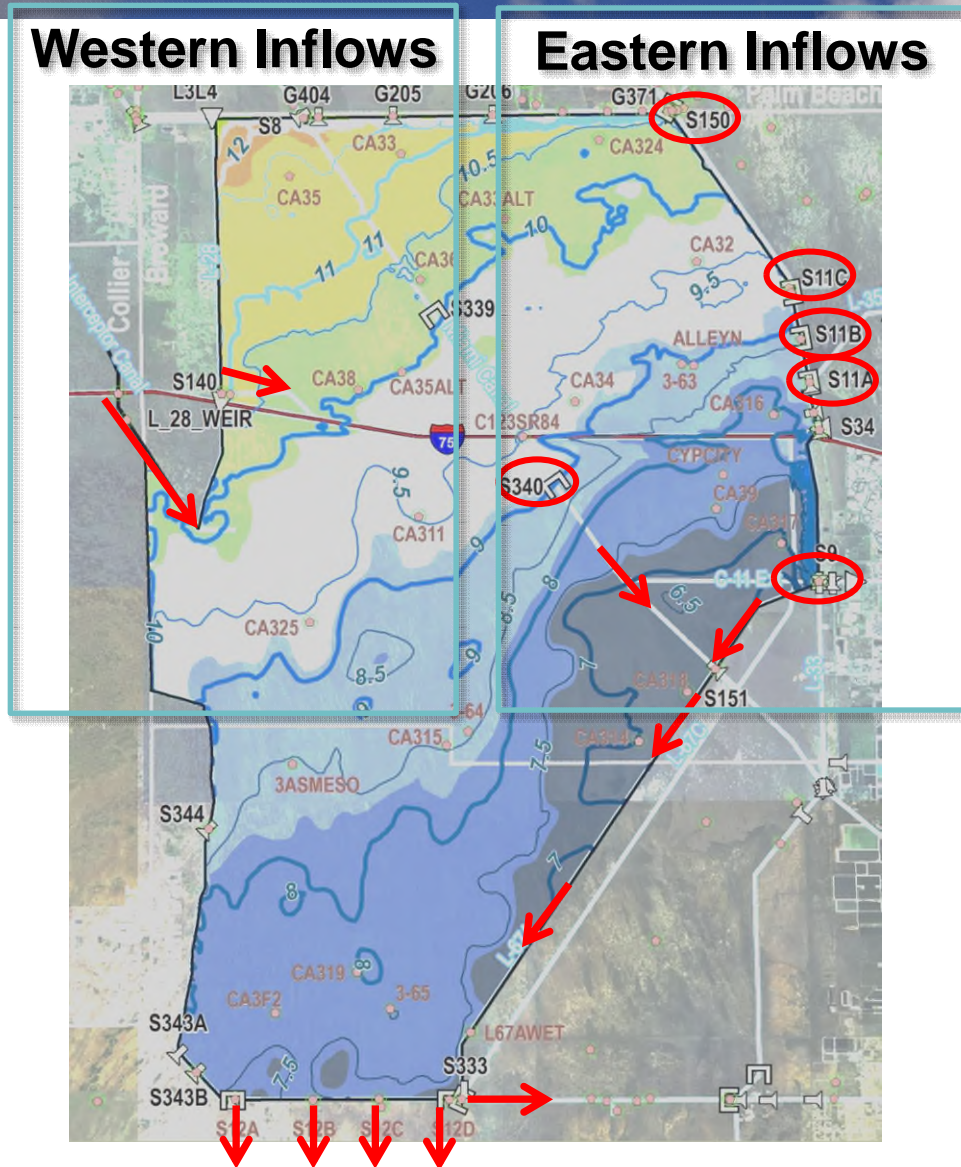
	WY2020	WY2021	WY2022
Total Flow	693 ac-ft x 10 <sup>3</sup>	1,733 ac-ft x 10 <sup>3</sup>	1,066 ac-ft x 10 <sup>3</sup>
LT Limit	9.5 µg/L or ppb	7.6 µg/L or ppb	7.6 µg/L or ppb
FWMC TP	9.3 µg/L or ppb	8.2 µg/L or ppb	10.2 µg/L or ppb



$$\text{Flow (LTL)} = S12s + S333\&S333N + S355A\&B + S356 + \min(S356, S335)$$

$$\text{Flow (FWM)} = S12s + S333\&S333N + S355A\&B + \min(S356, S335) - S334$$

# SRS Water Quality Conditions - Upstream Conditions



## WCA-3A Surface Water Inflows

### • Eastern Inflows (included)

- S150 from EAA STAs
- S11A-C from WCA-2
- S9 & S9A from Western Broward
- S340 from Miami Canal & WCA-3A

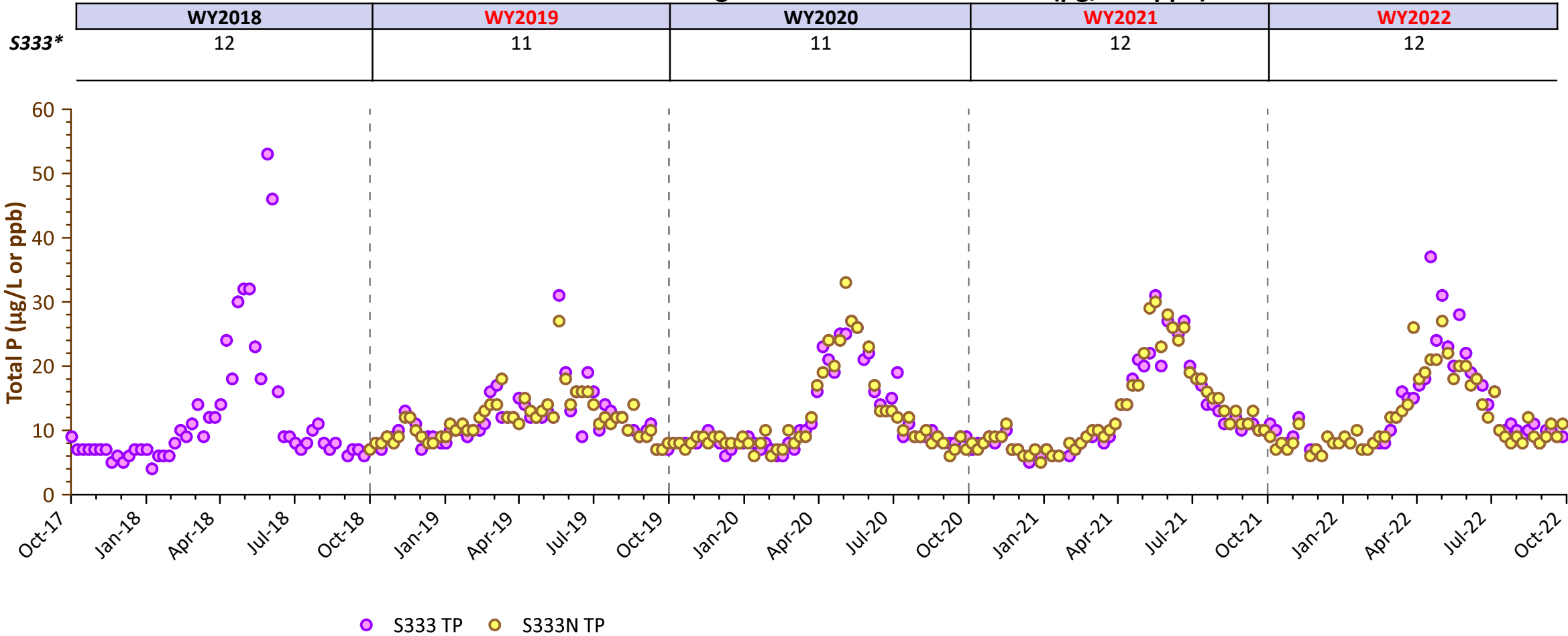
### • Western Inflows (excluded)

- S8 from STA-3/4 and Rotenberger
- L3/L4 Canals from STA-5/6
- S140 from L-28 Canal
- S190 from L-28 Interceptor Canal
- Mullet Slough from Big Cypress



# SRS Water Quality Conditions - Downstream > Upstream?

Annual Total P Flow-Weighted Mean Concentrations (µg/L or ppb)

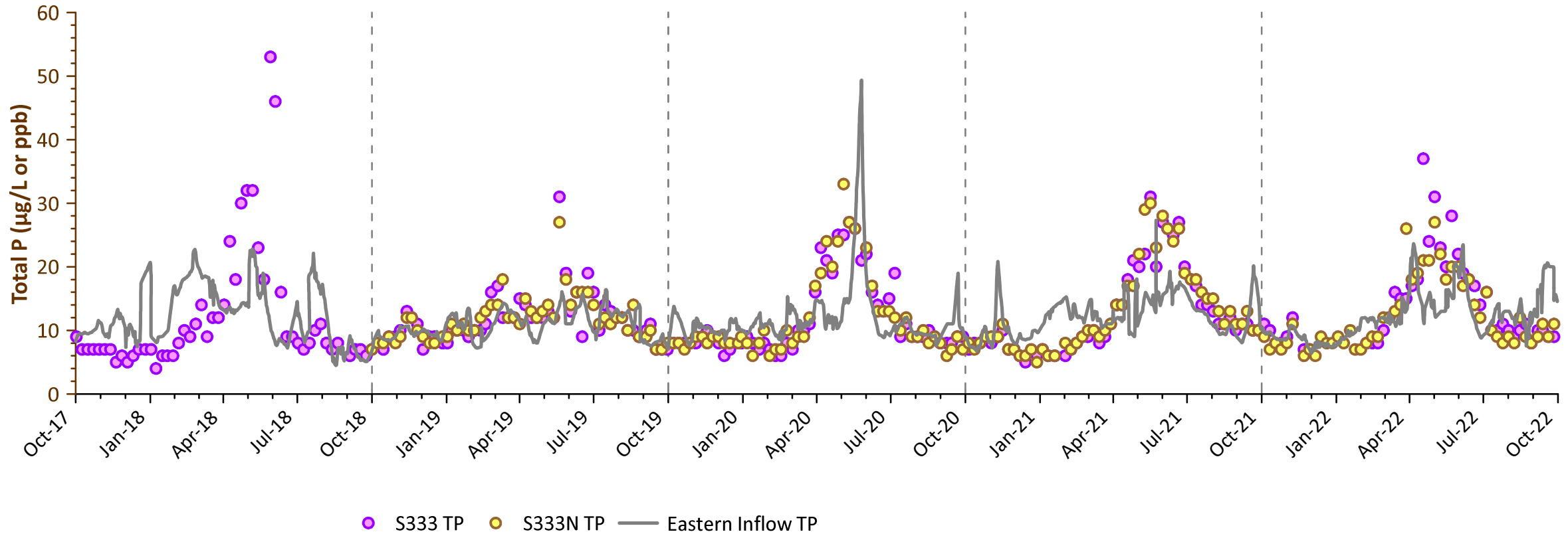


S333\* = Aggregate of S333 and S333N

# SRS Water Quality Conditions - Downstream > Upstream?

Annual Total P Flow-Weighted Mean Concentrations (µg/L or ppb)

	WY2018	WY2019	WY2020	WY2021	WY2022
S333*	12	11	11	12	12
Eastern*	10	11	12	11	12



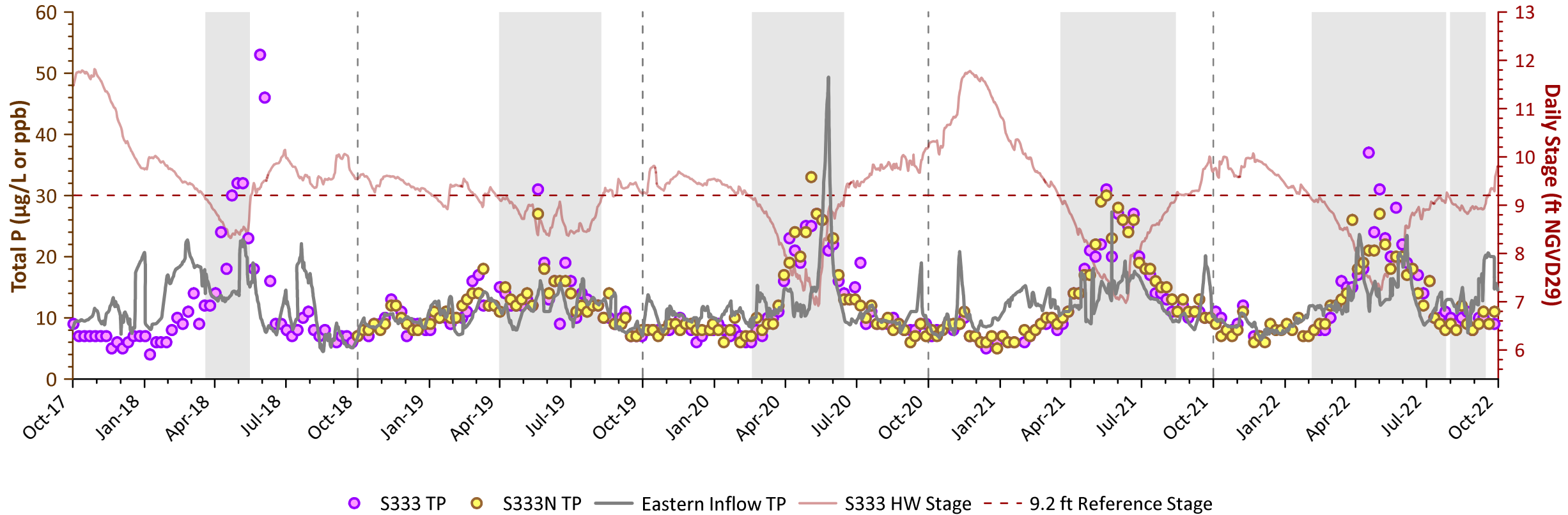
S333\* = Aggregate of S333 and S333N

Eastern\* = Eastern Inflow 7-day eastern inflow FWM Aggregate (S11s, S150, S9, S9A, S340) before the S333 and S333N sampling dates

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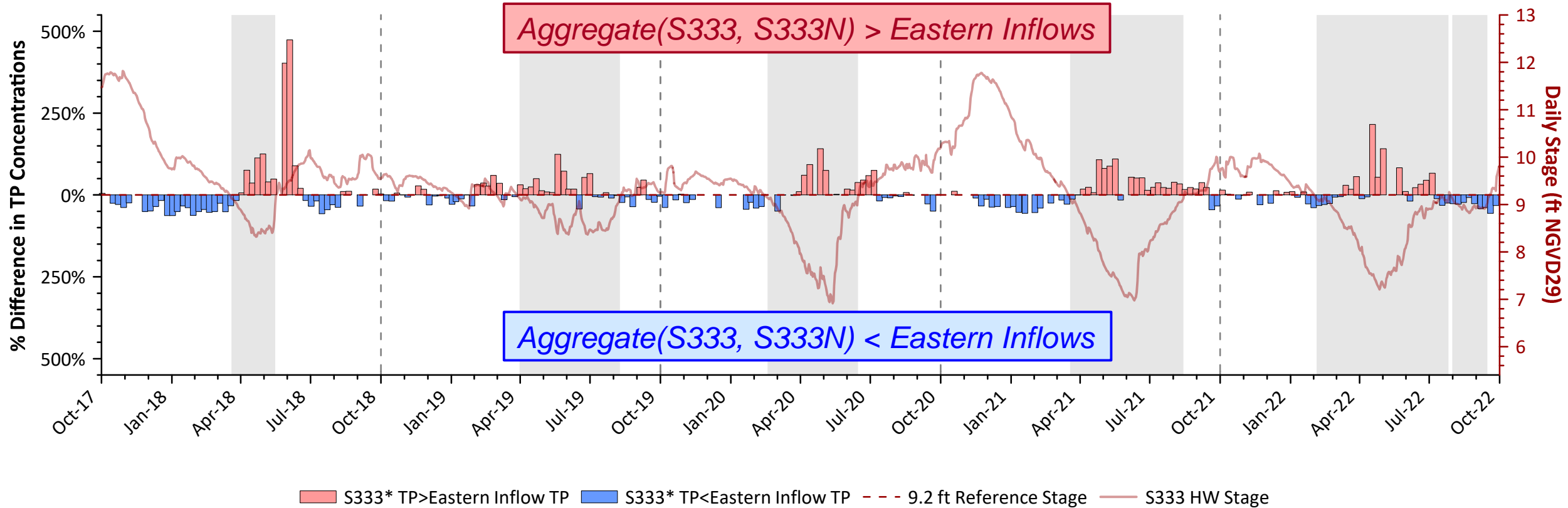
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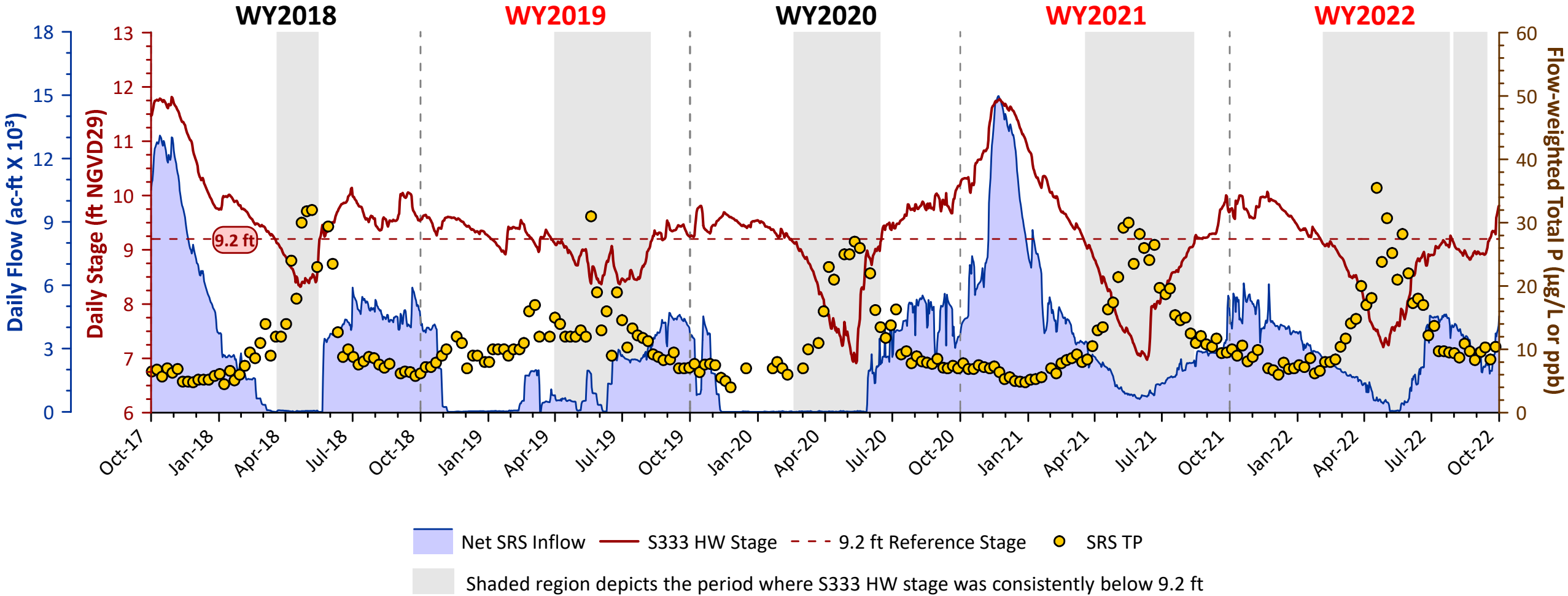
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# SRS Water Quality Conditions - Effects on Compliance

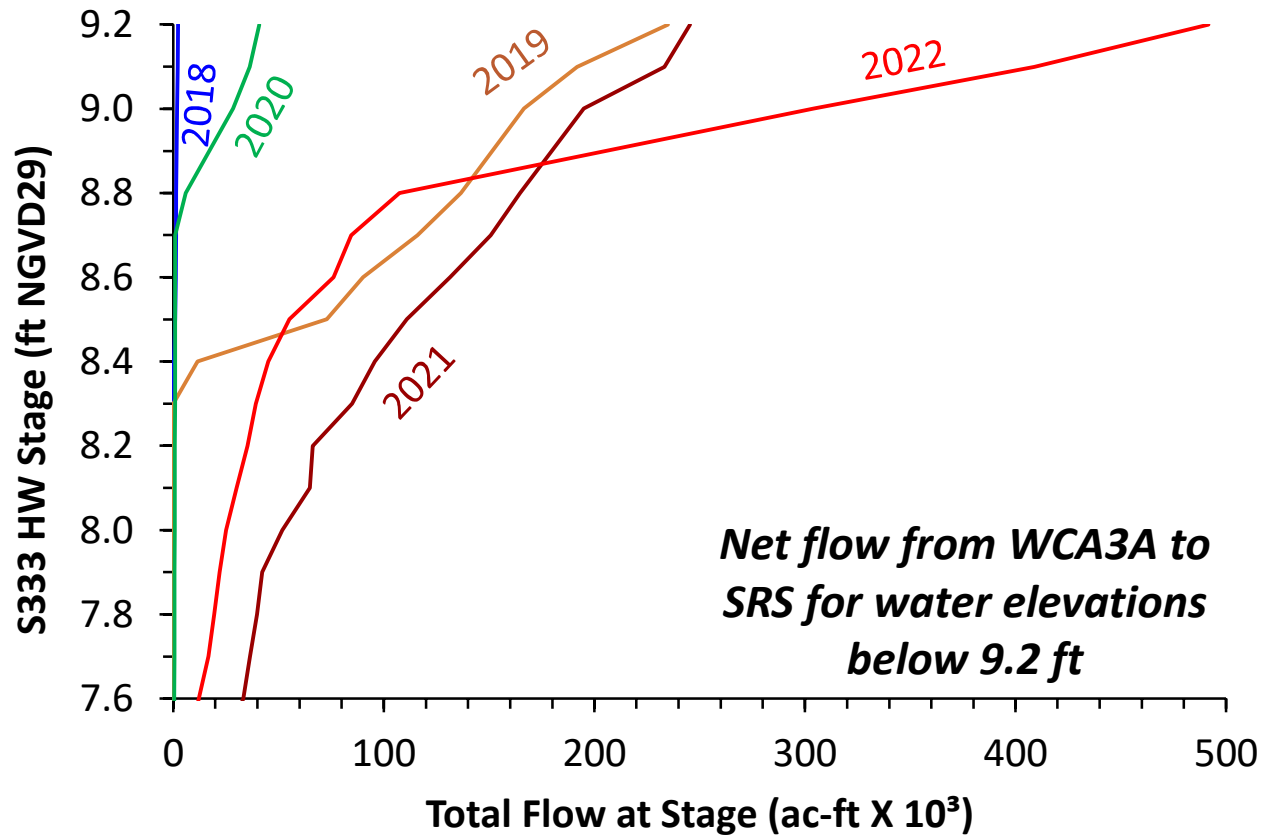
## Understanding what might have caused the exceedance

- The relationship between L-67A stage (S333HW) and TP concentration
- Flows from WCA-3A to SRS below S333 HW stage of 9.2 ft
- Effects on compliance results
- Identified major drivers to compliance results

# SRS Water Quality Conditions - Effects on Compliance



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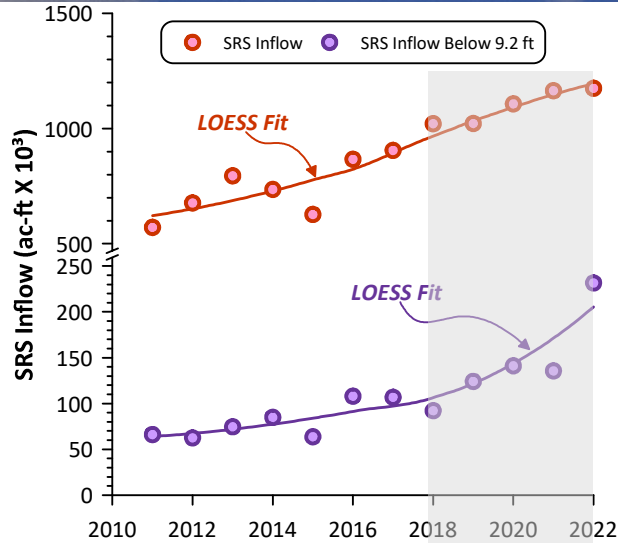
The top three years of the last 30 years with highest flows under low stage:

- 1<sup>st</sup>: 2022 (exceedance year)
- 2<sup>nd</sup>: 2021 (exceedance year)
- 3<sup>rd</sup>: 2019 (exceedance year)

FWY	LTL	FWM TP	Net flow from WCA3A to SRS S333HW ≤ 9.2 ft (ac-ft X 10 <sup>3</sup> )
	(µg/L or ppb)		
2018	7.6	7.3	2
2019	9.7	10	235
2020	9.5	9.3	41
2021	7.6	8.2	245
2022	7.6	10.2	492

Exceedance year

# SRS Water Quality Conditions – Trends of 5-year Average Data

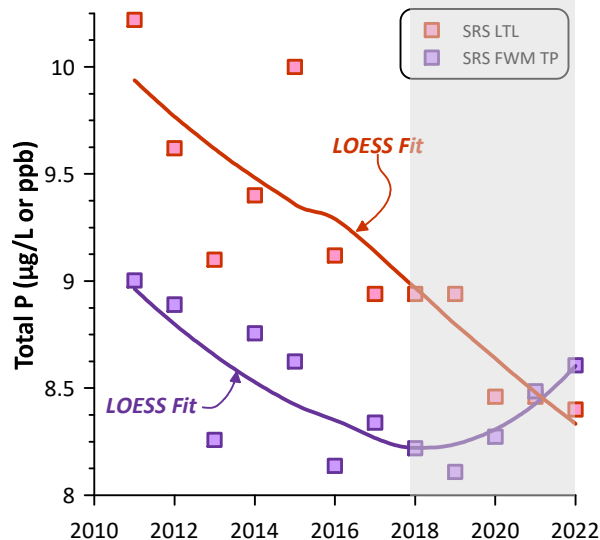


Federal Water Year	5-year average of flow (ac-ft X 10 <sup>3</sup> )			5-year average of TP (µg/L or ppb)	
	SRS Inflow	Flow to SRS from WCA3A when S333HW ≤ 9.2 ft	* Net flow to SRS from WCA3A when S333HW ≤ 9.2ft	LTL	FWM
2018	1,021	92	57	8.9	8.2
2019	1,022	124	81	8.9	8.1
2020	1,107	141	90	8.5	8.3
2021	1,164	136	108	8.5	8.5
2022	1,174	232	205	8.4	8.6

\* Net flow from WCA3A to SRS is computed as S12s+[S333+S333N-S334].

Statistically significant trends in 5-year data at 10% confidence level:

- Increasing trends in 2011 – 2022 in SRS inflow (p value < 0.001) , SRS flow when S333HW ≤ 9.2 ft (p value < 0.001) and net flow from WCA3A when S333HW ≤ 9.2 ft (p value < 0.001)
- Decreasing trend in LTL in 2011 – 2022 (p value < 0.001)
- Increasing trend in FWM in 2018 – 2022 (p value 0.050)





# SRS Water Quality Conditions - Summary

## Evaluation of the WY2022 Exceedance

<b>Data errors?</b>	Is not a factor
<b>Extraordinary natural phenomena?</b>	Does not appear to be a factor
<b>Upstream influence?</b>	Continues not to be a factor
<b>Major Driver?</b>	<ul style="list-style-type: none"><li>• Localized effects – periods of higher concentrations under low stage conditions</li><li>• More flow during these periods</li></ul>



# QUESTIONS