

DRAFT MEMO

Date: May 9, 2013  
To: Nick Aumen, Everglades National Park  
From: Bill Walker  
Subject: Shark River Slough Compliance with Long-term Limits in Water Year 2012

The SRS compliance determination in Water Year 2012 is complicated by number of factors to be discussed at the May 14 TOC meeting. The attached information can be considered in evaluating SFWMD proposals to utilize an alternative flow dataset (USGS vs. COE) and substitute a re-sampled value for S12D that was collected two days after December 16, 2011 compliance sampling event. Sensitivities to other assumptions made in the compliance calculations are also explored. The information may also support considerations as to whether an exceedance of the long-term limit (LTL) can be attributed to “error”, in which case the exceedance would not constitute a violation.

- Attachment A. Comparison of USGS, COE, and WMD (Preferred) Daily Flows in Water Years 2007-2012.
- Attachment B. Sensitivity of SRS Compliance Results to Various Assumptions, Water Years 2000-2012.
- Attachment C. SFWMD Memo on SRS Compliance in WY 2012.
- Attachment D. Appendix A of Settlement Agreement Compliance Report, December 2008.

## Attachment A

### Comparison of USGS, COE, and WMD (Preferred) Daily Flows in Water Years 2007-2012.

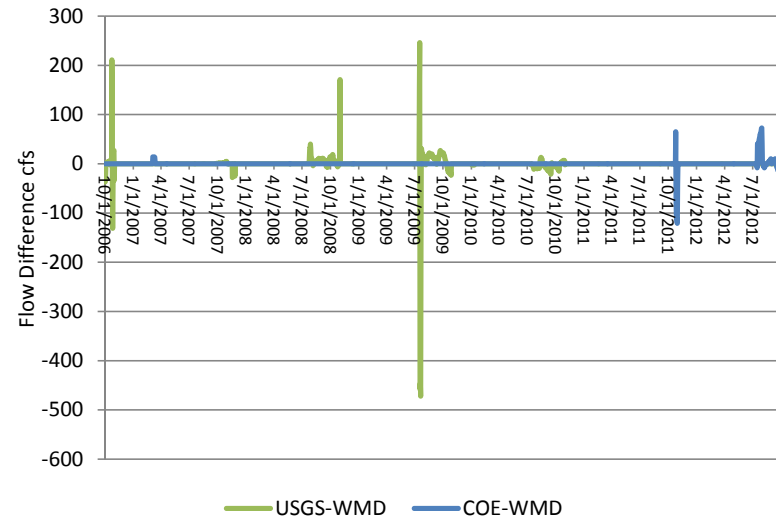
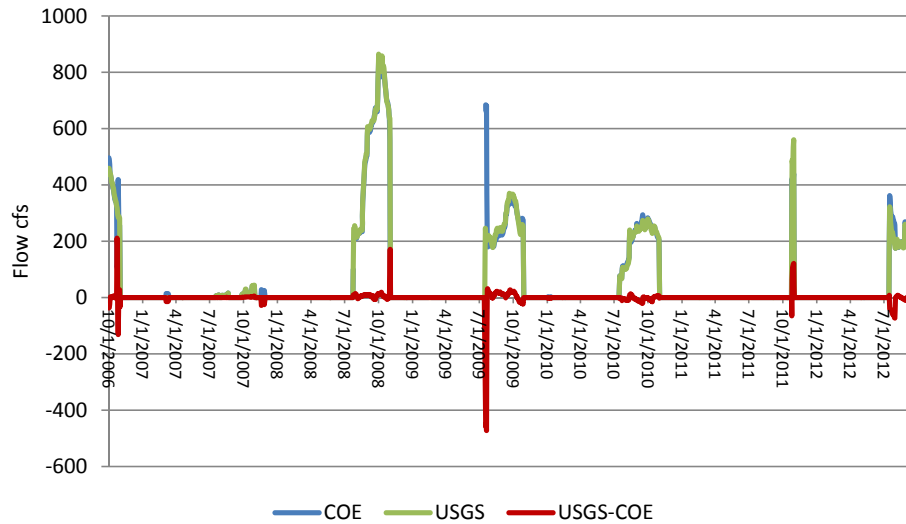
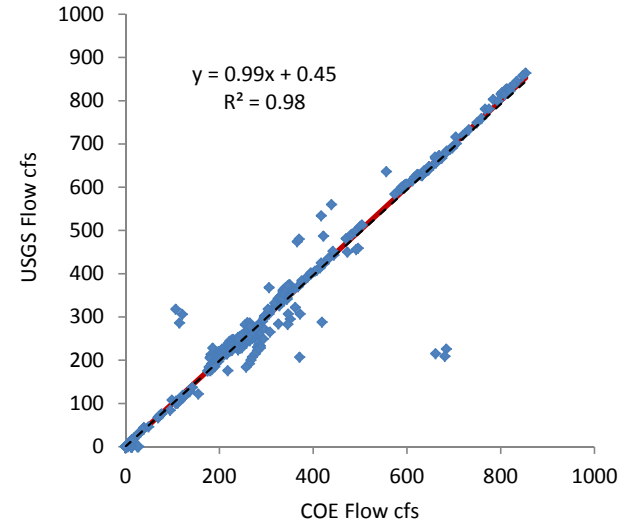
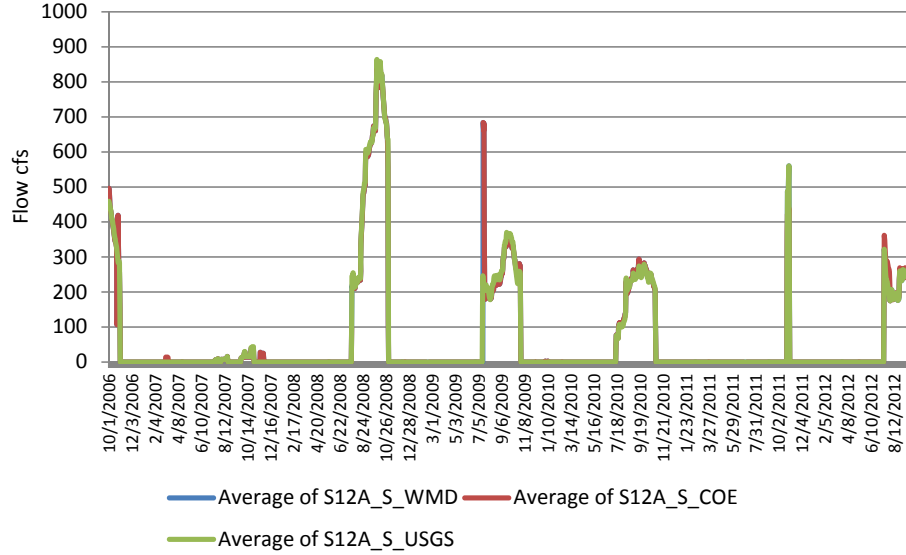
SFWMD proposes to switch from COE to USGS as the source of data for S12 flows to be placed in the "Preferred" dataset and used in the compliance determination in WY 2012 and subsequent years. The attached figures compare daily flows for each data source and S12 structure. The COE and USGS values agree exactly on most dates. This apparently reflects the fact that COE contracts with USGS to collect the data. It is my understanding that the deviations occurred when provisional USGS data, initially copied to the COE and WMD Preferred datasets in DBHYDRO, were subsequently revised without updating the COE and WMD datasets. The largest deviation between the COE and USGS flows for S12ABCD occurred in July-August 2009 (~400 cfs or ~25% of USGS values).

The WMD is the only source of flow data for S333 and S334. As of May 4, 2013, the WMD Preferred S12 flows in DBHYDRO are based upon COE data prior to WY 2012 and USGS data in WY2012. It is my understanding that SFWMD proposes to use USGS flows in the future and wait until the data are finalized by the USGS before making a compliance determination. To address the delay in obtaining the final USGS data, it is possible that the provisional flow data could be used to make a provisional compliance determination without changing the current reporting frequency (~3 month lag).

Comparison of Shark River Slough Structure Daily Flows

Structure: S12A

WY 2007-2012



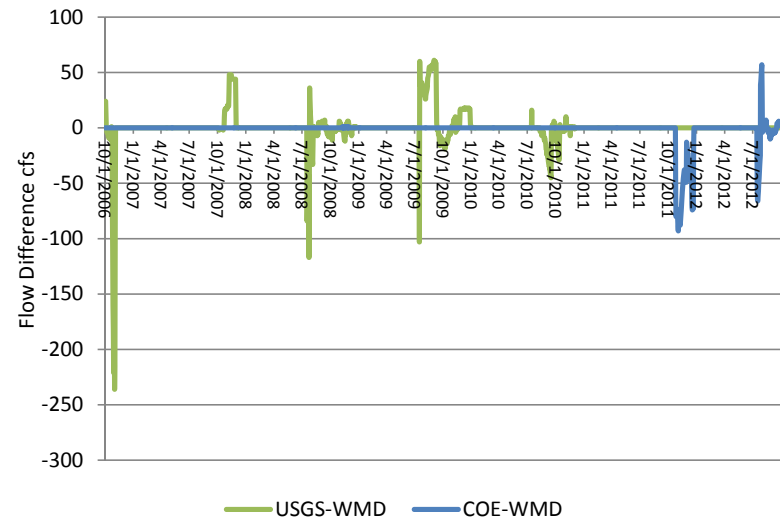
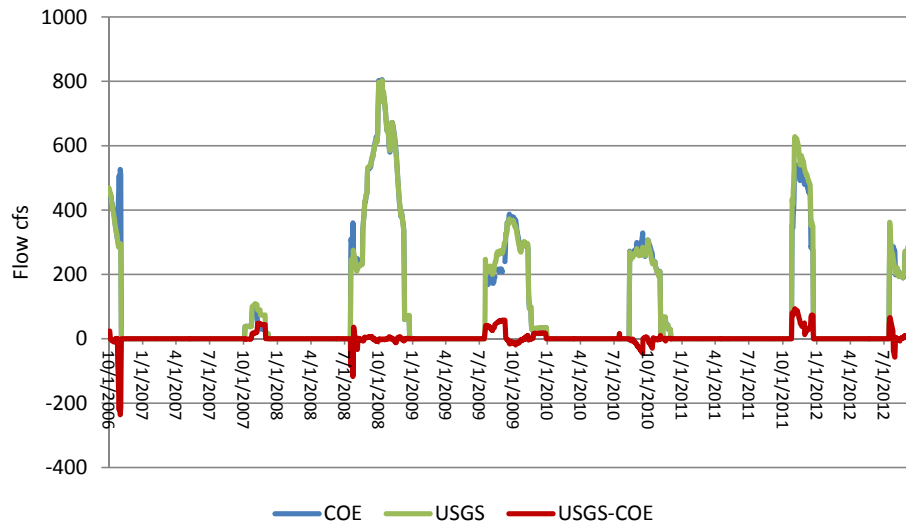
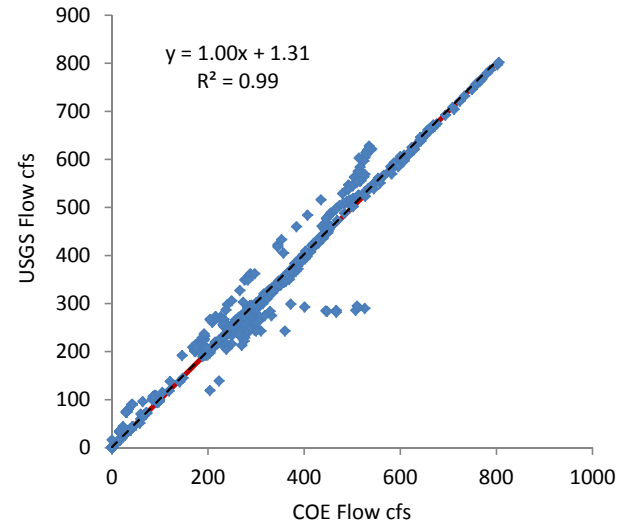
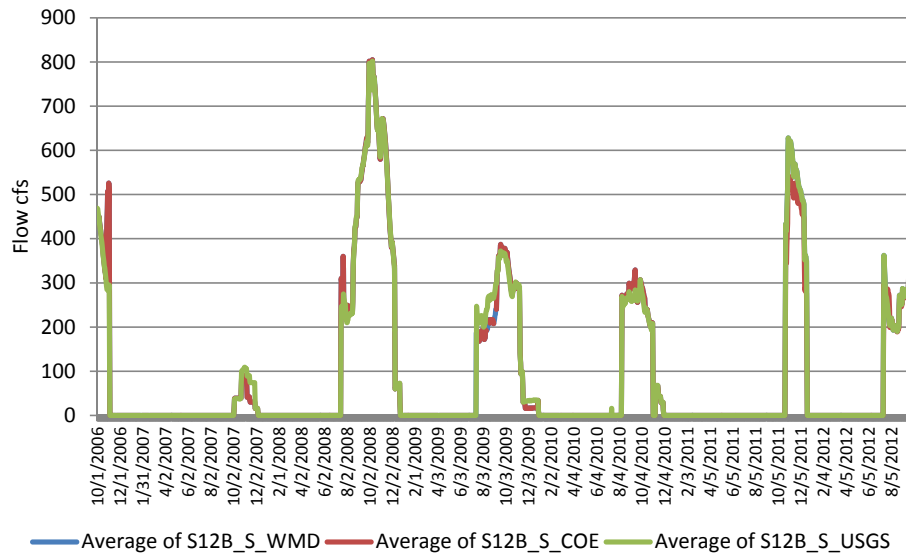
WMD = Preferred Key Currently Used for Measuring Compliance = COE flows < WY 2012 & USGS flows >= WY 2012

WWW 5/1/2013

### Comparison of Shark River Slough Structure Daily Flows

Structure: S12B

WY 2007-2012



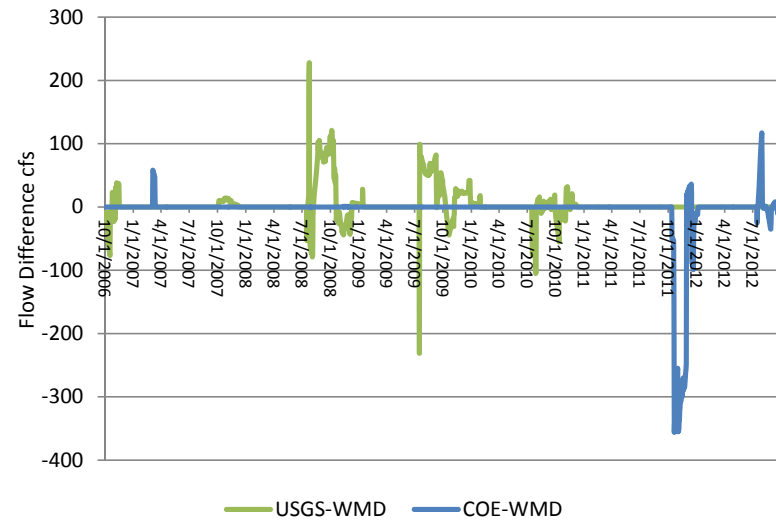
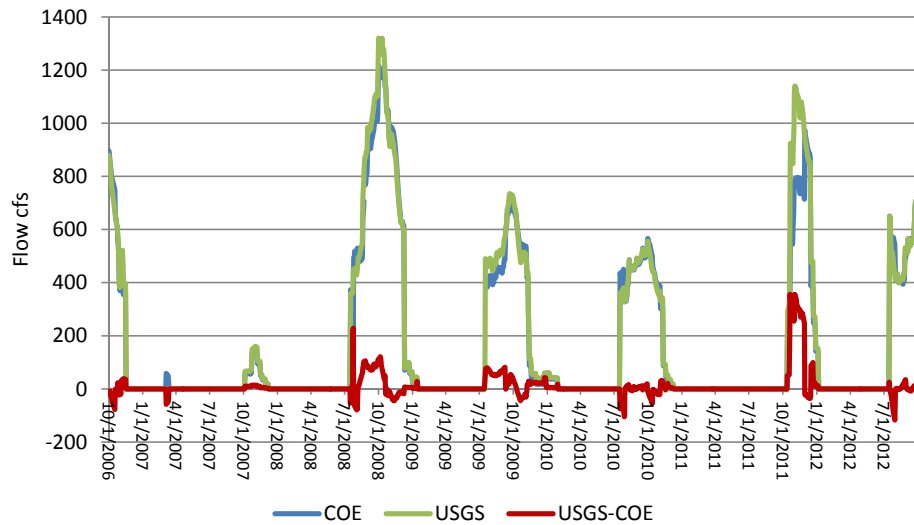
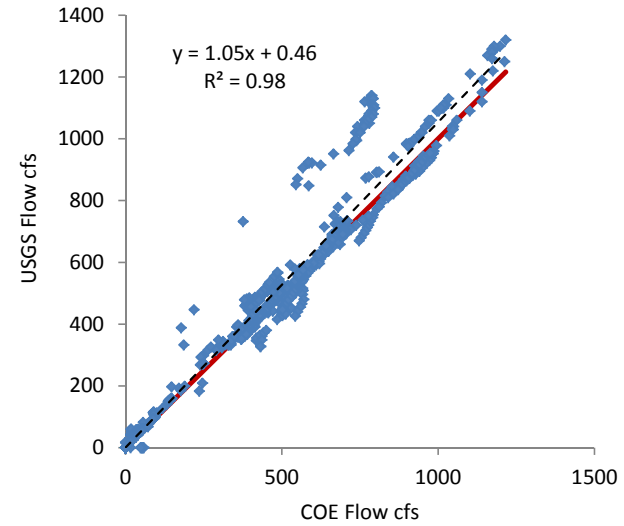
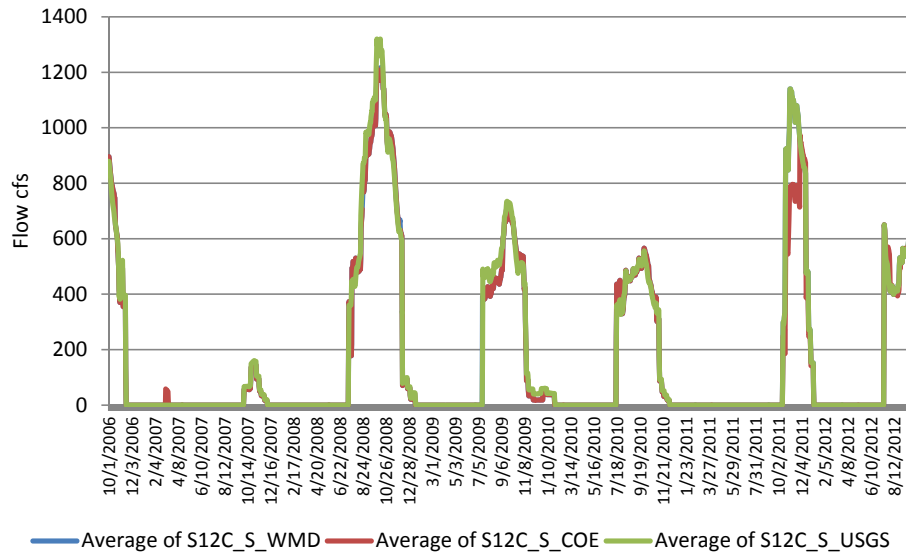
WMD = Preferred Key Currently Used for Measuring Compliance = COE flows < WY 2012 & USGS flows >= WY 2012

WWW 5/1/2013

### Comparison of Shark River Slough Structure Daily Flows

Structure: S12C

WY 2007-2012



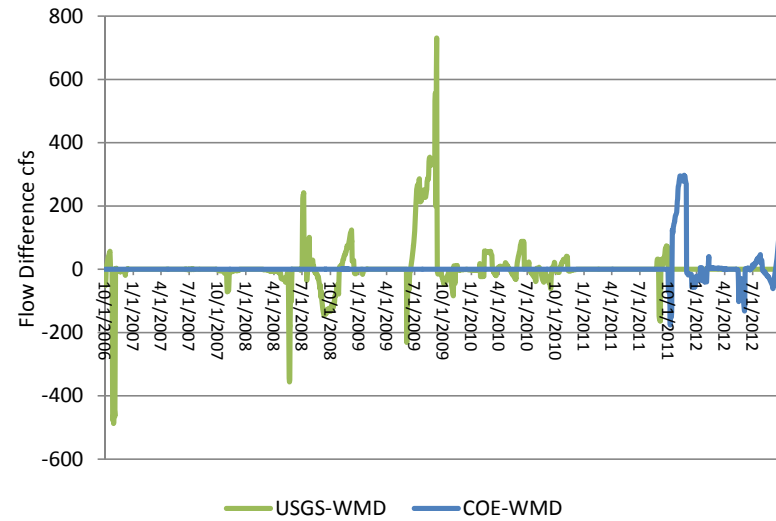
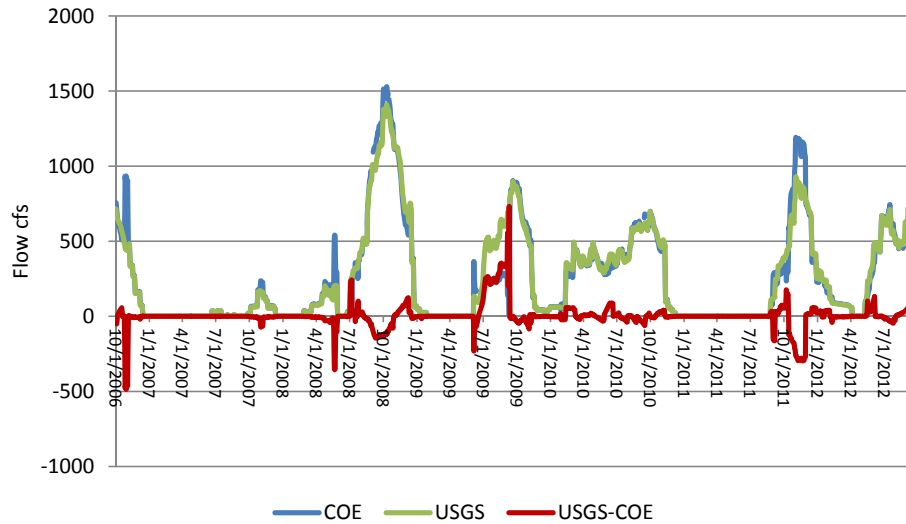
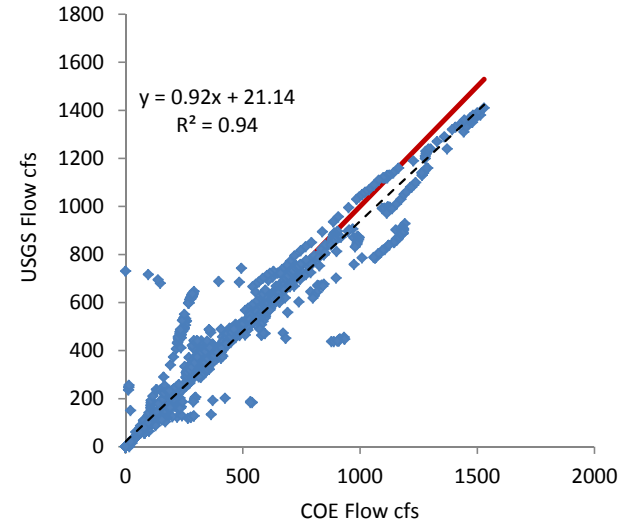
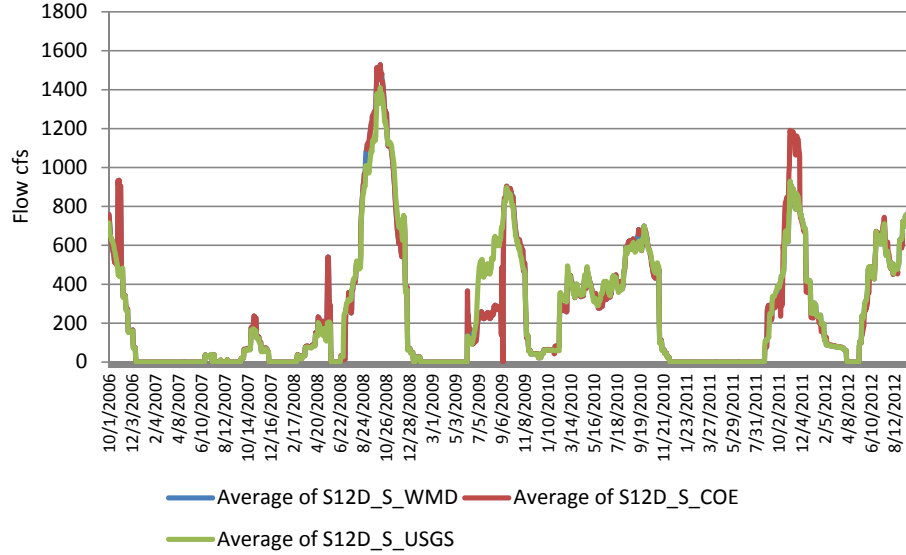
WMD = Preferred Key Currently Used for Measuring Compliance = COE flows < WY 2012 & USGS flows >= WY 2012

WWW 5/1/2013

Comparison of Shark River Slough Structure Daily Flows

Structure: S12D

WY 2007-2012



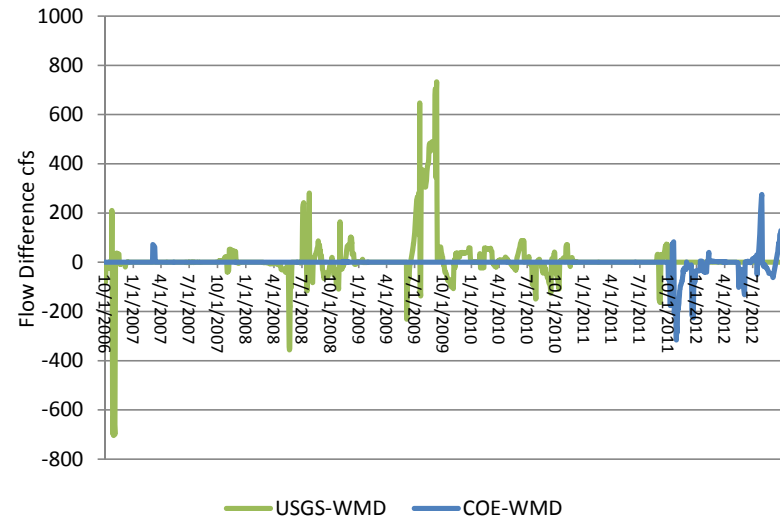
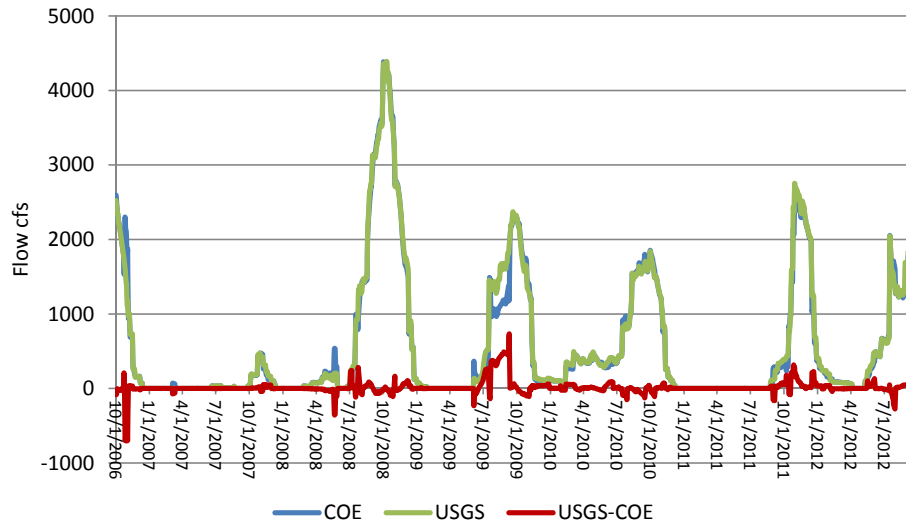
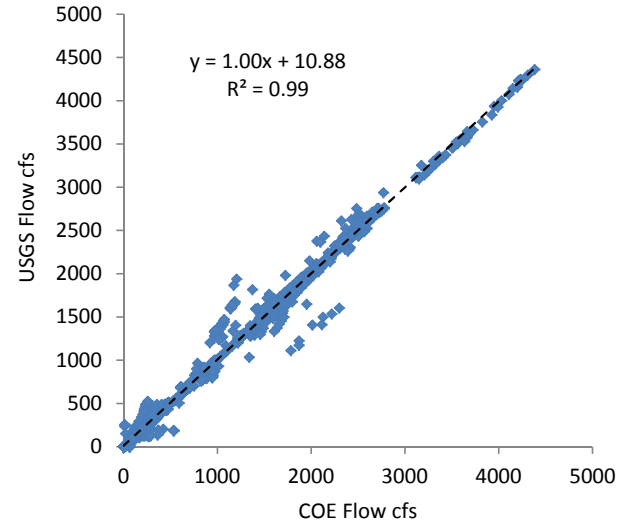
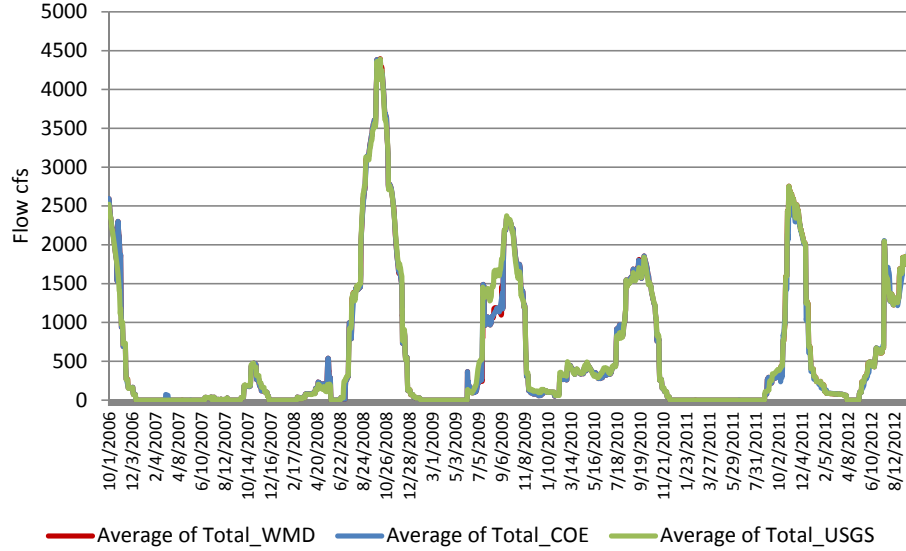
WMD = Preferred Key Currently Used for Measuring Compliance = COE flows < WY 2012 & USGS flows >= WY 2012

WWW 5/1/2013

Comparison of Shark River Slough Structure Daily Flows

Structure: S12ABCD

WY 2007-2012



WMD = Preferred Key Currently Used for Measuring Compliance = COE flows < WY 2012 & USGS flows >= WY 2012

WWW 5/1/2013

## Attachment B

### Sensitivity of SRS Compliance Results to Various Assumptions, Water Years 2000-2012

The attached table explores sensitivity of compliance results to various assumptions made in the calculations. Results are expressed in terms of FWM and difference between FWM and LTL. Sensitivities to the following assumptions are tested using the WY 2000-2012 data:

Assumption	Current	SFWMD Proposal
Use S12D resampled value for Dec 8, 2011 to compute FWM for Dec 6, 2011	No	Yes
Use USGS flows for WY <= 2012, otherwise WMD preferred key (~COE < WY 2012 & USGS WY 2012)	No	Yes
Use COE flows instead of USGS flows in WY 2012	Yes	No
Use weekly data instead of biweekly data to compute FWM	No	No
Round off Limit and FWM to nearest 0.1 ppb before determining compliance	Yes	Yes
Include S334 in computing FWM (sensitivity to water management)	Yes	Yes

The first three items reflect changes being considered for the compliance calculation in WY 2012 (Dec 2011 resampling & switch to USGS flows). The next two items (weekly data and round-off) are sensitivity analyses to other assumptions routinely made in the calculations and possibly useful in considering whether the WY 2012 results are significantly impacted by “error”. While not relevant to the compliance determination, the final item demonstrates sensitivity of compliance frequency to changes in water management, as reflected by recent increases in S334 flows.

The attached table compares results for 16 different combinations of the above assumptions. The WY 2012 FWM varies from 8.8 to 9.2 ppb and exceeds the LTL in each of the 16 cases, except for Case 6, which utilizes the USGS flow data and includes the December 2011 resampled value for S12D. The 0.4 ppb range in sensitivity is small relative to the inherent variability in the LTL regression model, as reflected by the difference between the 90<sup>th</sup> and 50<sup>th</sup> percentile predictions (~ 2.0 ppb). The small range in FWM is sufficient to change the compliance determination (FWM-LTL) in some cases because the FWMs have hovered around the limit for several years. Since 2000, the yearly FWMs have been consistently above 8.0 ppb, which would be exceeded in only ~50% of the years if the LTL goal (1978-1979 water quality conditions) had been achieved.



The attached table summarizes results for 16 combinations of assumptions:

- Cases 1-4 show sensitivity to sample frequency (biweekly vs. weekly) with and without the December 2011 resampled value using the COE flow dataset. Case 1 represents the current set of assumptions. Using the resampled value does not impact the biweekly results (Case 1 vs. 2). The weekly dataset increases the compliance determinant (FWM – LTL) by 0.1 to 0.2 ppb in WY 2012 (Cases 1-2 vs. 3-4).
- Cases 5-8 show sensitivity to sample frequency (biweekly vs. weekly) with and without the December 2011 resampled value using the USGS flow dataset. While the results vary from year to year, there is no indication that switching from COE to USGS flows would have significant long-term impacts on the mean flows or compliance frequency. Switching from COE to USGS flows would have triggered an excursion in WY 2009 (FWM increased by 0.4 ppb); the largest differences in flows were observed in July-August 2009 (Attachment A). When the December 2011 resampled value is excluded, switching from COE to USGS flows in WY 2012 would have no impact on compliance (FWM-LTL = 0.1 for Cases 1 and 5). When the resampled value is included, switching from the COE to USGS data decreases the FWM-LTL from 0.1 to 0.0 ppb (Case 2 vs. Case 6). The limitations of either flow dataset resulting from construction activity and Hurricane Isaac can also be considered in evaluating the compliance results for WY 2012.
- Cases 9-12 show sensitivity to flow dataset and resampling without rounding off the FWM and Limit to nearest 0.1 ppb. In WY 2012, the difference between the FWM and the LTL ranged from 0.02 to 0.07 ppb without rounding, as compared with 0.0 to 0.1 ppb with rounding.
- Cases 13-16 show sensitivity to flow dataset and resampling while excluding S334 flows. Compliance results are relatively sensitive to S334 flows, which increased substantially in the past several years. Approximately 18% of the TP load from WCA-3A was diverted from Shark River Slough to ENP's Taylor Slough/Coastal basin via S334 in WY 2008-2012, as compared with 4% in WY 1978-1990. Without S334 flows, an excursion would have occurred in each of the past 5 years, regardless of flow dataset or resampling. The largest sensitivity occurred in WY 2011 (drought), when eliminating the S334 flows, which accounted for ~53% of the WCA-3A load, increased the FWM from 9.2 to 14.1 ppb using the COE flows (Case 1 vs. Case 13) and from 9.4 to 14.1 using the USGS flows (Case 5 vs. Case 15). There has been much discussion of the potential adverse impacts of changes in water management on SRS compliance. The increase in S334 flows is an

example of where a change in water management has had a significant and quantifiable beneficial impact on SRS compliance. While the load diversion could have adverse impacts on the Taylor Slough/Coastal basin, they have not impacted compliance.

### Shark River Slough Compliance Sensitivity Analysis

Assumption	Use COE Flows ---->				Use USGS Flows ---->				Do Not Roundoff---->				Exclude S334 ---->			
	Biweekly-->		Weekly-->		Biweekly-->		Weekly-->		COE Flows-->		USGS Flows-->		COE Flows-->		USGS Flows-->	
	Default				SFWMD Proposed											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Resample Dec 2011	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE
Use USGS Flows	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE
Use COE Flows 2012	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Use Weekly	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Round Off	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Include S334	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE

#### FWM - Limit ppb

2000	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.06	2.06	2.06	2.06	2.0	2.0	2.0	2.0
2001	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.98	3.98	3.98	3.98	4.0	4.0	4.0	4.0
2002	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.16	1.16	1.14	1.14	1.2	1.2	1.2	1.2
2003	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.37	1.37	1.36	1.36	1.6	1.6	1.6	1.6
2004	-1.0	-1.0	-1.0	-1.0	-0.9	-0.9	-0.9	-0.9	-1.02	-1.02	-0.95	-0.95	-1.0	-1.0	-0.9	-0.9
2005	1.8	1.8	1.8	1.8	1.5	1.5	1.5	1.5	1.75	1.75	1.50	1.50	2.2	2.2	2.0	2.0
2006	-0.4	-0.4	0.1	0.1	-0.3	-0.3	0.2	0.2	-0.40	-0.40	-0.30	-0.30	-0.2	-0.2	-0.1	-0.1
2007	-1.9	-1.9	-2.2	-2.2	-2.0	-2.0	-2.2	-2.2	-1.93	-1.93	-1.91	-1.91	-1.1	-1.1	-1.0	-1.0
2008	0.4	0.4	0.0	0.0	0.4	0.4	0.0	0.0	0.43	0.43	0.41	0.41	0.4	0.4	0.4	0.4
2009	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.4	-0.02	-0.02	0.35	0.35	0.5	0.5	0.8	0.8
2010	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.05	0.05	0.06	0.06	0.6	0.6	0.6	0.6
2011	-2.8	-2.8	-2.9	-2.9	-2.6	-2.6	-2.7	-2.7	-2.84	-2.84	-2.68	-2.68	2.0	2.0	2.1	2.1
2012	0.1	0.1	0.3	0.2	0.1	0.0	0.2	0.2	0.07	0.02	0.07	0.02	0.3	0.2	0.3	0.2

#### Observed FWM ppb

2000	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.69	9.69	9.69	9.69	9.6	9.6	9.6	9.6
2001	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	14.98	14.98	14.98	14.98	15.0	15.0	15.0	15.0
2002	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.84	8.84	8.84	8.84	8.9	8.9	8.9	8.9
2003	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.02	10.02	10.02	10.02	10.3	10.3	10.3	10.3
2004	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.40	8.40	8.27	8.27	8.4	8.4	8.3	8.3
2005	9.4	9.4	9.4	9.4	9.1	9.1	9.1	9.1	9.38	9.38	9.13	9.13	9.8	9.8	9.6	9.6
2006	8.5	8.5	9.0	9.0	8.6	8.6	9.1	9.1	8.47	8.47	8.56	8.56	8.7	8.7	8.8	8.8
2007	9.9	9.9	9.6	9.6	9.9	9.9	9.7	9.7	9.85	9.85	9.94	9.94	10.7	10.7	10.8	10.8
2008	10.6	10.6	10.2	10.2	10.6	10.6	10.2	10.2	10.62	10.62	10.62	10.62	10.6	10.6	10.6	10.6
2009	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.16	8.16	8.28	8.28	8.6	8.6	8.7	8.7
2010	8.9	8.9	8.8	8.8	8.9	8.9	8.8	8.8	8.91	8.91	8.93	8.93	9.5	9.5	9.5	9.5
2011	9.2	9.2	9.1	9.1	9.4	9.4	9.3	9.3	9.20	9.20	9.35	9.35	14.1	14.1	14.1	14.1
2012	9.0	9.0	9.2	9.1	8.9	8.8	9.0	9.0	8.89	8.84	8.89	8.84	9.1	9.0	9.1	9.0

Assumption Different from Default

FWM Exceeds Limit

Assumption	SFWMD		Description
	Default	Proposed	
Resample Dec 2011	FALSE	TRUE	Use S12D resampled value for Dec 8, 2011 to compute FWM for Dec 6, 2011
Use USGS Flows	FALSE	TRUE	Use USGS flows for WY <= 2012, otherwise WMD preferred key (~COE < WY 2012 & USGS WY 2012)
Use COE Flows 2012	TRUE	FALSE	Use COE flows instead of USGS flows WY 2012
Use Weekly	FALSE	FALSE	Use weekly data instead of biweekly data to compute FWM
Round Off	TRUE	TRUE	Round off Limit and FWM to nearest 0.1 ppb before determining compliance
Include S334	TRUE	TRUE	Include S334 in computing FWM (sensitivity to water management)

Attachment C

SFWMD Memo on SRS Compliance in WY 2012, May 2013

Attachment D

Appendix A of Settlement Agreement Compliance Report, December 2008.

These attachments pertain to use of weekly data in evaluating compliance results when the biweekly data indicate an excursion, as occurred in WY 2008 and WY 2012. Weekly results have been used for informational purposes to assist the TOC in determining of whether an excursion can be attributed to error. Examples include the following:

Water Year	Limit	Biweekly	Weekly
WY 2008	10.2	10.6*	10.2
WY 2012**	8.8	8.9 / 8.8	9.0/9.0*
* Exceeds Limit			
**WY 2012 results without & with S12D resampled value.			

In WY 2008, the weekly result was below the biweekly result and equal to the compliance limit. Weekly results were cited in the December 2008 Settlement Agreement Report (Attachment D) to justify designation of the WY 2008 LTL excursion as an error as opposed to a violation.

In WY 2012, the weekly result was above the biweekly result and compliance limit, regardless of whether the resampled S12D December 2011. Attachment D indicates that the weekly results are not included in the compliance report. This information should be available to the TOC in making compliance determination.

If the weekly results are to be used for informational purposes in evaluating an excursion, they should be reported regardless of how they compare with the biweekly values or limits. As indicated in the SFWMD document (Attachment C), the weekly and biweekly results are not significantly different in the long run, although variations occur from year to year.

It is recommended that TOC develop a standard protocol for reporting (not reporting) weekly data in the event of an excursion. .

## **Shark River Slough Compliance Water Year 2012**

### General Summary Notes for Settlement Agreement Report

The sampling protocol for the S12A/B/C/D and S333 structures is to collect bi-weekly grab samples (26 possible events in a year) at each structure (per the Consent Decree) to compute the annual flow-weighted mean TP concentration (FWMC) for Shark River Slough (SRS). Additional samples are collected in the intervening weeks (the other 26 weeks). However, these “other” samples are not used for compliance calculations, but rather are collected as additional information only.

When a field sampling issue is detected by the District laboratory, the water quality monitoring section is notified. The monitoring staff then evaluate the circumstances and logistics to determine if a “re-sampling” event should occur, and if the re-sampling event can occur within a 72 hour time window within the same week (specified in *Resampling Guidance for District Water Quality Sampling* dated January 2009). Re-sampled events (discussed further below), stemming from any bi-weekly compliance sampling, can be considered by the TOC in the event a compliance issue is evident at the end of a federal water year (TOC approved recommendation, Agenda Item 3A, May 30, 2012).

During Water Year 2012 (October 1, 2011 – September 30, 2012) or WY12, there were a total of 99 bi-weekly flow events at the 5 structures that were appropriate for collecting samples for compliance calculations. Of those, 98 samples were collected. One sampling event (structure gate was open) was not conducted due to gate maintenance activities at the S12D structure (8/14/2012) which prevented field staff from obtaining a sample. The re-sampling protocol could not be initiated, as well, because the gate maintenance activity lasted beyond the 72 hour re-sampling threshold. Of the 98 possible samples collected, one sample (12/06/2011) at S12D was determined to have had a field sampling issue, and the re-sampling protocol was implemented to collect a sample (12/08/2012). **Table 1** summarizes sampling events for this compliance year.

To determine the annual TP FWMC (8.9 ppb rounded) for Shark River Slough (Water Year 2012), the TP data from 97 compliance samples collected at all structures during the bi-weekly sampling were utilized. The annual limit (8.8 ppb rounded) was based on a total flow volume of 818, 282 ac-ft. The re-sampled datum (7 ppb – 12/08/2011) was included in the annual report for discussion purposes by the TOC, per the May 30, 2012 TOC approved recommendation. A calculation for the annual TP FWMC, which includes the re-sampled datum, results in an annual value of 8.8 ppb (rounded).

No calculation is presented in the annual compliance report that is based on all the weekly sampling events because the results are not utilized for compliance determinations. In fact, informational calculations for an annual TP FWMC for Shark River structures based on “all” weekly grab sample events collected during the year (bi-weekly compliance and “other”) provides no clear indication of any trend that would place the informational calculation consistently higher or lower than the annual compliance FWMC. **Table 2** below further illustrates this. Since WY07 when the long-term limit came into effect for SRS, FWMC

calculations based on “all” weekly grab data, when compared to compliance FWMC calculations based on bi-weekly sampling, show three instances where the value is lower (60% of time), one tie (16.7% of time), and two instances when the values are higher (33.3% of time). If anything, this could be an indication that the bi-weekly sampling used for compliance calculations is overestimating the actual FWMC over time (Table 2).

**Table 1**

Summary of Bi-weekly TP Compliance Sampling Events						
Sampling Info/Sites	S12A	S12B	S12C	S12D	S333	Totals
Total Events when Sampling was to Occur	26	11	12	24	26	99
Event Samples Collected	26	11	12	23	26	98
Event Samples used for Compliance Calculation	26	11	12	22	26	97
Event Re-sampling	0	0	0	1	0	1
Events not Collected	0	0	0	1	0	1

**Table 2**

Summary of Shark River Slough Annual FWMC (ppb) Calculations (based on "bi-weekly" compliance sampling trips vs. "all" weekly trips)				
Water Year (WY)	Annual Compliance Limit	Annual Compliance FWMC (bi-weekly)	Annual Informational FWMC (weekly)	Comparison of Compliance vs. Informational FWMC's (weekly is lower, tie, or higher)
WY07	11.8	9.8	9.6	lower
WY08	10.2	10.6	10.2	lower
WY09	8.2	8.2	8.2	tie
WY10	8.9	8.9	8.8	lower
WY11	12	9.2	9.5	higher
WY12	8.8	8.9 (8.8*)	9	higher

Note: value shown in parenthesis (8.8) for WY12 is for informational purposes. It includes a re-sampled datum collected on 12/08/2012.

# Settlement Agreement July - September 2008 Report

Revisions were made to this document on the following dates:

January 26, 2009: See pages 5 and 6

December 23, 2008: See page 9, Table 2



**Prepared for the  
Technical Oversight Committee  
December 9, 2008**

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## Appendix A

### **12-Month Flow-Weighted Mean TP Concentrations for Shark River Slough (October 1, 2007 – September 30, 2008)**

Compliance with the Settlement Agreement's long-term phosphorus limits for inflows to Shark River Slough is based on the 12-month, flow-weighted mean concentration (FWMC) for the water year ending on September 30<sup>th</sup>. Inflow concentrations are measured bi-weekly at structures S12A, S12B, S12C, S12D, and S333 - S334 (e.g., net flow for S333 minus S334).

Preliminary data for the 2008 water year indicated that inflow concentrations were 10.2 ppb, which equaled the long-term limit of 10.2 ppb. It was subsequently discovered, however, that the field-cleaned equipment blank (FCEB) used during the September 3, 2008, sampling event had a TP concentration of 3 ppb and, as a result, that data was qualified. If the September 3, 2008, data is excluded, the FWMC for water year 2008 increases to 10.6 ppb -- exceeding the long-term limit by 0.4 ppb.

As discussed below, a review of other, contemporaneously collected data reflect that the September 3, 2008, data is accurate. In addition, if, in fact, the samples were exposed to any extraneous phosphorus (as suggested by the FCEB), this would mean that the September 3, 2008, reported concentrations would potentially be over-estimated to some extent.

### **Background**

The field-cleaned equipment blank (FCEB) for the Shark River Slough sampling trip on September 3, 2008, had a TP concentration of 3 ppb, one ppb over the District laboratory's Method Detection Limit (MDL). FCEB's are used to assure that field equipment is properly rinsed with deionized water and used following standard protocols. The District's laboratory protocol specifies that if the FCEB has a detected TP concentration above the MDL then the associated samples should be qualified unless the sample concentration is more than 5 times the FCEB concentration (so that any bias that may have been introduced is essentially trivial in the sample itself). Contamination detected in a FCEB indicates the possibility that associated samples may also be contaminated and the data user should proceed with caution in using the data.

The measured TP concentrations for the Shark River stations ranged from 7 to 13 ppb for the September 3, 2008, sampling event, with an average concentration of 9 ppb. Table A-1 depicts the September 3, 2008, TP concentrations collected by grab samples at the S12A and S333 stations and by the autosamplers on the same day. As indicated, substantial evidence exists demonstrating that the initially reported concentrations for September 3, 2008, were accurate.



**Table A-1. Shark River Slough Grab TP Concentration Data in August and September 2008 and Daily Time Composite Autosampler Data around 9/3/2008**

Date	Sample Type	S12A	S12B	S12C	S12D	S333
8/6/2008*	Grab	8	9	15	14	10
8/13/2008	Grab	7	7	9	13	13
8/21/2008*	Grab	6	7	10	14	12
8/27/2008	Grab	6	6	9	12	10
9/2/2008	Daily Autosampler	8				10
9/3/2008*	Grab**	7	6	8	10	13
9/3/2008	Daily Autosampler	8				11
9/10/2008	Grab	6	6	9	9	8
9/17/2008*	Grab	6	5	8	6	9
9/24/2008	Grab	6	5	6	8	10

\* Shaded row indicates compliance data.

\*\* Results for the September 3, 2008 sampling event grabs were qualified based on the District's laboratory protocol for detections in the associated FCEB.

Flows into Shark River Slough were well below normal for most of the 2008 federal water year, October 1, 2007, through September 30, 2008, with the majority of flow for the year occurring in August and September 2008. As a result, the year-long FWMC is strongly influenced by the status of the September data.

### Alternative Compliance Scenarios

Historically, the District collected bi-weekly, grab samples at the Shark River Slough stations to calculate the 12-month FWMC for Settlement Agreement compliance. This year, however, the sampling frequency at the stations was changed from bi-weekly to weekly to accommodate other District program needs as described in the TOC-approved monitoring plans known as the PIE and PIN. In addition, daily autosamplers have been installed at the S12A and S333 inflow stations to Shark River Slough. This additional data provides useful information with which to analyze the accuracy of the September 3, 2008, sampling results.

Table A-2 depicts the 2008 federal water year 12-month FWMC with, and without, the September 3, 2008, results, plus four alternative scenarios using the weekly sampling results stemming from the PIN monitoring regime.

**Table A-2. WY2008 12-month FWMC Calculations for Shark River Slough**

<b>Scenario</b>	<b>Description</b>	<b>Qualified 9/3/2008 Data Used?</b>	<b>12-month TP FWMC (ppb)</b>	<b>Met Long-Term Limit (10.2 ppb)?</b>	<b>Comments</b>
1	Bi-weekly with 9/3/2008 data	Yes	10.2	Yes	Standard compliance calculation with 9/3/2008 data
2	Bi-weekly without 9/3/2008 data	No	10.6	No	Standard compliance calculation without 9/3/2008 data
3	Bi-weekly with 8/27/2008 and 9/10/2008 data	No	10.2	Yes	Used average TP from 8/27/2008 and 9/10/2008 events
4	Alternate bi-weekly data	No	9.9	Yes	Used alternate sampling events normally excluded from compliance calculations
5	Weekly data	No	10.2	Yes	Used all unqualified data for weekly sampling events

**Recommendations**

Although the September 3, 2008, TP results were qualified based on the District’s current data validation protocol for FCEB’s, the District recommends inclusion of these data as reflecting the best available data and most representative FWMC for the following reasons:

- TP concentrations for the September 3, 2008 sampling event were consistent with results for adjacent weeks and the historical period of record.
- TP concentrations for the September 3, 2008 sampling event were consistent with the autosampler TP concentrations at S12A (8 ppb) and S333 (11 ppb) for the same day.
- If any contamination was introduced during sampling, the sample results would be biased high (e.g., actual TP concentrations would be less than or equal to the reported values).
- Unusual flow patterns associated with the 2007-2008 drought resulted in most of the annual flow occurring in August and September 2008. Therefore, excluding one sampling event in September has a significant impact on the annual 12-month FWMC calculation and produces unwarranted bias in the resulting FWMC.
- The TP concentration detected in the FCEB (3 ppb) was slightly above the District’s MDL (2 ppb) but in the range of substantial likelihood of occurring by chance.