Draft summary of alternative calculation methods for Shark River Slough provisional reporting

The following two alternative methods were used for provisional quarterly reporting:

1. Method 1:
    a. S355A and S355B were previously identified as inflows from the WCAs and should be included in both methods
    b. Flow at S334 (from L-29 Canal to L-31N) that has been discounted from S333 flows when quantifying the S333 flow weighting of TP concentrations to Shark River Slough should now be discounted proportionally to all inflows to the L-29 Canal.
2. Method 2:
    a. In addition to steps outlined for Method 1, all S356 flow (less any potential proportion of S334) will be added without consideration of source.

These calculation methods were incorporated to the reporting for the May 23, 2017, TOC Quarterly meeting, which includes the 4th Quarter of 2016 and update to the Water Year[a] (WY) 2016 annual report ending September 2016. Provisional Shark River Slough compliance calculations for these alternative Methods are detailed below:

Method 1: Total flows and flow-weighted mean TP[b] from inflows to Shark River Slough (excluding S356)

- Annual Long-Term Limit is based upon total of flow (Q):

$$\text{Total Annual Flow} = \sum Q_{S12A} + \sum Q_{S12B} + \sum Q_{S12C} + \sum Q_{S12D} + \sum Q_{S333} + \sum Q_{S355A} + \sum Q_{S355B} \tag{1}$$

- Annual flow-weighted mean concentration is the sum of the cross-product of each structure's flow and concentration divided by the total flow for all bi-weekly compliance sampling events, where flows into the L-29 Canal are proportionally adjusted by S334[c] discharges from the L-29 Canal:

$$FWM_{WY} = \frac{\left(\sum_{i=A}^{D}(Q_{S12i})(TP_{S12i})\right) + \sum(Q_{S333*})(TP_{S333}) + \sum(Q_{S355A*})(TP_{S355A}) + \sum(Q_{S355B*})(TP_{S355B})}{\left(\sum_{i=A}^{D}(Q_{S12i})\right) + \sum Q_{S333*} + \sum Q_{S355A*} + \sum Q_{S355B*}} \tag{2}$$

---

[a] Water Year or WY is designated as a 12-month period from October through September.
[b] TP = total phosphorus
[c] $Q_{Structure*}$ in Equation 2 refer to the proportionally adjusted flows for a given structure using the formulas provided in the Calculations common to both methods section below.

<u>Method 2: Total flows and flow-weighted mean TP from inflows to Shark River Slough (including S356)</u>

- Annual Long-Term Limit is based upon total of flow (Q):

$$\text{Total Annual Flow} = \sum Q_{S12A} + \sum Q_{S12B} + \sum Q_{S12C} + \sum Q_{S12D} + \sum Q_{S333} + \sum Q_{S355A} + \sum Q_{S355B} + \sum Q_{S356} \quad (3)$$

- Annual flow-weighted mean concentration is the sum of the cross-product of each structure's flow and concentration divided by the total flow for all bi-weekly compliance sampling events, where flows into the L-29 Canal are proportionally adjusted by S334[d] discharges from the L-29 Canal:

$$FWM_{WY} = \frac{\left(\sum_{i=A}^{D}(Q_{S12i})(TP_{S12i})\right) + \sum(Q_{S333*})(TP_{S333}) + \sum(Q_{S355A*})(TP_{S355A}) + \sum(Q_{S355B*})(TP_{S355B*}) + \sum(Q_{S356*})(TP_{S356})}{\left(\sum_{i=A}^{D}(Q_{S12i})\right) + \sum Q_{S333*} + \sum Q_{S355A*} + \sum Q_{S355B*} + \sum Q_{S356*}} \quad (4)$$

<u>Calculations common to both methods</u>

For each compliance sampling event date, L-29 Canal inflows (Q_{WCAs_L29}) are adjusted by flows at S334 or Q_{S334} (*i.e.*, from the L-29 Canal to L-31N):

- $Q_{WCAs\_L29} = Q_{S333} + Q_{S355A} + Q_{S355B}$ for Method 1
- $Q_{WCAs\_L29} = Q_{S333} + Q_{S355A} + Q_{S355B} + Q_{S356}$ for Method 2
- $Q_{WCAs\_L29} = 0$ on a sampling event day when $Q_{S334} \geq Q_{WCA\_L29}$
- A proportional adjustment is made for $\sum Q_{WCAs\_L29}$ when $Q_{S334} < Q_{WCAs\_L29}$ for individual structures as follows:

  - $Q_{S333*} = Q_{S333}\left(1 - \dfrac{Q_{S334}}{Q_{WCAs\_L29}}\right)$, used for Methods 1 and 2

  - $Q_{S355A*} = Q_{S355A}\left(1 - \dfrac{Q_{S334}}{Q_{WCAs\_L29}}\right)$, used for Methods 1 and 2

  - $Q_{S355B*} = Q_{S355B}\left(1 - \dfrac{Q_{S334}}{Q_{WCA\_L29}}\right)$, used for Methods 1 and 2

  - $Q_{S356*} = Q_{S356}\left(1 - \dfrac{Q_{S334}}{Q_{WCA\_L29}}\right)$, used for Method 2

---

[d] $Q_{Structure*}$ in Equation 2 refer to the proportionally adjusted flows for a given structure using the formulas provided in the <u>Calculations common to both methods</u> section below.