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Historical Performance of the Everglades Stormwater Treatment Areas

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Location Map

<table>
<thead>
<tr>
<th>STA</th>
<th>Treatment Area, acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1E</td>
<td>4,994</td>
</tr>
<tr>
<td>1W</td>
<td>6,544</td>
</tr>
<tr>
<td>2</td>
<td>15,495</td>
</tr>
<tr>
<td>3/4</td>
<td>16,327</td>
</tr>
<tr>
<td>5/6</td>
<td>13,685</td>
</tr>
<tr>
<td>Total</td>
<td>57,045</td>
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</tbody>
</table>
Purpose and Mandates

- Reduce phosphorus in runoff water prior to discharge to the Everglades Protection Area.

- Mandates:
  - Everglades Forever Act
  - NPDES and EFA permits
  - Consent decrees

- Current Water-quality based effluent limit (WQBEL) for TP
  - Maximum of 19 ppb Annual Flow-weighted Mean
  - Not to exceed 13 ppb long-term flow-weighted mean in more than three (3) out of five (5) years.
Phosphorus Removal Process

- Particulate settling
- Plant uptake
- Microbial uptake
- Binding with cations, e.g. Ca
- Phosphorus cycling
- Burial
Assessing STA Performance

- Volume of water treated
- Phosphorus load retained
- Phosphorus load reduction (%)
- Reduction in water column P concentration
  - Outflow TP concentration - permit WQBEL
- Phosphorus species reduction
- Settling rate (k value)
Annual Flows and TP Concentrations

Inflow Volume (x1000 ac-ft)

Flow-weighted Mean (ppb)

Water Year (May-April) (partial WY2015)

Treatment area, acres

Inflow FWM TP
Outflow FWM TP
Inflow Volume
Phosphorus Load Retention

- Variable annual inflow load
- POR total retained P: 2,000 mt
- P load Retention 75% (POR)/80% or better recent years
- **POR outflow FWMC:**
  17 (STA-3/4) to 70 ppb (STA-5/6)
- **WY 2015 outflows:**
  15 (STA-2 & STA-3/4) to 32 ppb (STA-5/6)
- **STA-2 & 3/4**
  frequently achieved ≤19 ppb; each achieved ≤ 13 ppb once
- 13 ppb or less – 21% of the time
- 19 ppb or less - 63% of the time
- Median TP FWM concentrations are comparable between wet and dry seasons.
- 13 ppb or less - 28% of the time
- 19 ppb or less – 60% of the time
- Median TP FWMC slightly higher during the dry season; higher variability during the wet season
SRP comprise the bulk of inflow TP
STAs have been very effective in reducing SRP and PP
In these well-performing STAs, PP comprise the bulk of outflow TP.
Summary

- Since WY1995, the STAs have treated over 16 million ac-ft of runoff.
- To date, STAs retained ~2000 mt of P
  - 75% reduction in P load for POR
  - 80% or better reduction in P load in the past eight years
- Reduced TP concentration from 134 ppb (inflow) to 33 ppb (outflow) (POR)
  - Best: STA-2 and ¾ with 21 and 17 ppb, respectively
  - Highest: STA-5/6 with 70 ppb
  - Outflow concentrations have improved over the years
  - WY2015 – 15 ppb in STA-2 and 3/4
Summary

- On an annual basis, STA-2 & STA-3/4 have frequently achieved \( \leq 19 \) ppb but each STA only achieved \( \leq 13 \) ppb once.
- On a monthly basis, \( \leq 19 \) ppb and \( \leq 13 \) ppb are often achieved in STA-2 and STA-3/4.
- No seasonal differences in outflow TP concentrations in STA-2; STA-3/4 shows higher variability in TP concentration during the wet season.
- Very effective at reducing SRP; remaining TP at outflow of well-performing STAs is primarily PP.
Questions?