

Appendix 3A-5: Water Year 2016 and Five-year (Water Years 2012–2016) Annual Flows and Total Phosphorus Loads and Concentrations by Structure and Area

Shi Kui Xue

Contributors: Youchao Wang, Jonathan Madden,
Christopher King, and Stuart Van Horn

This appendix provides annual flows, total phosphorus (TP) loads, and TP flow-weighted mean concentrations (FWMC) by structure and area for Water Year 2016 (WY2016) (May 1, 2015–April 30, 2016) and the most recent five-year period, WY2012–WY2016 (May 1, 2011–April 30, 2016). **Tables 1 through 5** present this information for the Stormwater Treatment Area (STA) 1 inflow basin and L-8/C-51 basin/Rustic Ranches; Water Conservation Area (WCA) 1; WCA-2; WCA-3; and Everglades National Park (ENP), respectively. Note that the same color font within a table indicates the same source level.

For WY2016, total flows, TP loads, and TP FWM concentrations into the Everglades Protection Area (EPA) are calculated from the total inflows to WCA-1, WCA-2, WCA-3, and ENP, minus that transferred within the EPA through numerous structures: S-10A, S-10C, S-10D, S-11A, S-11B, S-11C, S-12A, S-12B, S-12C, S-12D, S-333–S-334, and S-355A/S-355B. The totals into the EPA are as follows:

- Flow: 2,085.045 acre-feet (ac-ft) in thousands
- TP load: 65,301 kilograms (kg)
- TP FWM concentration: 25 micrograms per liter ($\mu\text{g/L}$)

For WY2016, total flows, TP loads, and TP FWM concentrations from the EPA for water supply and flood control are calculated from the totals of WCA-1, WCA-2, and WCA-3 and from structures S-39, G-300 (negative flow), G-301 (negative flow), G-94A, G-94C, G-94D, S-7 (negative flow), S-38, S-34, S-150 (negative flow), S-8 (negative flow), S-31, S-337, S-343A, S-343B, S-344, S-197, and S-334. In addition, the majority of flow exiting the EPA south from ENP is not monitored. The monitored totals from the EPA are as follows:

- Flow: 560.0 ac-ft in thousands
- TP load: 8,587 kg
- TP FWM concentration: 12 $\mu\text{g/L}$

This appendix provides five-year average annual flows, TP loads, and FWM TP concentrations by area for WY2012–WY2016. **Tables 6 through 8** present flows, TP loads, and FWM TP concentrations to the

34 Everglades STAs and diversion from inflow tributaries. **Tables 9 through 11** present flows, TP loads, and
 35 FWM TP concentrations for the EPA. A summary of the individual years used to calculate the five-year
 36 average values is presented in this appendix and the *2012–2016 South Florida Environmental Reports –*
 37 *Volume I*, Appendix 3A-5 (Xue 2012, 2013, 2014, 2015, 2016).

38

Table 1. WY2016 annual flows, TP loads, and TP FWM concentrations for the STA-1 inflow basin and L-8/C-51 basin, L-8 Flow Equalization Basin (FEB), and Rustic Ranches.

Into STA-1 Inflow Basin

Structure	Flow	Phosphorus	
	(1,000 ac-ft)	Load (kg)	FWMC (µg/L)
S-5A_P	320.242	71,295	180
<i>S-5A from EAA^a</i>	<i>174.250</i>	<i>36,047</i>	<i>168</i>
<i>S-5A from East Beach^b</i>	<i>13.296</i>	<i>12,011</i>	<i>732</i>
<i>S-5A from Lake^c</i>	<i>132.697</i>	<i>22,695</i>	<i>139</i>
<i>S-5AW from Lake</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>S-5AW from L-8 basin/ FEB</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
S-5AS	0.000	0	N/A ^d
<i>S-5AS from Lake</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>S-5AS from L-8 basin/FEB</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
G-300	0.000	0	179
<i>G-300 from WCA-1</i>	<i>0.000</i>	<i>0</i>	<i>179</i>
G-301	0.001	0	126
<i>G-301 from WCA-1</i>	<i>0.001</i>	<i>0</i>	<i>126</i>
G-311	5.287	408	63
<i>G-311 from C-51W</i>	<i>5.287</i>	<i>408</i>	<i>63</i>
Total	325.531	71,703	179

From STA-1 Inflow Basin

Structure	Flow	Phosphorus	
	(1,000 ac-ft)	Load (kg)	FWMC (µg/L)
S-5AS	120.770	15,670	105
<i>From EAA</i>	<i>14.426</i>	<i>732</i>	<i>41</i>
<i>From East Beach</i>	<i>1.566</i>	<i>757</i>	<i>392</i>
<i>From Lake</i>	<i>90.520</i>	<i>13,315</i>	<i>119</i>
<i>From L-8 basin/FEB</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From WCA-1</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From G-311</i>	<i>4.486</i>	<i>366</i>	<i>66</i>
G-300	0.001	0	132
<i>From EAA</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From East Beach</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From Lake</i>	<i>0.000</i>	<i>0</i>	<i>173</i>
<i>From L-8 basin/FEB</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From G-311(C-51)</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
G-301	0.002	0	92
<i>From EAA</i>	<i>0.000</i>	<i>0</i>	<i>276</i>
<i>From East Beach</i>	<i>0.000</i>	<i>0</i>	<i>541</i>
<i>From Lake</i>	<i>0.002</i>	<i>0</i>	<i>164</i>
<i>From L-8 basin/FEB</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From G-311(C-51)</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
G-302	154.827	37,416	196
<i>From EAA</i>	<i>111.776</i>	<i>21,566</i>	<i>156</i>
<i>From East Beach</i>	<i>8.116</i>	<i>7,935</i>	<i>793</i>
<i>From Lake</i>	<i>25.949</i>	<i>7,062</i>	<i>221</i>
<i>From L-8 basin/FEB</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From WCA-1</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From G-311(C-51)</i>	<i>0.479</i>	<i>42</i>	<i>71</i>
G-311	56.169	18,201	263
<i>From EAA</i>	<i>42.904</i>	<i>11,496</i>	<i>217</i>
<i>From East Beach</i>	<i>3.262</i>	<i>3,170</i>	<i>788</i>
<i>From Lake</i>	<i>9.775</i>	<i>2,243</i>	<i>186</i>
<i>From L-8 basin/FEB</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From WCA-1</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
Total	331.768	71,288	174

From L-8/C-51 Basin/Rustic Ranches

Structure	Flow	Phosphorus	
	(1,000 ac-ft)	Load (kg)	FWMC (µg/L)
S-319	147.487	23,177	127
<i>from Lake</i>	<i>25.701</i>	<i>4,174</i>	<i>132</i>
<i>from L-8 basin/FEB</i>	<i>38.851</i>	<i>7,068</i>	<i>147</i>
<i>From S-5AS</i>	<i>34.267</i>	<i>4,655</i>	<i>110</i>
<i>S-5AS from Lake</i>	<i>32.010</i>	<i>5,526</i>	<i>140</i>
<i>S-5AS from EAA</i>	<i>8.620</i>	<i>502</i>	<i>47</i>
<i>S-5AS from WCA-1</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>S-5AS from East Beach</i>	<i>1.233</i>	<i>610</i>	<i>401</i>
<i>from C-51W</i>	<i>48.668</i>	<i>7,279</i>	<i>121</i>
S-361 (Rustic Ranches)	8.592	349	33
Total	156.079	23,526	122

39 a. EAA – Everglades Agricultural Area
 40 b. East Beach Water Control District
 41 c. Lake – Lake Okeechobee
 42 d. N/A – not applicable

Table 2. WY2016 annual flows, TP loads, and TP FWM concentrations for WCA-1.

Into WCA-1			
Structure	Flow	Phosphorus	
	(1,000 ac-ft)	Load (kg)	FWMC (µg/L)
G-300 & G-301	0.003	0.381	106
G-338	0	0	N/A ^a
S-362 (from STA-1 East)	187.054	4,444	19
G-251 (from STA-1 West)	12.724	250	16
G-310 (from STA-1 West)	152.157	7,060	38
ACME2	0.000	0	N/A
Total	351.938	11,754	27

From WCA-1			
Structure	Flow	Phosphorus	
	(1,000 ac-ft)	Load (kg)	FWMC (µg/L)
S-10A	45.663	469	8
S-10C	95.891	1,105	9
S-10D	66.631	6,708	82
S-39	121.033	2,200	15
G-300	0.000	0	179
G-301	0.001	0	126
G-94A	8.363	174	17
G-94C	10.126	187	15
G-338	0.009	1	52
G-94D	0.000	0	N/A
Total	347.717	10,843	25

43 a. N/A – not applicable

Table 3. WY2016 annual flows, TP loads, and TP FWM concentrations for WCA-2.

Into WCA-2			
Structure	Flow	Phosphorus	
	(1,000 ac-ft)	Load (kg)	FWMC (µg/L)
G-436 (from STA-2)	164.168	3,165	16
G-335 (from STA-2)	295.930	7,029	19
<i>STA-2 from EAA^a</i>	<i>305.651</i>	<i>39,858</i>	<i>106</i>
<i>STA-2 from East Shore^b</i>	<i>30.114</i>	<i>6,136</i>	<i>165</i>
<i>STA-2 from Lake^c</i>	<i>74.099</i>	<i>7,094</i>	<i>78</i>
<i>STA-2 retained</i>	<i>---</i>	<i>-43,825</i>	<i>---</i>
S-7	196.172	3,079	13
<i>From STA-3/4</i>	<i>146.630</i>	<i>1,920</i>	<i>11</i>
<i>From Lake</i>	<i>17.510</i>	<i>1,827</i>	<i>85</i>
<i>From EAA</i>	<i>92.780</i>	<i>13,850</i>	<i>121</i>
<i>STA-3/4 retained</i>	<i>---</i>	<i>-19,743</i>	<i>---</i>
<i>From G-371</i>	<i>0.000</i>	<i>0.004</i>	<i>23</i>
<i>From Lake</i>	<i>0.000</i>	<i>0</i>	<i>32</i>
<i>From EAA</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
S-10A (from WCA-1)	45.663	469	8
S-10C (from WCA-1)	95.891	1105	9
S-10D (from WCA-1)	66.631	6708	82
Total	864.455	21,555	20

From WCA-2			
Structure	Flow	Phosphorus	
	(1,000 ac-ft)	Load (kg)	FWMC (µg/L)
S-7	0.178	5	22
S-11A (from WCA-2)	366.367	3,542	8
S-11B (from WCA-2)	168.718	1,619	8
S-11C (from WCA-2)	177.475	1,952	9
S-38	149.394	2,058	11
S-34	13.505	312	19
Total	875.637	9,488	9

44 a. EAA – Everglades Agricultural Area
 45 b. East Shore – East Shore Drainage District
 46 c. Lake – Lake Okeechobee

Table 4. WY2016 annual flows, TP loads, and TP FWM concentrations for WCA-3.

Into WCA-3

Structure	Flow	Phosphorus	
	(1000 ac-ft)	Load (kg)	FWMC (µg/L)
Non-ECP ^a -L-28, Feeder Canal	242.725	24,755	83
<i>S-140 (from L-28 Canal)</i>	<i>151.914</i>	<i>11,981</i>	<i>64</i>
<i>S-190 (from Feeder Canal)</i>	<i>90.811</i>	<i>12,774</i>	<i>114</i>
G-407	0.000	0	71
STA-5/6-south	86.598	4,173	39
<i>From C-139 basin</i>	<i>86.475</i>	<i>28,077</i>	<i>263</i>
S-8	240.130	4,843	16
<i>From STA-3/4</i>	<i>179.487</i>	<i>3,019</i>	<i>14</i>
<i>From Lake^b</i>	<i>72.710</i>	<i>9,614</i>	<i>107</i>
<i>from EAA^c</i>	<i>186.128</i>	<i>42,302</i>	<i>184</i>
<i>From C-139 basin</i>	<i>13.231</i>	<i>1,722</i>	<i>106</i>
<i>From SFCD^d</i>	<i>12.309</i>	<i>1,650</i>	<i>109</i>
<i>From SSDD^e</i>	<i>9.091</i>	<i>1,816</i>	<i>162</i>
<i>STA-3/4 retained</i>	<i>---</i>	<i>-31,051</i>	<i>---</i>
<i>From G-373</i>	<i>0.000</i>	<i>0</i>	<i>74</i>
<i>From Lake</i>	<i>0.000</i>	<i>0</i>	<i>N/A^f</i>
<i>From EAA</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From C-139 basin</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From SFCD</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From SSDD</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>STA5/6-North</i>	<i>55.571</i>	<i>1,249</i>	<i>18</i>
<i>From C-139 basin</i>	<i>46.577</i>	<i>10,929</i>	<i>190</i>
S-150	56.582	826	12
<i>From STA-3/4</i>	<i>42.292</i>	<i>515</i>	<i>10</i>
<i>From Lake</i>	<i>5.050</i>	<i>490</i>	<i>79</i>
<i>From EAA</i>	<i>26.760</i>	<i>3,714</i>	<i>113</i>
<i>STA-3/4 retained</i>	<i>---</i>	<i>-5,294</i>	<i>---</i>
<i>From G-371</i>	<i>0.000</i>	<i>0.001</i>	<i>22</i>
<i>From Lake</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From EAA</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
G-404 & G-357-G409	63.152	916	12
<i>From STA3/4</i>	<i>47.203</i>	<i>571</i>	<i>10</i>
<i>From Lake to G-409</i>	<i>19.122</i>	<i>1,818</i>	<i>77</i>
<i>From EAA</i>	<i>48.950</i>	<i>7,998</i>	<i>132</i>
<i>From C-139 basin</i>	<i>3.480</i>	<i>326</i>	<i>76</i>
<i>From SFCD</i>	<i>3.237</i>	<i>312</i>	<i>78</i>
<i>From SSDD</i>	<i>2.391</i>	<i>343</i>	<i>116</i>
<i>STA-3/4 retained</i>	<i>---</i>	<i>-5,871</i>	<i>---</i>
<i>From G-373</i>	<i>0.000</i>	<i>0</i>	<i>57</i>
<i>From Lake</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From EAA</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From C-139 basin</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From SFCD</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>From SSDD</i>	<i>0.000</i>	<i>0</i>	<i>N/A</i>
<i>STA5/6-North</i>	<i>14.615</i>	<i>236</i>	<i>13</i>
<i>From C-139 basin</i>	<i>12.249</i>	<i>2,066</i>	<i>137</i>
S-11A (from WCA-2)	366.367	3,542	8
S-11B (from WCA-2)	168.718	1,619	8
S-11C (from WCA-2)	177.475	1,952	9
Non-ECP-C-11 West	136.641	2,652	16
<i>S-9</i>	<i>78.326</i>	<i>1,849</i>	<i>19</i>
<i>S-9A</i>	<i>58.315</i>	<i>803</i>	<i>11</i>
Total	1538.388	45,277	24

From WCA-3

Structure	Flow	Phosphorus	
	(1000 ac-ft)	Load (kg)	FWMC (µg/L)
S-150	0.000	0	n/a
S-8	0.075	2	24
S-31	58.494	839	12
S-337	104.539	1,832	14
S-343A	2.870	32	9
S-343B	5.981	66	9
S-344	6.877	68	8
S-12A	17.526	226	10
S-12B	34.013	271	6
S-12C	287.738	1,974	6
S-12D	356.019	3,065	7
S-333 ^g	288.328	4,605	13
S-355A/ S-355B	15.077	163	9
G-357	0.000	0	N/A
Total	1177.536	13,143	9

- a. Non-ECP – Non-Everglades Construction Project
- b. Lake – Lake Okeechobee
- c. EAA – Everglades Agricultural Area
- d. SFCD – South Florida Conservancy District
- e. SSDD – South Shore Drainage District
- f. N/A – not applicable
- g. Value includes S-334 from WCA-3.

Table 5. WY2016 annual flows, TP loads, and TP FWM concentrations for ENP.

Into ENP

Structure	Flow (1,000 ac-ft)	Phosphorus	
		Load (kg)	FWMC (µg/L)
S-12A (from WCA-3)	17.526	226	10
S-12B (from WCA-3)	34.013	271	6
S-12C (from WCA-3)	287.738	1,974	6
S-12D (from WCA-3)	356.019	3,065	7
S-333-S-334 (from WCA-3)	255.667	4,165	13
S-355A/S-355B (from WCA-3)	15.077	163	9
Non-ECP ^a -C-111 Basin	52.558	496	8
<i>S-332D</i>	<i>198.451</i>	<i>1,613</i>	<i>7</i>
<i>S-18C</i>	<i>109.420</i>	<i>965</i>	<i>7</i>
Total	89.031	648	6

From ENP

Structure	Flow (1,000 ac-ft)	Phosphorus	
		Load (kg)	FWMC (µg/L)
S-197	45.893	371	7
Total	45.893	371	7

48 a. Non-ECP – Non-Everglades Construction Project

Table 6. Flow volume budgets to the Everglades STAs and diversion from inflow tributaries in 1,000 acre-feet per year.^a

Source Apportioned STA Inflows & Diversions							
	WY2012	WY2013	WY2014	WY2015	WY2016	Five-Year Average	Five-year % STAs/Diversions
Lake Okeechobee							
<i>Lake Okeechobee through EAA^b to STAs and diversions</i>	95.6	81.8	168.3	574.6	268.1	237.7	19%
<i>Lake Okeechobee through L-8 canal to STAs and diversions</i>	0.5	16.6	6.9	10.6	25.7	12.1	1%
<i>Total Lake Okeechobee to STAs and diversions</i>	96.1	98.4	175.2	585.3	293.8	249.8	20%
C-139 Basin							
<i>From C-139 basin to EAA STAs and diversions</i>	17.8	13.6	23.2	24.3	16.7	19.1	2%
<i>From C-139 basin to STA-5/6 and diversions</i>	60.4	59.1	103.3	83.1	145.3	90.2	7%
<i>Total C-139 basin to STAs and diversions</i>	78.2	72.7	126.6	107.3	162.0	109.4	9%
EAA Basin							
<i>Flow from Lake Okeechobee to EAA canals</i>	447.7	249.3	590.8	1042.7	763.3	618.8	N/A ^c
<i>From EAA to STAs and diversions</i>	544.9	841.2	868.9	669.1	828.7	750.6	60%
Water Control District Basins through EAA							
<i>East Beach^d diversion basin to STAs and diversions</i>	4.7	14.3	15.3	7.7	13.3	11.1	1%
<i>East Shore^e & Closter Farms diversion basins to STAs and diversions</i>	14.6	18.9	25.4	19.9	30.1	21.8	2%
<i>SFCD/SSDD^f diversion basins to STAs and diversions</i>	23.3	31.0	35.5	23.6	27.0	28.1	2%
<i>Total other water control districts to STAs and diversions</i>	42.7	64.3	76.1	51.1	70.4	60.9	5%
L-8 Basin/Flow Equalization Basin (FEB)/C-51 West/Rustic Ranch Basins							
<i>Flow from Lake Okeechobee to L-8 canal</i>	39.1	121.6	175.3	146.2	101.7	116.8	N/A
<i>L-8 basin/L-8 FEB to STAs and diversions</i>	0.3	34.4	18.5	7.0	38.9	19.8	2%
<i>C-51 West to STAs and diversions</i>	58.3	85.1	32.1	0.0	48.7	44.8	4%
<i>Rustic Ranches to STAs^h</i>	6.1	4.4	10.7	8.9	8.6	7.7	1%
<i>Total from L-8 basin/L-8 FEB/C-51 West/Rustic Ranches to STAs and diversions</i>	64.7	123.8	61.3	15.9	96.1	72.4	6%
Apportioned Total to STA Inflows and Diversions	826.7	1200.5	1308.2	1428.7	1451.1	1243.0	100%
STAs Reported Data							
STA and Diversion Budget							
<i>FEB Storage</i>	N/A	N/A	N/A	N/A	90.2	90.2	N/A
<i>Total STAs inflow</i>	712.3	1160.9	1301.8	1364.8	1329.9	1174.0	98%
<i>Total diversions</i>	86.2	28.0	17.4	8.0	0.0	27.9	2%
<i>Total STAs inflows and diversions</i>	798.6	1189.0	1319.2	1372.7	1329.9	1201.9	100%
<i>Total STAs outflows</i>	730.5	1206.9	1336.0	1315.9	1381.7	1194.2	
<i>Total STAs outflows and diversions</i>	816.7	1235.0	1353.4	1323.9	1381.7	1222.1	
STA Inflows & Diversions Mass Balance Check							
Percent difference between historical and source apportioned	-3.52%	-0.97%	0.84%	-4.08%	-2.33%	-2.01%	

49 a. The actual values are the basis for the apportionment to the sources. However, mass balancing the system results in slight differences due to multiple
50 complexities in tracking all discharges. Everglades Agricultural Area (EAA) to STAs and diversions is a portion of the total EAA runoff reported in Chapter 4 of
51 this volume.
52 b. EAA – Everglades Agricultural Area
53 c. N/A – not applicable
54 d. East Beach – East Beach Water Control District
55 e. East Shore – East Shore Water Control District
56 f. SFCD – South Florida Conservancy District
57 g. SSDD – South Shore Drainage District
58 h. Rustic Ranches to STAs included the seepage since WY2014.
59
60

Table 7. TP load budgets to the Everglades STAs and diversion from inflow tributaries in metric tons per year.^a

Source Apportioned STA Inflows & Diversions							
	WY2012	WY2013	WY2014	WY2015	WY2016	Five-Year Average	Five-year % STAs/Diversions
Lake Okeechobee							
<i>Lake Okeechobee through EAA^b to STAs and diversions</i>	12.5	9.1	27.6	85.4	34.1	33.7	18%
<i>Lake Okeechobee through L-8 canal to STAs and diversions</i>	0.1	2.4	1.2	2.2	4.2	2.0	1%
<i>Total Lake Okeechobee to STAs and diversions</i>	12.6	11.5	28.8	87.6	38.3	35.8	19%
C-139 Basin							
<i>From C-139 basin to EAA STAs and diversions</i>	3.2	0.9	3.1	3.7	2.0	2.6	1%
<i>From C-139 basin to STA-5/6 and diversions</i>	12.1	9.5	25.2	23.6	41.1	22.3	12%
<i>Total C-139 basin to STAs and diversions</i>	15.3	10.4	28.3	27.2	43.1	24.9	13%
EAA Basin							
<i>Flow from Lake Okeechobee to EAA canals</i>	55.1	28.1	95.8	170.8	110.6	92.1	N/A ^c
<i>From EAA to STAs and diversions</i>	62.7	138.2	98.3	38.6	143.5	96.3	52%
Water Control District Basins through EAA							
<i>East Beach^d diversion basin to STAs and diversions</i>	2.3	10.9	10.3	4.3	12.0	8.0	4%
<i>East Shore^e & Closter Farms diversion basins to STAs and diversions</i>	2.1	3.4	3.4	2.6	6.1	3.5	2%
<i>SFCD^f/SSDD^g diversion basins to STAs and diversions</i>	3.2	4.4	4.0	2.5	4.1	3.6	2%
<i>Total other water control districts to STAs and diversions</i>	7.7	18.6	17.7	9.4	22.3	15.1	8%
L-8 Basin/Flow Equalization Basin (FEB)/C-51 West/Rustic Ranch Basins							
<i>Flow from Lake Okeechobee to L-8 canal</i>	7.3	23.8	36.0	33.8	21.1	24.4	N/A
<i>L-8 basin/FEB to STAs and diversions</i>	0.0	8.3	4.3	1.3	7.1	4.2	2%
<i>C-51 West to STAs and diversions</i>	6.7	26.1	8.7	0.0	7.3	9.8	5%
<i>Rustic Ranches to STAs^h</i>	0.1	0.3	0.7	0.3	0.3	0.4	0%
<i>Total from L-8 basin/L-8 FEB/C-51 West/Rustic Ranches to STAs and diversions</i>	6.9	34.7	13.8	1.6	14.7	14.3	8%
Apportioned Total to STA Inflows and Diversions							
	105.1	213.5	186.8	164.4	261.9	186.4	100%
STAs Reported Data							
STA and Diversion Budget							
<i>FEB storage</i>	N/A	N/A	N/A	N/A	20.8	20.8	N/A
<i>Total STAs inflow</i>	97.8	198.3	181.1	166.3	241.8	177.1	97%
<i>Total diversions</i>	7.5	13.1	6.2	0.6	0.0	5.5	3%
<i>Total STAs inflows and diversions</i>	105.3	211.4	187.2	166.9	241.8	182.5	100%
<i>Total STAs outflows</i>	17.0	31.9	34.2	28.0	33.5	28.9	
<i>Total STAs outflows and diversions</i>	24.5	45.0	40.3	28.5	33.5	34.4	
STA Inflows & Diversions Mass Balance Check							
Percent difference between historical and source apportioned	0.13%	-1.00%	0.24%	1.48%	0.30%	0.23%	

61 a. The actual values are the basis for the apportionment to the sources. However, mass balancing the system results in slight differences due to multiple
 62 complexities in tracking all discharges. EAA to STAs and diversions is a portion of the total EAA runoff reported in Chapter 4 of this volume.
 63 b. EAA – Everglades Agricultural Area
 64 c. N/A – not applicable
 65 d. East Beach – East Beach Water Control District
 66 e. East Shore – East Shore Water Control District
 67 f. SFCD – South Florida Conservancy District
 68 g. SSDD – South Shore Drainage District
 69 h. Rustic Ranches to STAs included the seepage since WY2014.
 70

71

Table 8. TP FWM to the Everglades STAs and diversion from inflow tributaries in µg/L.^a

Source Apportioned STA Inflows & Diversions						
	WY2012	WY2013	WY2014	WY2015	WY2016	Five-year Average
Lake Okeechobee						
<i>Lake Okeechobee through EAA^b to STAs and diversions</i>	106	90	133	121	103	115
<i>Lake Okeechobee through L-8 canal to STAs and diversions</i>	168	119	135	167	132	135
<i>Total Lake Okeechobee to STAs and diversions</i>	106	95	133	121	106	116
C-139 Basin						
<i>From C-139 basin to EAA STAs and diversions</i>	146	53	109	122	99	110
<i>From C-139 basin to STA-5/6 and diversions</i>	162	131	197	230	229	200
<i>Total C-139 basin to STAs and diversions</i>	159	116	181	206	216	184
EAA Basin						
<i>Flow from Lake Okeechobee to EAA canals</i>	100	91	131	133	117	121
<i>From EAA to STAs and diversions</i>	93	133	92	47	140	104
Water Control District Basins through EAA						
<i>East Beach^c diversion basin to STAs and diversions</i>	401	617	545	453	732	583
<i>East Shore^d & Closter Farms diversion basins to STAs and diversions</i>	115	144	110	105	165	131
<i>SFCD^e/SSDD^f diversion basins to STAs and diversions</i>	113	114	91	86	124	105
<i>Total other water control districts to STAs and diversions</i>	146	235	188	149	256	201
L-8 Basin/Flow Equalization Basin (FEB)/C-51 West/Rustic Ranch Basins						
<i>Flow from Lake Okeechobee to L-8 canal</i>	151	158	167	187	169	169
<i>L-8 basin/FEB to STAs and diversions</i>	122	195	190	147	147	172
<i>C-51 West to STAs and diversions</i>	94	249	220	N/A ^g	N/A	177
<i>Rustic Ranches to STAs^h</i>	12	63	54	29	33	38
<i>Total from L-8 basin/L-8 FEB/C-51 West/Rustic Ranches to STAs and diversions</i>	86	227	182	81	124	160
Apportioned Total to STA Inflows and Diversions						
	103	144	116	93	146	122
STAs Reported Data						
STA and Diversion Budget						
<i>FEB storage</i>	N/A	N/A	N/A	N/A	N/A	N/A
<i>Total STAs inflow</i>	111	138	113	99	147	122
<i>Total diversions</i>	70	380	287	57	109	159
<i>Total STAs inflows and diversions</i>	107	144	115	99	147	123
<i>Total STAs outflows</i>	19	21	21	17	20	20
<i>Total STAs outflows and diversions</i>	24	30	24	17	20	23
STA Inflows & Diversions Mass Balance Check						
<i>Percent difference between historical and source apportioned</i>	3.53%	-0.04%	-0.60%	5.34%	0.74%	1.79%

72
73
74
75
76
77
78
79
80

a. The actual values are the basis for the apportionment to the sources. However, mass balancing the system results in slight differences due to multiple complexities in tracking all discharges. EAA to STAs and diversions is a portion of the total EAA runoff reported in Chapter 4 of this volume.
 b. EAA – Everglades Agricultural Area
 c. East Beach – East Beach Water Control District
 d. East Shore – East Shore Water Control District
 e. SFCD – South Florida Conservancy District
 f. SSDD – South Shore Drainage District
 g. N/A – not applicable
 h. Rustic Ranches to STAs included the seepage since WY2014.

Table 9. Flow budgets for the EPA and inflow tributaries in 1,000 acre-feet per year.

	WY2012	WY2013	WY2014	WY2015	WY2016	Five-year Average
Discharges within the EPA						
WCA-1						
Into WCA-1 ^a	170.2	365.1	380.3	245.4	351.9	302.6
<i>From STA + diversion</i>	<i>170.2</i>	<i>363.9</i>	<i>380.3</i>	<i>245.4</i>	<i>351.9</i>	<i>302.3</i>
<i>From eastern Non-ECP^b</i>	<i>0.0</i>	<i>1.2</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.2</i>
From WCA-1 total	16.3	483.7	471.4	197.3	347.7	303.3
<i>From WCA-1 to WCA-2</i>	<i>0.0</i>	<i>359.5</i>	<i>328.5</i>	<i>99.0</i>	<i>208.2</i>	<i>199.0</i>
<i>Discharge from WCA-1 out of EPA</i>	<i>16.3</i>	<i>124.2</i>	<i>143.0</i>	<i>98.3</i>	<i>139.5</i>	<i>104.3</i>
Net to WCA-1	154.0	-118.6	-91.2	48.0	4.2	-0.7
WCA-2						
Into WCA-2	386.1	1069.0	1078.2	823.9	864.5	844.3
<i>From STA + diversion</i>	<i>339.2</i>	<i>634.6</i>	<i>749.7</i>	<i>724.9</i>	<i>656.3</i>	<i>620.9</i>
<i>From eastern basin (NSID^c)</i>	<i>0.0</i>	<i>359.5</i>	<i>328.5</i>	<i>99.0</i>	<i>208.2</i>	<i>199.0</i>
<i>From WCA-1 to WCA-2</i>	<i>378.0</i>	<i>937.7</i>	<i>959.0</i>	<i>810.0</i>	<i>875.6</i>	<i>792.1</i>
From WCA-2 total	297.2	779.6	689.6	655.2	712.6	626.8
<i>From WCA-2 to WCA-3</i>	<i>80.9</i>	<i>158.2</i>	<i>269.4</i>	<i>154.8</i>	<i>163.1</i>	<i>165.3</i>
<i>Discharge from WCA-2 out of EPA</i>	<i>8.1</i>	<i>131.3</i>	<i>119.2</i>	<i>13.9</i>	<i>-11.2</i>	<i>52.2</i>
Net to WCA-2	386.1	1069.0	1078.2	823.9	864.5	844.3
WCA-3						
Into WCA-3	959.7	1367.8	1424.6	1308.0	1538.4	1319.7
<i>From STA + Diversion</i>	<i>306.8</i>	<i>236.4</i>	<i>380.0</i>	<i>394.5</i>	<i>446.5</i>	<i>352.9</i>
<i>From eastern Non-ECP</i>	<i>191.1</i>	<i>247.5</i>	<i>176.2</i>	<i>119.1</i>	<i>136.6</i>	<i>174.1</i>
<i>From western Non-ECP</i>	<i>135.6</i>	<i>98.5</i>	<i>178.8</i>	<i>148.0</i>	<i>242.7</i>	<i>160.7</i>
<i>From WCA-2 to WCA-3</i>	<i>297.2</i>	<i>779.6</i>	<i>689.6</i>	<i>655.2</i>	<i>712.6</i>	<i>626.8</i>
From WCA-3 total	502.3	942.9	1082.7	523.4	1177.5	845.8
<i>From WCA-3 to ENP</i>	<i>426.3</i>	<i>813.8</i>	<i>867.8</i>	<i>498.5</i>	<i>966.0</i>	<i>714.5</i>
<i>Discharge from WCA-3 out of EPA</i>	<i>76.0</i>	<i>129.1</i>	<i>214.9</i>	<i>25.0</i>	<i>211.5</i>	<i>131.3</i>
Net to WCA-3	457.4	424.9	341.9	784.6	360.9	473.9
ENP						
Into ENP	596.6	1096.2	1114.4	683.1	1217.0	941.5
<i>From eastern Non-ECP</i>	<i>170.3</i>	<i>282.4</i>	<i>246.6</i>	<i>184.6</i>	<i>198.5</i>	<i>216.5</i>
<i>From WCA-3 to ENP</i>	<i>426.3</i>	<i>813.8</i>	<i>867.8</i>	<i>498.5</i>	<i>966.0</i>	<i>714.5</i>
Discharge out of ENP	12.28	11.30	6.81	0.00	45.89	15.3
Discharges into the EPA from Non-ECP Basins						
Eastern Non-ECP Basin	361.4	531.1	422.8	303.7	335.1	390.8
Western Non-ECP Basin	135.6	98.5	178.8	148.0	242.7	160.7
Discharges out of the EPA^d						
Discharges for Water Supply and Flood Control	185.4	422.8	634.1	278.1	560.0	416.1

81 a. ACME discharges to WCA-1 were stopped and conveyed to the C-51 canal for treatment in STA-1 East.
 82 b. Non-ECP – Non-Everglades Construction Project
 83 c. North Springs Improvement District
 84 d. Water supply/flood releases discharged outside of the EPA

85

Table 10. TP load budgets for the EPA and inflow tributaries in metric tons per year.

	WY2012	WY2013	WY2014	WY2015	WY2016	Five-year Average
Discharges within the EPA						
WCA-1						
Into WCA-1 ^a	4.6	26.4	18.9	6.0	11.8	13.5
<i>From STA + diversion</i>	4.6	26.2	18.9	6.0	11.8	13.5
<i>From eastern Non-ECP^b</i>	0.0	0.2	0.0	0.0	0.0	0.0
From WCA-1 total	0.4	16.2	15.8	3.7	10.8	9.4
<i>From WCA-1 to WCA-2</i>	0.0	11.2	11.0	1.6	8.3	6.4
<i>Discharge from WCA-1 out of EPA</i>	0.4	5.0	4.7	2.1	2.6	2.9
Net to WCA-1	4.3	10.2	3.2	2.3	0.9	4.2
WCA-2						
Into WCA-2	7.8	26.1	26.1	15.7	21.6	19.4
<i>From STA + diversion</i>	7.7	14.0	15.1	14.0	13.3	12.8
<i>From eastern basin (NSID^c)</i>	0.0	11.2	11.0	1.6	8.3	6.4
<i>From WCA-1 to WCA-2</i>	6.6	10.4	10.6	9.4	9.5	9.3
From WCA-2 total	4.5	8.7	8.0	7.7	7.1	7.2
<i>From WCA-2 to WCA-3</i>	2.1	1.7	2.7	1.8	2.4	2.1
<i>Discharge from WCA-2 out of EPA</i>	1.2	15.7	15.4	6.2	12.1	10.1
Net to WCA-2	7.8	26.1	26.1	15.7	21.6	19.4
WCA-3						
Into WCA-3	27.0	25.2	31.9	33.5	45.3	32.6
<i>From STA + diversion</i>	12.2	4.8	8.3	9.0	10.8	9.0
<i>From eastern Non-ECP</i>	3.5	4.3	2.8	1.9	2.7	3.0
<i>From western Non-ECP</i>	7.4	7.5	12.8	15.2	24.8	13.5
<i>From WCA-2 to WCA-3</i>	4.5	8.7	8.0	7.7	7.1	7.2
From WCA-3 total	7.5	10.7	12.7	10.2	13.1	10.8
<i>From WCA-3 to ENP</i>	5.0	8.0	8.5	8.8	9.9	8.0
<i>Discharge from WCA-3 out of EPA</i>	2.5	2.7	4.2	1.5	3.3	2.8
Net to WCA-3	19.6	14.5	19.2	23.2	32.1	21.7
ENP						
Into ENP	6.7	10.8	10.2	10.0	12.0	10
<i>From eastern Non-ECP</i>	1.8	2.8	1.7	1.2	1.6	1.8
<i>From WCA-3 to ENP</i>	5.0	8.0	8.5	8.8	9.9	8.0
Discharge out of ENP	0.1	0.1	0.0	0.0	0.4	0.1
Discharges into the EPA from Non-ECP Basins						
Eastern Non-ECP Basin	5.3	7.3	4.5	3.2	4.3	4.9
Western Non-ECP Basin	7.4	7.5	12.8	15.2	24.8	13.5
Discharges out of the EPA^d						
Discharges for Water Supply and Flood Control	5.0	9.5	11.6	5.3	8.6	8.0

a. ACME discharges to WCA-1 were stopped and conveyed to the C-51 canal for treatment in STA-1 East
 b. Non-ECP – Non-Everglades Construction Project
 c. North Springs Improvement District
 d. Water supply/flood releases discharged outside of the EPA

86
87
88
89
90

Table 11. FWM TP for the EPA and inflow tributaries in µg/L.

	WY2012	WY2013	WY2014	WY2015	WY2016	Five-year Average
Discharges within the EPA						
WCA-1						
Into WCA-1 ^a	22	59	40	20	27	36
<i>From STA + diversion</i>	22	58	40	20	27	36
<i>From eastern Non-ECP^b</i>	N/A ^c	139	N/A	N/A	N/A	139
From WCA-1 total	18	27	27	15	25	25
<i>From WCA-1 to WCA-2</i>	N/A	25	27	13	32	26
<i>Discharge from WCA-1 out of EPA</i>	18	32	27	17	15	23
WCA-2						
Into WCA-2	16	20	20	15	20	19
<i>From STA + diversion</i>	18	18	16	16	16	17
<i>From eastern basin (NSID^d)</i>	N/A	25	27	13	32	26
<i>From WCA-1 to WCA-2</i>	14	9	9	9	9	10
From WCA-2 total	12	9	9	9	8	9
<i>From WCA-2 to WCA-3</i>	21	9	8	9	12	10
<i>Discharge from WCA-2 out of EPA</i>	N/A	25	27	13	32	26
<i>From WCA-1 to WCA-2</i>	16	20	20	15	20	19
WCA-3						
Into WCA-3	23	15	18	21	24	20
<i>From STA + diversion</i>	32	17	18	18	20	21
<i>From eastern Non-ECP</i>	15	14	13	13	16	14
<i>From western Non-ECP</i>	44	62	58	83	83	68
<i>From WCA-2 to WCA-3</i>	12	9	9	9	8	9
From WCA-3 total	12	9	10	16	9	10
<i>From WCA-3 to ENP</i>	9	8	8	14	8	9
<i>Discharge from WCA-3 out of EPA</i>	26	17	16	48	13	17
ENP						
Into ENP	9	8	7	12	8	9
<i>From eastern Non-ECP</i>	8	8	6	5	7	7
<i>From WCA-3 to ENP</i>	9	8	8	14	8	9
Discharge out of ENP	5	5	4	N/A	7	6
Discharges into EPA from Non-ECP Basins						
Eastern Non-ECP Basin	12	11	9	8	10	10
Western Non-ECP Basin	44	62	58	83	83	68
Discharges Out of EPA^e						
Discharges for Water Supply and Flood Control	22	18	15	16	12	16

91
92
93
94
95

a. ACME discharges to WCA-1 were stopped and conveyed to the C-51 canal for treatment in STA-1 East.
 b. Non-ECP – Non-Everglades Construction Project.
 c. N/A – not applicable.
 d. North Springs Improvement District.
 e. Water supply/flood releases discharged outside of the EPA.

96

LITERATURE CITED

97 Xue, S.K. 2012. Appendix 3A-5: Water Year 2011 Annual Flows and Total Phosphorus Loads and
98 Concentrations by Structure. In: *2012 South Florida Environmental Report – Volume I*, South Florida
99 Water Management District, West Palm Beach, FL.

100 Xue, S.K. 2013. Appendix 3A-5: Water Year 2012 Annual Flows and Total Phosphorus Loads and
101 Concentrations by Structure. In: *2013 South Florida Environmental Report – Volume I*, South Florida
102 Water Management District, West Palm Beach, FL.

103 Xue, S.K. 2014. Appendix 3A-5: Water Year 2013 and Five-Year (Water Year 2009–2013) Annual Flows
104 and Total Phosphorus Loads and Concentrations by Structure and Area. In: *2014 South Florida
105 Environmental Report – Volume I*, South Florida Water Management District, West Palm Beach, FL.

106 Xue, S.K. 2015. Appendix 3A-5: Water Year 2014 and Five-Year (Water Year 2010–2014) Annual Flows
107 and Total Phosphorus Loads and Concentrations by Structure and Area. In: *2015 South Florida
108 Environmental Report – Volume I*, South Florida Water Management District, West Palm Beach, FL.

109 Xue, S.K. 2016. Appendix 3A-5: Water Year 2015 and Five-Year (Water Year 2011–2015) Annual Flows
110 and Total Phosphorus Loads and Concentrations by Structure and Area. In: *2016 South Florida
111 Environmental Report – Volume I*, South Florida Water Management District, West Palm Beach, FL.