

Appendix 3A-5: Water Year 2011 Annual Flows and Total Phosphorus Loads and Concentrations by Structure

Shi Kui Xue

This appendix provides the annual flows, and total phosphorus (TP) loads and flow-weighted mean concentrations (FWMCs) by structure for Water Year 2011 (WY2011) (May 1, 2010–April 30, 2011). **Tables 1** through **5** present this information for Stormwater Treatment Area (STA) 1 Inflow Basin; Water Conservation Areas 1, 2, and 3 (WCA-1, WCA-2, and WCA-3); and Everglades National Park (ENP), respectively. Note that the same color font within a table indicates the same source level.

For WY2011, total flows, TP loads, and TP FWMCs into the Everglades Protection Area (EPA) are calculated from the totals of WCA-1, WCA-2, WCA-3, and ENP minus that coming from numerous structures: S-10A, S-10C, S-10D, S-11A, S-11B, S-11C, S-12-A, S-12B, S-12C, S-12D, S-333-S-334, and S-355A/S-355B. The totals into the EPA are as follows:

- Flow – 1,300.584 acre-feet (ac-ft) in thousands
- TP load – 29,871 kilograms (kg)
- TP FWMC – 19 parts per billion (ppb)

For WY2011, total flows, TP loads, and TP FWMCs from the EPA are calculated from the totals of WCA-1, WCA-2, and WCA-3 for numerous structures: S-39, G-300, G-301, G-94A, G-94B, G-94C, S-7, S-38, S-34, S-150, S-8, S-31, S-337, S-343A, S-343B, S-344, S-197, S-333-S-334 (from WCA-3 to ENP). The totals from the EPA are as follows:

- Flow – 461.230 ac-ft in thousands
- TP load – 8,623 kg
- TP FWMC – 15 ppb

Table 1. WY2011 annual flows, TP loads, and TP FWMCs for STA-1 Inflow Basin.

Into STA-1 Inflow Basin

Structure	Flow (1,000 ac-ft)	TP	
		Load (kg)	FWMC (ppb)
S-5A_P	148.266	24,524	134
S-5A from EAA	120.912	14,876	100
S-5A from East Beach	7.893	4,253	437
S-5A from Lake O	17.316	1,977	93
S-5AW from Lake O	1.545	143	75
S-5AW from L-8 Basin	0.020	2	75
Mass Balance Adjustment	0.581	3,273	4,569
S-5AS	0.000	0	NA
S-5AS from Lake O	0.000	0	NA
S-5AS from L-8 Basin	0.000	0	NA
G-300	6.962	425	50
G-301	2.208	309	113
G-311	0.402	43	86
Total	157.838	25,301	130

From STA-1 Inflow Basin

Structure	Flow (1,000 ac-ft)	TP	
		Load (kg)	FWMC (ppb)
S-5AS	21.376	2,349	89
from S-5A	14.879	1,424	78
from EAA	12.137	992	66
from East Beach	0.792	284	290
from Lake O	1.893	141	61
from L-8 Basin	0.002	0	50
from WCA-1	5.671	394	56
from G-311	0.281	34	99
Mass Balance Adjustment	0.024	-178	
Net S-5AS	21.400	2,171	82
G-300	0.000	0	98
G-301	0	0	92
G-302	125.933	23,461	151
from S-5A	129.804	19,426	121
from EAA	105.881	13,539	104
from East Beach	6.912	3,871	454
from Lake O	16.516	1,930	95
from L-8 Basin	0.018	2	78
from WCA-1	0.159	40	202
from G-311	0.025	1	27
Mass Balance Adjustment	7.408	-811	
Net G-302	133.341	22,650	217
G-311	3.525	581	134
from S-5A	3.548	493	113
from EAA	2.894	344	96
from East Beach	0.189	98	422
from Lake O	0.451	49	88
from L-8 Basin	0.000	0	72
from WCA-1	0.000	0	
Mass Balance Adjustment	0.117	-9	
Net G-311	3.642	572	163
Total	158.383	25,393	130

Table 2. WY2011 annual flows, TP loads, and TP FWMCs for WCA-1.**Into WCA-1**

Structure	Flow (1,000 ac-ft)	TP	
		Load (kg)	FWMC (ppb)
G-300 & G-301	0.000	0.02	96
from EAA	0.000	0	74
from East Beach	0.000	0	323
from Lake O	0.000	0	67
from L-8 Basin	0.000	0	56
from WCA-1	0.000	0	48
from G-311	0.000	0	64
Mass Balance Adjustment	0.000	0	3,383
S-362 (from STA-1E)	25.758	691	22
from EAA	3.949	457	94
from East Beach	0.258	30	94
from Lake O	6.533	756	94
from L-8 Basin	4.964	574	94
from WCA-1	0.878	102	94
from G-311	0.043	5	94
C-51W and Wellington	6.831	791	94
from S-361	2.218	257	94
Mass Balance Adjustment	0.083	-2,280	-22,264
G-251 (from STA-1W)	18.130	501	22
from EAA	14.397	534	30
from East Beach	0.940	35	30
from Lake O	2.246	83	30
from L-8 Basin	0.002	0	30
from WCA-1	0.022	1	30
from G-311	0.003	0	30
Mass Balance Adjustment	0.521	19	30
G-310 (from STA-1W)	108.751	3,488	26
from EAA	86.355	4,314	41
from East Beach	5.637	282	41
from Lake O	13.470	673	41
from L-8 Basin	0.014	1	41
from WCA-1	0.130	6	41
from G-311	0.020	1	41
Mass Balance Adjustment	3.125	-1,789	41
Total	152.639	4,681	25

From WCA-1

Structure	Flow (1,000 ac-ft)	TP	
		Load (kg)	FWMC (ppb)
S-10A	0.000	0	NA
S-10C	49.137	1,203	20
S-10D	84.504	3,133	30
S-39	41.096	834	16
G-300	6.962	425	50
G-301	2.208	309	113
G-94A	26.646	1,096	33
G-94B	0.000	0	32
G-94C	6.736	192	23
G-338	0.119	4	24
G-94D	0.000	0	NA
Total	217.407	7,195	27

Table 3. WY2011 annual flows, TP loads, and TP FWMCs for WCA-2.Into WCA-2¹

Structure	Flow (1,000 ac-ft)	TP	
		Load (kg)	FWMC (ppb)
G-335 (from STA-2)	159.914	3,049	15
from EAA	136.247	2,598	15
from East Shore	15.192	290	15
from Lake O	8.635	165	15
Mass Balance Adjustment	-0.160	-3	15
S-7	173.057	3,013	14
from STA-3/4	131.072	2,647	16
from Lake O	4.027	81	16
from EAA	112.980	2,282	16
from C-139	4.073	82	16
from SFCD	5.804	117	16
from SSDD	4.188	85	16
from G-371	3.456	154	36
from Lake O	3.455	154	36
from EAA	0.000	0	36
Back flow [S-7(-)+S-150(-) +S-8(-)+G-357(-)-G-371(-)- G-373(-)]	-0.970	-17	14
Mass Balance Adjustment	39.500	229	5
S-10A (from WCA-1)	0.000	0.000	NA
S-10C (from WCA-1)	49.137	1,203	19.842
S-10D (from WCA-1)	84.504	3,133	30.056
N. Springs Improv. District	0.000	0	NA
Total	466.612	10,398	18

Into WCA-2

Structure	Flow (1,000 ac-ft)	TP	
		Load (kg)	FWMC (ppb)
S-7	28.907	412	12
S-11A (from WCA-2)	173.328	3,066	14
S-11B (from WCA-2)	76.600	1,274	13
S-11C (from WCA-2)	4.403	86	16
S-38	106.560	1,034	8
S-34	17.360	354	17
Total	407.158	6,227	12

¹ Orange shaded cells indicate the values are proportionally calculated based on summation of EAA model outputs of the S-7 and S-8 Basins.

Table 4. WY2011 annual flows, TP loads, and TP FWMCs for WCA-3.**Into WCA-3¹**

Structure	Flow (1,000 ac-ft)	TP	
		Load (kg)	FWMC (ppb)
S-140 (from L-28 Canal)	77.688	3,810	40
S-190 (from Feeder Canal)	40.228	2,241	45
G-407	0.062	10	131
STA-6	74.591	2,317	25
S-8	151.489	3,331	18
from STA-3/4	114.737	2,317	16
from Lake O	3.525	71	16
from EAA	98.899	1,998	16
from C-139	3.565	72	16
from SFCD	5.081	103	16
from SSDD	3.666	74	16
from G-373	6.147	267	35
from Lake O	6.122	266	35
from EAA	0.018	1	35
from C-139	0.000	0	35
from SFCD	0.004	0	35
from SSDD	0.004	0	35
STA-5	18.347	1,071	47
Back flow [S-7(-)+S-150(-) +S-8(-)+G3-57(-)-G-371(-)- G-373(-)]	-0.849	-19	18
Mass Balance Adjustment	13.108	-305	-19
S-150	38.171	741	16
from STA-3/4	28.910	584	16
from Lake O	0.888	18	16
from EAA	24.920	503	16
from C-139	0.898	18	16
from SFCD	1.280	26	16
from SSDD	0.924	19	16
from G-371	0.762	34	36
from Lake O	0.762	34	36
from EAA	0.000	0	36
Back flow [S-7(-)+S-150(-) +S-8(-)+G-357(-)-G-371(-)- G-373(-)]	-0.214	-4	16
Mass Balance Adjustment	8.712	127	12
G-404 & G-357	49.311	1,263	21
from STA-3/4	37.348	754	16
from Lake O to G-409	1.147	23	16
from EAA	32.193	650	16
from C-139	1.161	23	16
from SFCD	1.654	33	16
from SSDD	1.193	24	16
from G-373	2.001	87	35
from Lake O	1.993	86	35
from EAA	0.006	0	35
from C-139	0.000	0	35
from SFCD	0.001	0	35
from SSDD	0.001	0	35
STA-5	5.972	349	47
Back flow [S-7(-)+S-150(-) +S-8(-)+G-357(-)-G-371(-)- G-373(-)]	-0.277	-7	21
Mass Balance Adjustment	4.267	81	15
S-11A (from WCA-2)	173.328	3,066	14
S-11B (from WCA-2)	76.600	1,274	13
S-11C (from WCA-2)	4.403	86	16
G-123 (from N. New River)	0.000	0	NA
S-9 (from C-11 West)	58.172	967	13
S-9A (from C-11 West)	90.047	1,364	12
Total	834.091	20,470	20

From WCA-3

Structure	Flow (1,000 ac-ft)	TP	
		Load (kg)	FWMC (ppb)
S-150	0.766	17	18
S-8	0.003	0	28
S-31	71.135	972	11
S-337	0.000	0	NA
S-343A	12.333	137	9
S-343B	19.679	218	9
S-344	0.000	0	NA
S-12A	45.007	443	8
S-12B	46.024	349	6
S-12C	106.094	986	8
S-12D	182.852	2,039	9
S-333 ²	205.054	3,839	15
S-355A/S-355B	0.000	0	NA
G-409	10.535	351	27
Total	699.483	9,351	11

¹ Orange shaded cells indicate the values are proportionally calculated based on summation of EAA model outputs of the S-7 and S-8 Basins.

² The value included S-334 from WCA-3.

Table 5. WY2011 annual flows, TP loads, and TP FWMCs for ENP.

Into ENP

Structure	Flow (1,000 ac-ft)	TP	
		Load (kg)	FWMC (ppb)
S-12A (from WCA-3)	45.007	443	8
S-12B (from WCA-3)	46.024	349	6
S-12C (from WCA-3)	106.094	986	8
S-12D (from WCA-3)	182.852	2,023	9
S-333-S-334 (from WCA-3) ³	94.869	1,572	13
S-355A/S-355B (from WCA-3)	0.000	0	NA
S-174 (from L-31W)	0.000	0	NA
S-332D	105.084	1,847	14
S-18C	130.130	1,237	8
Total	710.060	8,456	10

From ENP

Structure	Flow (1,000 ac-ft)	TP	
		Load (kg)	FWMC (ppb)
S-197	24.967	140	5
Total	24.967	140	5

Structures/Locations

C-139 – C-139 Basin
 EAA – Everglades Agricultural Area
 East Beach – East Beach Water Control District
 East Shore – East Shore Drainage District
 ENP – Everglades National Park
 Lake O – Lake Okeechobee
 N. New River – North New River
 N. Springs Improv. District – North Springs Improvement District
 SFCD – South Florida Conservancy District
 SSDD – South Shore Drainage District
 STA-1E – Stormwater Treatment Area 1 East
 STA-1W – Stormwater Treatment Area 1 West
 STA-2 – Stormwater Treatment Area 2
 STA-3/4 – Stormwater Treatment Area 3/4
 STA-5 – Stormwater Treatment Area 5
 STA-6 – Stormwater Treatment Area 6
 WCA-1 – Water Conservation Area 1
 WCA-2 – Water Conservation Area 2
 WCA-3 – Water Conservation Area 3

Units of Measurement

ac-ft – acre-feet
 kg – kilograms
 ppb – parts per billion

Other Abbreviations

FWMC – flow-weighted mean concentration
 NA – not applicable