

Appendix 5B-3: Emergent and Submerged Aquatic Vegetation Coverage in the STAs

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The STA vegetation-mapping program has several objectives: (1) document areal coverage of emergent aquatic vegetation (EAV), submerged aquatic vegetation (SAV) and open-water areas based on aerial images, (2) map dominant vegetation types on an as-needed basis, and (3) monitor changes in vegetation density in problematic cells. Ground-truthing via helicopter flights supplements the aerial imagery. Future goals include being able to relate vegetation coverage and density to STA performance, estimate phosphorus storage in plant biomass, and determine hydraulic effects of vegetation resistance

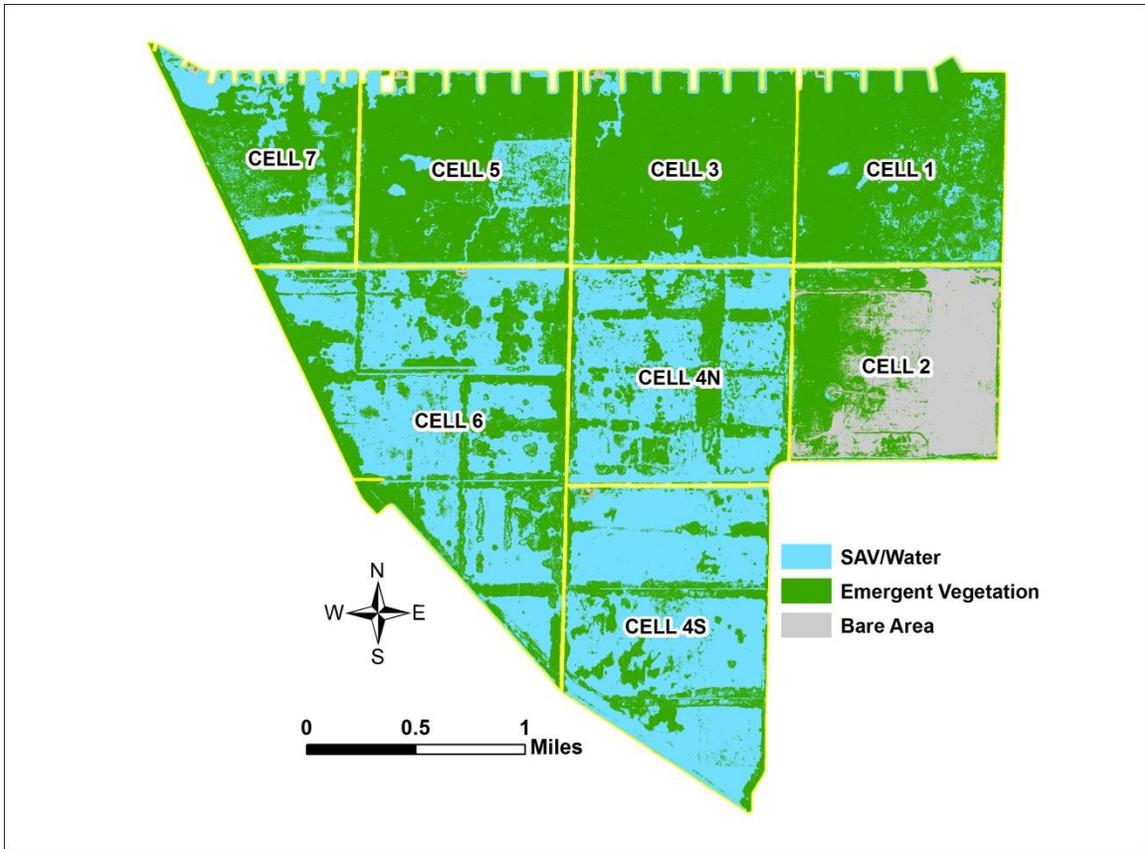
The 2013 digital imagery was collected on March 4, 2013, utilizing a Vexcel UltraCamX large format digital camera mounted in a Cessna 208 Grand Caravan aircraft flying at an approximate altitude of 13,500 ft above ground level. Raw images were processed using Vexcel UltraMap (v1.0; Microsoft Corp., Redmond, WA). Stereo imagery was captured with 60 percent overlap between adjacent frames and 40 percent overlap between adjacent flight lines. Vegetation cover maps for STA-1E, 1W, 2, 3/4, 5, and 6 were produced using unsupervised classification of the color infrared bands of this imagery. Image processing software (ERDAS Imagine, 2011; Intergraph Corp., Huntsville, AL) was also used to reclassify, filter, and aggregate the initial classification. Expert knowledge and ground-truthing of vegetation composition were employed to conduct final edits, calculate acreage, and output results cartographically using geographic information system (GIS) software (ArcGIS v10.1; Esri, Redlands, CA).

Among the limitations of STA aerial imagery are (1) photographic overflights are limited to once a year only during the dry season, and (2) the inability to discriminate between areas covered with SAV versus open-water areas. Since acquiring aerial imagery requires clear weather with a cloudless sky, flights oftentimes occur during periods when the water levels in the STAs are receding (i.e., the dry season). Wetland vegetation coverage can change quickly depending on hydrologic conditions. For example, some areas covered with SAV and open-water areas may be rapidly covered with EAV when the water level recedes and conditions become conducive to EAV growth and expansion. For the STA maps and data summaries presented in this appendix, coverage is distinguished among areas covered with EAV, areas covered with open-water or SAV (SAV/ Water), and bare areas (Bare Area). Bare Area includes areas of dry soil and dead grasses (often times less than 1 percent of total coverage; the largest was in STA-1E Cell 2, with almost 60 percent of the area) during the time of the aerial flight.

For consistency with previous consolidated reports, vegetation data is not provided for Cells 5-8 of STA-2, the Periphyton Stormwater Treatment Area Project cell in STA-3/4, and Cells 5-4A, 5-4B, 5-5A, 5-5B, and 6-4 of STA-5/6 in this report.

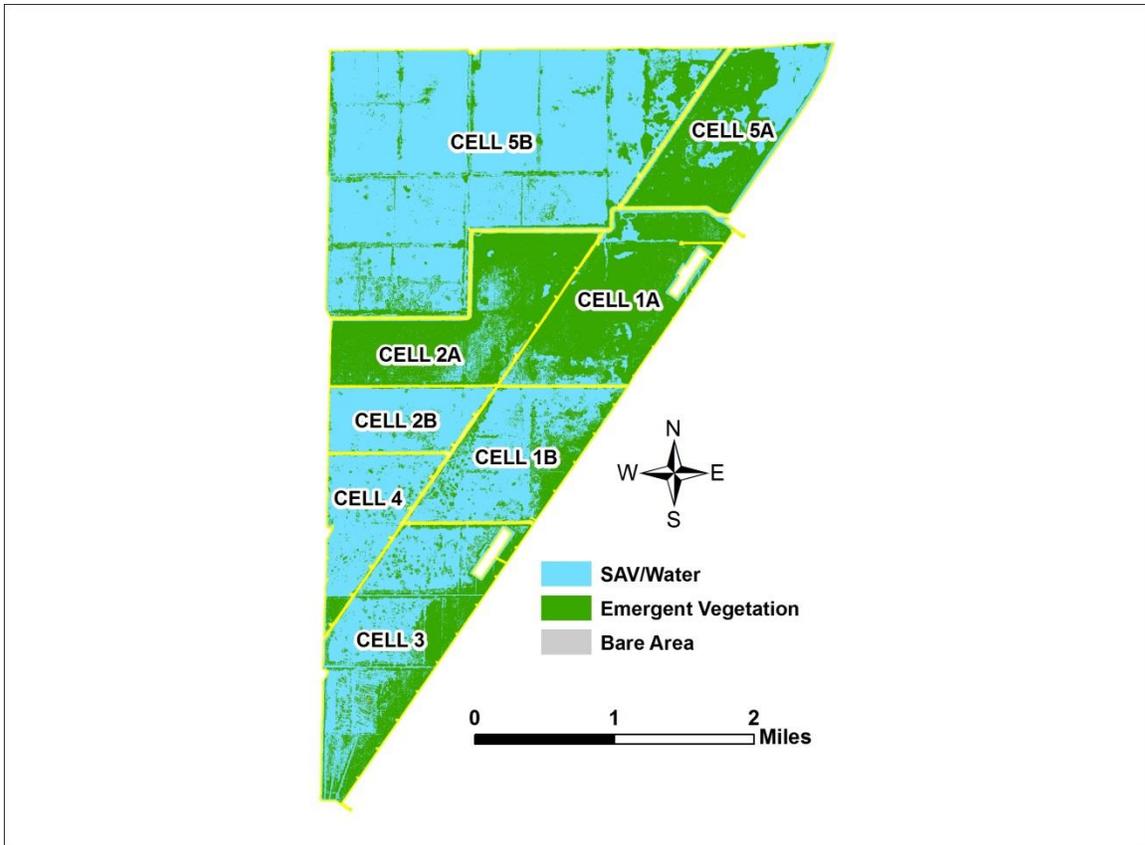
STORMWATER TREATMENT AREA 1 EAST

Cell	Coverage Type	Estimated Coverage (acre)	Coverage (%)	Cell Area (acre)
CELL 1	SAV/Water	65.96	12.20	540.60
	EAV	473.95	87.67	
	Bare Soil	0.77	0.14	
CELL 2	SAV/Water	11.91	2.20	540.41
	EAV	206.45	38.20	
	Bare Soil	322.13	59.61	
CELL 3	SAV/Water	54.93	9.60	572.07
	EAV	515.55	90.13	
	Bare Soil	1.69	0.30	
CELL 4N	SAV/Water	406.27	64.00	634.81
	EAV	228.45	35.99	
	Bare Soil	0.11	0.02	
CELL 4S	SAV/Water	559.40	76.46	731.57
	EAV	170.81	23.35	
	Bare Soil	1.43	0.20	
CELL 5	SAV/Water	105.22	19.40	542.31
	EAV	436.09	80.41	
	Bare Soil	1.08	0.20	
CELL 6	Water/SAV	601.34	58.21	1032.99
	EAV	428.23	41.46	
	Bare Soil	3.52	0.34	
CELL 7	SAV/Water	146.33	36.79	397.78
	EAV	250.04	62.86	
	Bare Soil	1.41	0.35	



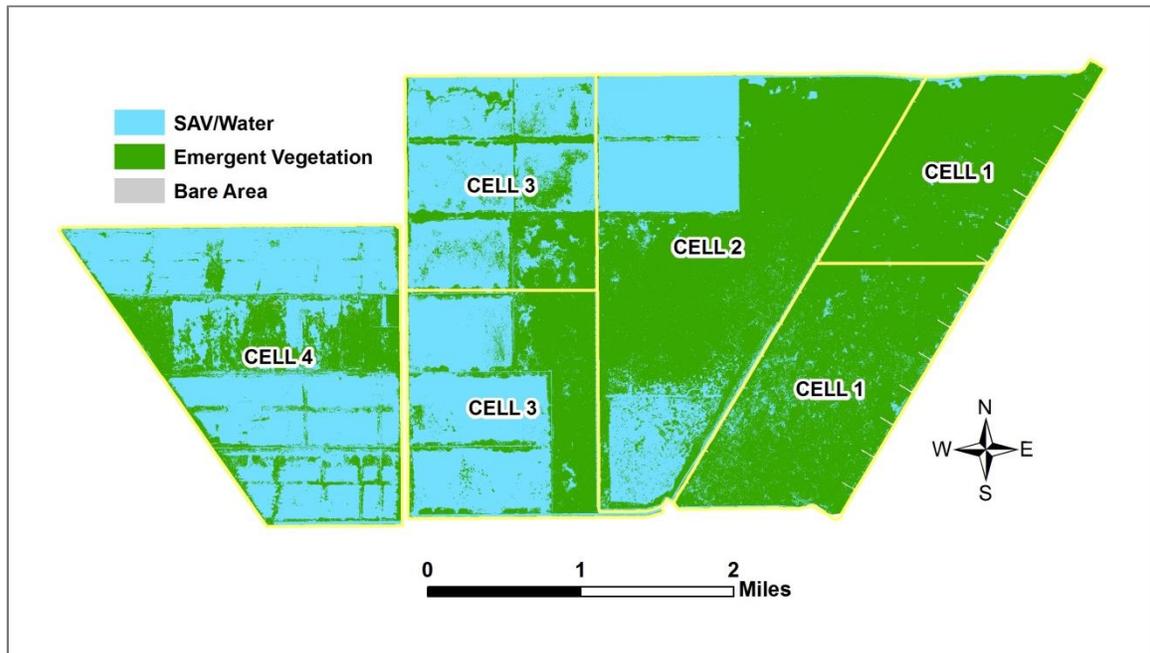
STORMWATER TREATMENT AREA 1 WEST

Cell	Coverage Type	Estimated Coverage (acre)	Coverage (%)	Cell Area (acre)
CELL 1A	Water/SAV	122.26	17.14	713.35
	EAV	590.18	82.73	
	Bare Soil	1.08	0.15	
CELL 1B	Water/SAV	414.14	71.76	577.12
	EAV	162.42	28.14	
	Bare Soil	0.70	0.12	
CELL 2A	Water/SAV	103.71	14.79	701.37
	EAV	595.39	84.89	
	Bare Soil	2.36	0.34	
CELL 2B	Water/SAV	286.36	92.65	309.09
	EAV	22.74	7.36	
	Bare Soil	0.04	0.01	
CELL 3	Water/SAV	522.29	59.30	880.83
	EAV	355.48	40.36	
	Bare Soil	3.06	0.35	
CELL 4	Water/SAV	314.64	87.73	358.66
	EAV	44.01	12.27	
	Bare Soil	0.09	0.02	
CELL 5A	Water/SAV	203.17	33.73	602.32
	EAV	399.15	66.27	
	Bare Soil	0.12	0.02	
CELL 5B	Water/SAV	2103.44	87.59	2401.39
	EAV	297.77	12.40	
	Bare Soil	0.42	0.02	



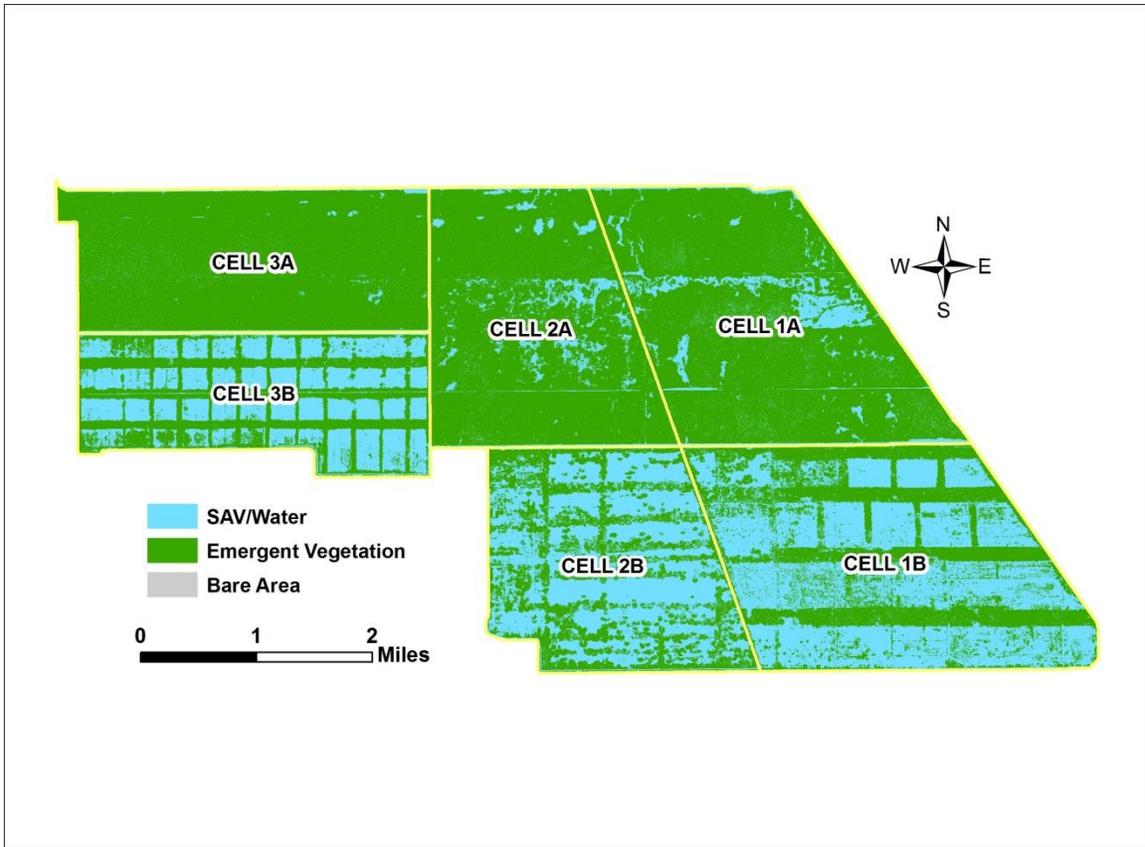
STORMWATER TREATMENT AREA 2

Cell	Coverage Type	Estimated Coverage (acre)	Coverage (%)	Cell Area (acre)
Cell 1	Water/SAV	114.51	5.63	2032.56
	EAV	1918.00	94.36	
	Bare Soil	0.04	0.00	
Cell 2	Water/SAV	827.84	34.88	2373.19
	EAV	1544.99	65.10	
	Bare Soil	0.36	0.02	
Cell 3	Water/SAV	1496.01	65.15	2296.33
	EAV	800.08	34.84	
	Bare Soil	0.24	0.01	
Cell 4	Water/SAV	1362.41	70.16	1942.00
	EAV	576.30	29.68	
	Bare Soil	3.29	0.17	



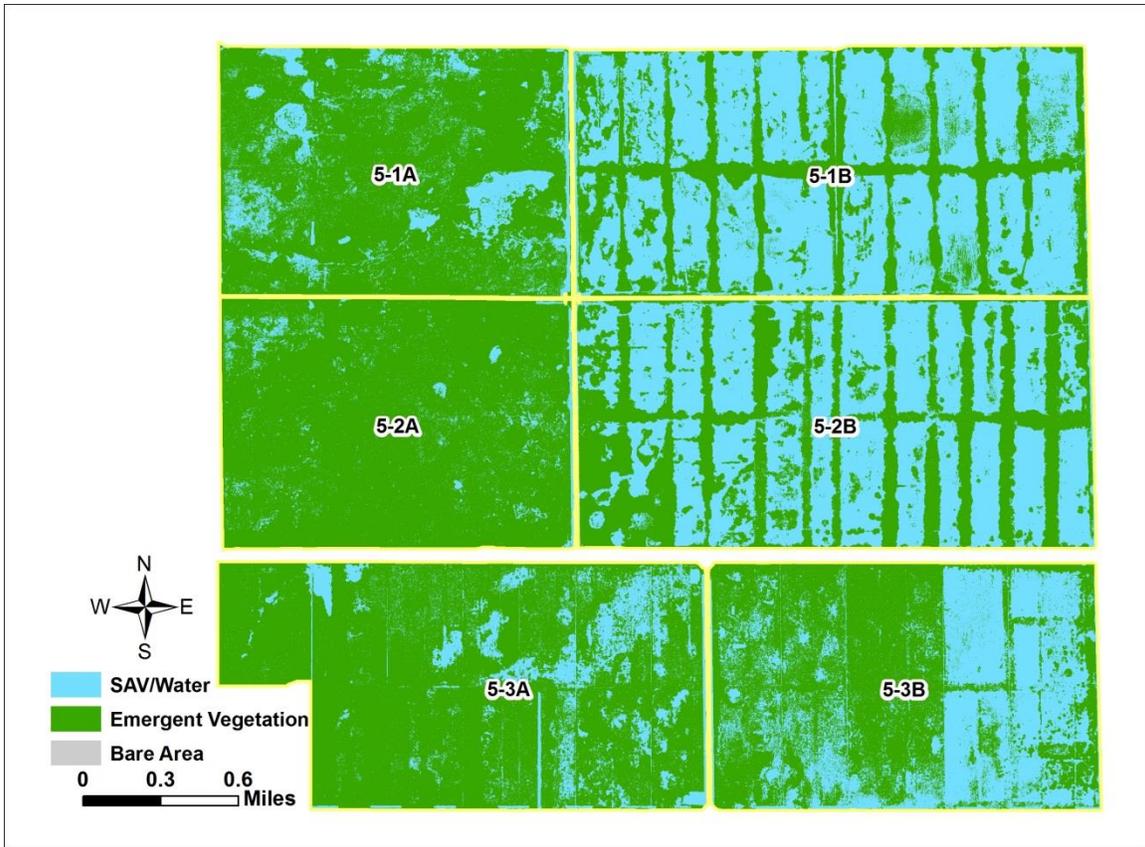
STORMWATER TREATMENT AREA 3/4

Cell	Coverage Type	Estimated Coverage (acre)	Coverage (%)	Cell Area (acre)
CELL 1A	Water/SAV	385.46	12.77	3019.60
	EAV	2634.02	87.23	
	Bare Soil	0.12	0.00	
CELL 1B	Water/SAV	2065.08	59.75	3456.10
	EAV	1389.83	40.21	
	Bare Soil	1.19	0.03	
CELL 2A	Water/SAV	265.94	10.61	2505.55
	EAV	2239.55	89.38	
	Bare Soil	0.05	0.00	
CELL 2B	Water/SAV	1446.37	60.35	2396.45
	EAV	949.79	39.63	
	Bare Soil	0.28	0.01	
CELL 3A	Water/SAV	94.98	3.93	2415.16
	EAV	2320.15	96.07	
	Bare Soil	0.02	0.00	
CELL 3B	Water/SAV	1164.71	55.82	2086.69
	EAV	921.71	44.17	
	Bare Soil	0.26	0.01	



STORMWATER TREATMENT AREA 5

Cell	Coverage Type	Estimated Coverage (acre)	Coverage (%)	Cell Area (acre)
CELL 1A	Water/SAV	154.46	18.38	840.25
	EAV	685.66	81.60	
	Bare Soil	0.13	0.02	
CELL 1B	Water/SAV	795.92	65.06	1223.22
	EAV	427.22	34.92	
	Bare Soil	0.08	0.01	
CELL 2A	Water/SAV	53.38	6.32	844.73
	EAV	791.24	93.67	
	Bare Soil	0.11	0.01	
CELL 2B	Water/SAV	710.25	57.60	1233.07
	EAV	522.66	42.39	
	Bare Soil	0.16	0.01	
CELL 3A	Water/SAV	181.49	17.33	1047.04
	EAV	865.54	82.67	
	Bare Soil	0.02	0.00	
CELL 3B	Water/SAV	395.58	42.99	920.26
	EAV	524.21	56.96	
	Bare Soil	0.47	0.05	



STORMWATER TREATMENT AREA 6

Cell	Coverage Type	Estimated Coverage (acre)	Coverage (%)	Cell Area (acre)
Section 2	Water/SAV	263.34	19.34	1361.38
	EAV	1098.01	80.65	
	Bare Soil	0.03	0.00	
Cell 3	Water/SAV	30.10	12.45	241.88
	EAV	211.77	87.55	
	Bare Soil	0.01	0.01	
Cell 5	Water/SAV	17.46	2.81	621.15
	EAV	603.68	97.19	
	Bare Soil	0.01	0.00	

