

Monthly Report: January 2017

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To:

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08 February 2017

By:

Jamie Duberstein

USACE Savannah District:

Please see the bulleted list below for the major actions and accomplishments associated with Cooperative Agreement Number W912HZ-14-2-0002 (Modification Number P00002) for the month of January 2017.

Please let me know if you would like me to elaborate on the details of any items I've listed below, or if there are any status updates you'd like on unlisted topics.

Thank you,

Jamie

Marsh Vegetation

- There are no updates to report.

Water Data

- Data from all water sensors were downloaded during the days of 18 – 20 January.
- An updated salinity table is provided (Table 1).
- See Table 2 for a complete list of salinity data losses thus far for FY17, which includes recently discovered data losses at Back 3 (see below).
- A “spot check” of belowground salinity conditions were measured using a YSI Pro30 handheld salinity meter during the January sensor download.
 - Salinity values were compared to those measured via Aquatrols (Table 3).
 - We saw a difference of 0.7 psu at the Back 3 monitoring area, so we investigated the data file.
 - There appear to be episodic data errors from the belowground sensor at Back 3. Belowground salinity readings usually change gradually, not typically varying much over the course of a day. However, there are episodic, small (< 1 psu) irregularities in the data set collected by the belowground salinity sensor located at Back 3. The irregularities were not consistent with increasing or decreasing water stage (*i.e.*, tidal changes), suggesting a potential internal sensor problem. Assumed measurement errors appear to be minimal, but sporadically located during several short time periods between 06 November 2016 and 19 January 2017 (Table 2).
 - Assumed measurement errors were deleted prior to calculating site averages for the months effected. Note that previous monthly reports and the FY17 1st quarter report may have slightly different values than those presented in Table 1 because the assumed measurement areas were just recently identified (and removed).
 - The presumed malfunctioning sensor has been removed from the field and sent to the manufacturer for diagnostic examination. A replacement sensor was deployed on 27 January.

Forest monitoring

- Monthly measurements of baldcypress tree growth were last taken on 20 January at the swamp monitoring areas.
- Average basal area increase since last measurement:
 - Swamp 1: 0.0 cm² (18 December – 20 January)
 - Swamp 2: -0.1 cm² (17 December – 20 January)
 - Swamp 3: -0.1 cm² (18 December – 20 January)
- It is normal to see no change or even constriction of the tree trunk (*i.e.*, small negative values) during winter months.

Table 1. Fiscal Year 2017 average, minimum, and maximum salinity (psu: practical salinity units) measured via sensors at above- and below-ground locations at (12) marsh monitoring areas and (3) tidal forest areas. Summaries are based on hourly measurements starting 01 October 2016 through 18 January 2017 for all monitoring areas unless noted by superscript; details of data losses are provided in Table 2. Measurements taken during dry well conditions were removed from calculations of summary statistics.

Area	Month	<u>Aboveground Salinity (psu)</u>			<u>Belowground Salinity (psu)</u>		
		Avg. (std. err.)	Min	Max	Avg. (std. err.)	Min	Max
Back 1	October 2016	0.03 (0.01)	0.00	0.24	0.22 (0.00)	0.12	0.30
	November 2016	0.07 (0.01)	0.00	0.55	0.32 (0.00)	0.26	0.39
	December 2016	0.04 (0.01)	0.00	0.12	0.23 (0.00)	0.16	0.33
	January 2017	0.05 (0.00)	0.05	0.06	0.14 (0.00)	0.11	0.18
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
		FY17	0.05 (0.01)	0.00	0.55	0.24 (0.00)	0.11
Back 2	October 2016	0.16 (0.01)	0.00	1.58	0.31 (0.00)	0.19	0.53
	November 2016	0.35 (0.03)	0.00	2.61	0.63 (0.01)	0.28	1.30
	December 2016	0.06 (0.01)	0.00	0.85	0.28 (0.00)	0.15	0.72
	January 2017	0.04 (0.01)	0.00	0.34	0.17 (0.00)	0.11	0.33
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
		FY17	0.17 (0.01)	0.00	2.61	0.37 (0.00)	0.11

Table 1 (cont'd). Fiscal Year 2017 average, minimum, and maximum salinity at above- and below-ground locations in marsh and tidal freshwater forest monitoring areas.

Area	Month	Aboveground Salinity (psu)			Belowground Salinity (psu)		
		Avg. (std. err.)	Min	Max	Avg. (std. err.)	Min	Max
Back 3	October 2016	0.24 (0.03)	0.00	2.63	1.19 (0.02)	0.41	1.96
	November 2016	0.52 (0.06)	0.00	4.05	1.36 (0.02) ^a	0.63 ^a	3.50 ^a
	December 2016	0.10 (0.02)	0.00	2.39	0.81 (0.01) ^a	0.40 ^a	1.50 ^a
	January 2017	0.08 (0.01)	0.00	0.17	0.68 (0.01) ^a	0.27 ^a	1.84 ^a
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
	FY17		0.31 (0.03)	0.00	4.05	1.06 (0.01) ^a	0.27 ^a
Back 3.5	October 2016	0.44 (0.04)	0.00	10.27	2.14 (0.01)	1.75	2.44
	November 2016	0.87 (0.07)	0.00	5.37	2.28 (0.00)	2.09	2.73
	December 2016	0.20 (0.02)	0.00	2.74	2.24 (0.00)	2.05	2.37
	January 2017	0.15 (0.03)	0.00	1.79	2.16 (0.00)	2.12	2.23
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
	FY17		0.46 (0.03)	0.00	10.27	2.21 (0.00)	1.75

^a Incomplete data record. See Table 2 for details.

Table 1 (cont'd). Fiscal Year 2017 average, minimum, and maximum salinity at above- and below-ground locations in marsh and tidal freshwater forest monitoring areas.

Area	Month	Aboveground Salinity (psu)			Belowground Salinity (psu)		
		Avg. (std. err.)	Min	Max	Avg. (std. err.)	Min	Max
Back 4	October 2016	1.01 (0.06)	0.00	8.96	3.68 (0.02)	3.01	4.50
	November 2016	1.38 (0.11)	0.00	8.80	3.76 (0.02)	3.15	4.18
	December 2016	0.66 (0.06)	0.00	5.72	3.87 (0.01)	3.50	4.20
	January 2017	0.48 (0.07)	0.00	3.12	3.45 (0.01)	3.16	3.68
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
		FY17	0.99 (0.05)	0.00	8.96	3.72 (0.01)	3.01
Front 1	October 2016	0.18 (0.02)	0.00	1.23	0.25 (0.00)	0.09	0.60
	November 2016	0.42 (0.03)	0.00	1.86	0.56 (0.01)	0.30	0.94
	December 2016	0.10 (0.01)	0.00	0.66	0.42 (0.00)	0.28	0.63
	January 2017	0.07 (0.00)	0.02	0.14	0.34 (0.00)	0.29	0.36
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
		FY17	0.24 (0.02)	0.00	1.86	0.40 (0.00)	0.09

Table 1 (cont'd). Fiscal Year 2017 average, minimum, and maximum salinity at above- and below-ground locations in marsh and tidal freshwater forest monitoring areas.

Area	Month	Aboveground Salinity (psu)			Belowground Salinity (psu)		
		Avg. (std. err.)	Min	Max	Avg. (std. err.)	Min	Max
Front 2	October 2016	0.52 (0.07)	0.00	12.29	1.43 (0.02)	0.48	6.07
	November 2016	0.83 (0.08)	0.00	6.53	1.84 (0.01)	1.15	2.26
	December 2016	0.21 (0.03)	0.00	5.73	1.58 (0.01)	1.30	2.20
	January 2017	0.12 (0.03)	0.00	1.87	1.26 (0.02)	0.69	1.77
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
		FY17	0.50 (0.03)	0.00	12.29	1.56 (0.01)	0.48
Middle 1	October 2016	0.29 (0.02) ^a	0.08 ^a	0.35 ^a	0.55 (0.02)	0.24	9.62
	November 2016	1.11 (0.09)	0.00	3.46	0.88 (0.02)	0.37	1.68
	December 2016	0.37 (0.02)	0.00	0.79	0.83 (0.00)	0.70	0.95
	January 2017	0.17 (0.02)	0.02	0.39	0.69 (0.00)	0.60	0.74
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
		FY17	0.63 (0.05) ^a	0.00 ^a	3.46 ^a	0.74 (0.01)	0.24

^a Incomplete data record. See Table 2 for details.

Table 1 (cont'd). Fiscal Year 2017 average, minimum, and maximum salinity at above- and below-ground locations in marsh and tidal freshwater forest monitoring areas.

Area	Month	Aboveground Salinity (psu)			Belowground Salinity (psu)			
		Avg. (std. err.)	Min	Max	Avg. (std. err.)	Min	Max	
Middle 2	October 2016	0.84 (0.36)	0.00	11.67	0.75 (0.04)	0.19	11.17	
	November 2016	0.34 (0.12)	0.00	6.20	1.44 (0.03)	0.48	5.50	
	December 2016	0.16 (0.03)	0.00	0.94	1.04 (0.02)	0.42	2.00	
	January 2017	0.11 (0.01)	0.00	0.57	0.68 (0.01)	0.49	0.95	
	February 2017							
	March 2017							
	April 2017							
	May 2017							
	June 2017							
	July 2017							
	August 2017							
	September 2017							
	FY17		0.30 (0.07)	0.00	11.67	1.01 (0.02)	0.19	11.17
	Middle 3	October 2016	0.26 (0.26)	0.00	5.92	1.02 (0.04)	0.32	9.64
November 2016		N/A ^b	N/A ^b	N/A ^b	2.01 (0.04)	0.80	5.28	
December 2016		0.24 (0.05)	0.00	1.29	1.35 (0.02)	0.54	2.64	
January 2017		0.40 (0.07)	0.00	0.89	0.98 (0.01)	0.47	1.37	
February 2017								
March 2017								
April 2017								
May 2017								
June 2017								
July 2017								
August 2017								
September 2017								
FY17			0.27 (0.07)	0.00	5.92	1.38 (0.02)	0.32	9.64

^b There wasn't any aboveground flooding for this reporting period.

Table 1 (cont'd). Fiscal Year 2017 average, minimum, and maximum salinity at above- and below-ground locations in marsh and tidal freshwater forest monitoring areas.

Area	Month	Aboveground Salinity (psu)			Belowground Salinity (psu)		
		Avg. (std. err.)	Min	Max	Avg. (std. err.)	Min	Max
Middle 4	October 2016	0.55 (0.09)	0.00	16.89	3.23 (0.07) ^a	1.02 ^a	11.16 ^a
	November 2016	0.81 (0.09)	0.00	7.41	3.74 (0.02)	2.60	4.90
	December 2016	0.14 (0.03)	0.00	6.34	3.38 (0.03)	2.17	5.90
	January 2017	0.20 (0.04)	0.00	0.83	2.53 (0.02)	1.60	3.33
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
	FY17		0.51 (0.05)	0.00	16.89	3.30 (0.02) ^a	1.02 ^a
Middle 5	October 2016	0.63 (0.05)	0.00	10.82	1.51 (0.01)	0.92	2.42
	November 2016	0.84 (0.06)	0.00	5.57	1.54 (0.01)	1.17	1.78
	December 2016	0.26 (0.02)	0.00	3.63	1.69 (0.00)	1.58	1.75
	January 2017	0.16 (0.02)	0.00	1.85	1.65 (0.00)	1.53	1.73
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
	FY17		0.55 (0.03)	0.00	10.82	1.59 (0.00)	0.92

^a Incomplete data record. See Table 2 for details.

Table 1 (cont'd). Fiscal Year 2017 average, minimum, and maximum salinity at above- and below-ground locations in marsh and tidal freshwater forest monitoring areas.

Area	Month	Aboveground Salinity (psu)			Belowground Salinity (psu)		
		Avg. (std. err.)	Min	Max	Avg. (std. err.)	Min	Max
Swamp 1	October 2016	0.07 (0.00)	0.00	0.43	0.07 (0.00)	0.06	0.08
	November 2016	0.07 (0.00)	0.00	0.08	0.07 (0.00)	0.06	0.09
	December 2016	0.05 (0.00)	0.00	0.07	0.07 (0.00)	0.05	0.09
	January 2017	0.04 (0.00)	0.00	0.05	0.06 (0.00)	0.05	0.07
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
	FY17		0.06 (0.00)	0.00	0.43	0.07 (0.00)	0.05
Swamp 2	October 2016	0.46 (0.09)	0.00	10.95	0.25 (0.00)	0.14	0.37
	November 2016	0.43 (0.04)	0.00	1.80	0.33 (0.00)	0.31	0.37
	December 2016	0.22 (0.01)	0.01	0.36	0.27 (0.00)	0.21	0.32
	January 2017	0.10 (0.01)	0.00	0.18	0.20 (0.00)	0.18	0.23
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
	FY17		0.38 (0.04)	0.00	10.95	0.27 (0.00)	0.14

Table 1 (cont'd). Fiscal Year 2017 average, minimum, and maximum salinity at above- and below-ground locations in marsh and tidal freshwater forest monitoring areas.

Area	Month	Aboveground Salinity (psu)			Belowground Salinity (psu)		
		Avg. (std. err.)	Min	Max	Avg. (std. err.)	Min	Max
Swamp 3	October 2016	0.25 (0.04)	0.00	5.72	0.32 (0.00)	0.20	0.57
	November 2016	0.38 (0.04)	0.00	3.04	0.39 (0.01)	0.19	0.66
	December 2016	0.11 (0.01)	0.00	0.68	0.32 (0.00)	0.21	0.41
	January 2017	0.09 (0.01)	0.00	0.26	0.19 (0.00)	0.17	0.22
	February 2017						
	March 2017						
	April 2017						
	May 2017						
	June 2017						
	July 2017						
	August 2017						
	September 2017						
	FY17		0.24 (0.02)	0.00	5.72	0.32 (0.00)	0.17

Table 2. Summary of FY17 salinity data losses from Aquatroll sensors deployed at SHEP monitoring areas between the dates of 01 October 2016 - 18 January 2017. Data loss periods and number of days may include periods within FY16. Minor data losses were incurred when data were downloaded near pre-programmed sensor measurements. Water level data losses may be beyond dates listed below.

Area	Position	Data loss period			Reason
		Beginning	End	# Days	
Middle 1	Aboveground	09/28/2016 03:00	10/20/2016 12:00	22.38	circuitboard failure
Middle 4	Belowground	10/09/2016 07:00	10/20/2016 15:00	11.33	circuitboard failure
Back 3	Belowground	11/06/2016 02:00	11/06/2016 18:00	0.67	Being diagnosed
Back 3	Belowground	12/07/2016 08:00	12/09/2016 07:00	1.96	Being diagnosed
Back 3	Belowground	12/15/2016 20:00	12/17/2016 14:00	1.75	Being diagnosed
Back 3	Belowground	12/29/2016 10:00	12/29/2016 21:00	0.46	Being diagnosed
Back 3	Belowground	01/17/2017 04:00	01/19/2017 10:00	2.25	Being diagnosed

Table 3. Comparison of belowground salinity measurements taken January 2017 via autonomous sensors (In-Situ Aquatrolls) versus a "spot check" measured via handheld YSI salinity meter (units: parts per thousand = ppt). Reports typically provide summaries of hourly Aquatroll measurements of salinity as practical salinity units (psu) though measurements of total dissolved solids as parts per thousand (ppt) are also collected. Here we report both Aquatroll measurements to facilitate comparisons with handheld YSI measurements. Accuracy of the handheld YSI meter is 0.1 (ppt), while accuracy of the Aquatrolls is 0.001 (psu, ppt); Aquatroll values were rounded to the nearest 0.1 to facilitate comparisons.

Site	Aquatroll Total		YSI "spot check" (ppt)	YSI Measurement Time	Aquatroll Measurement Time
	Aquatroll Salinity (psu)	Dissolved Solids (ppt)			
Back 1	0.1	0.2	0.1	01/18/2017 15:48	01/18/2017 15:00
Back 2	0.1	0.2	0.2	01/19/2017 10:45	01/19/2017 10:00
Back 3	0.0	0.0	0.7	01/19/2017 10:16	01/19/2017 10:00
Back 3.5	2.2	2.7	2.2	01/19/2017 09:49	01/19/2017 09:00
Back 4	3.4	4.0	3.4	01/19/2017 16:16	01/19/2017 16:00
Front 1	0.3	0.4	0.4	01/19/2017 11:37	01/19/2017 11:00
Front 2	0.9	1.1	1.0	01/20/2017 11:38	01/20/2017 11:00
Middle 1	0.6	0.8	0.6	01/19/2017 13:48	01/19/2017 13:00
Middle 2	0.8	1.0	0.8	01/19/2017 12:49	01/19/2017 12:00
Middle 3	0.7	0.9	1.1	01/19/2017 12:21	01/19/2017 12:00
Middle 4	2.2	2.7	2.2	01/19/2017 08:07	01/19/2017 08:00
Middle 5	1.5	1.9	1.6	01/19/2017 09:04	01/19/2017 09:00
Swamp 1	0.1	0.1	0.1	01/20/2017 08:45	01/20/2017 08:00
Swamp 2	0.2	0.3	0.2	01/20/2017 10:18	01/20/2017 10:00
Swamp 3	0.2	0.3	0.2	01/20/2017 13:46	01/20/2017 13:00