

Monthly Report: May 2016

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To:
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15 June 2016

By:
Jamie Duberstein

Bill and Mary:

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 May 2016. 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.

Best Regards,

Jamie

Marsh Vegetation

- The June synoptic sample event is scheduled to begin 06 June.

Water Data

- Data from all water sensors were downloaded on 18 and 19 May 2016.
 - Recall that the complete records of sensor data were not downloaded in April. The complete records were downloaded in May, and an updated salinity table (Table 1) is included with this May monthly report.
- There were no malfunctioning sensors identified in May 2016. However, there were minor widespread data losses due to sensor replacements in April. These salinity and water level data losses spanned less than two days. An updated table of 2016 salinity data losses are listed in Table 2.
- A “spot check” of belowground salinity conditions were measured using a handheld YSI meter during the May sensor download. Salinity values were compared to those measured via Aquatrolls, provided in Table 3.

Forest monitoring

- Monthly measurements of baldcypress tree growth were last taken on 19 May at Swamp 1, Swamp 2, and Swamp 3.
- Average basal area increase since last measurement:
 - Swamp 1: 1.6 cm² (20 April – 19 May)
 - Swamp 2: 2.3 cm² (20 April – 19 May)
 - Swamp 3: 1.9 cm² (20 April – 19 May)

Herpetofauna (MS student) study

- Field data collection ended 31 May 2016.

Table 1. Year 2016 average, maximum, and minimum 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 January through 18 May 2016 for all monitoring areas unless noted by superscript; details of data loss provided in Table 2. Measurements taken during dry well conditions were removed from calculations of summary statistics.

Area	Month	Aboveground Salinity (psu)			Belowground Salinity (psu)		
		Avg. (std. err)	Max	Min	Avg (std. err)	Max	Min
Back 1	January	0.03 (0.00)	0.05	0.00	0.09 (0.00)	0.10	0.08
	February	0.03 (0.00)	0.05	0.00	0.07 (0.00)	0.09	0.07
	March	0.08 (0.00)	0.12	0.00	0.09 (0.00)	0.11	0.06
	April	0.07 (0.00) ^b	0.12 ^b	0.00 ^b	0.10 (0.00) ^b	0.10 ^b	0.08 ^b
	May	0.06 (0.01)	0.15	0.00	0.11 (0.00)	0.13	0.09
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.05 (0.00)	0.15	0.00	0.09 (0.00)	0.13	0.06
Back 2	January	0.03 (0.00) ^a	0.03 ^a	0.03 ^a	0.06 (0.00) ^a	0.09 ^a	0.04 ^a
	February	0.03 (0.00)	0.04	0.00	0.07 (0.00) ^a	0.09 ^a	0.04 ^a
	March	0.05 (0.00)	0.08	0.00	0.08 (0.00)	0.10	0.07
	April	0.05 (0.00)	0.30	0.00	0.10 (0.00)	0.13	0.07
	May	0.08 (0.01)	0.40	0.00	0.17 (0.00)	0.19	0.13
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.06 (0.00)	0.40	0.00	0.09 (0.00)	0.19	0.04

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

^b Data loss less than 48 hours as a result of updating field sensor.

Table 1 (cont'd). Year 2016 average, maximum, and minimum 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)	Max	Min	Avg (std. err)	Max	Min
Back 3	January	0.04 (0.00)	0.07	0.00	1.49 (0.01) ^a	1.88 ^a	1.12 ^a
	February	0.03 (0.00)	0.06	0.00	1.15 (0.01) ^a	1.39 ^a	0.62 ^a
	March	0.06 (0.01)	0.15	0.00	0.68 (0.01)	1.46	0.12
	April	0.07 (0.01) ^b	0.48 ^b	0.00 ^b	0.42 (0.01)	1.03	0.01
	May	0.36 (0.05)	1.28	0.00	0.43 (0.02)	1.20	0.00
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.11 (0.01)	1.28	0.00	0.77 (0.01)	1.88	0.00
Back 3.5	January	0.03 (0.00)	0.18	0.00	2.14 (0.01)	2.61	1.23
	February	0.04 (0.00)	0.11	0.00	2.07 (0.00)	2.31	1.83
	March	0.06 (0.01)	0.38	0.00	1.78 (0.02)	2.20	0.43
	April	0.08 (0.01)	0.61	0.00	1.92 (0.00) ^b	2.11 ^b	1.78 ^b
	May	0.33 (0.04)	2.08	0.00	1.85 (0.01)	2.14	1.63
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.12 (0.01)	2.08	0.00	2.00 (0.01)	2.61	0.43

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

^b Data loss less than 48 hours as a result of updating field sensor.

Table 1 (cont'd). Year 2016 average, maximum, and minimum 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)	Max	Min	Avg (std. err)	Max	Min
Back 4	January	0.05 (0.00)	0.57	0.00	2.27 (0.01)	2.65	1.73
	February	0.08 (0.01)	0.62	0.00	2.69 (0.00)	2.83	2.42
	March	0.21 (0.02)	2.39	0.00	2.75 (0.01)	2.86	0.02
	April	0.33 (0.03) ^b	3.59 ^b	0.00 ^b	2.48 (0.01) ^b	2.83 ^b	1.96 ^b
	May	1.08 (0.11)	5.37	0.00	2.45 (0.00)	2.56	2.22
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.29 (0.02)	5.37	0.00	2.53 (0.00)	2.86	0.02
Front 1	January	0.03 (0.00)	0.08	0.00	0.08 (0.00)	0.10	0.05
	February	0.03 (0.00)	0.06	0.00	0.08 (0.00)	0.09	0.07
	March	0.04 (0.00)	0.06	0.00	0.08 (0.00)	0.09	0.07
	April	0.03 (0.00) ^b	0.13 ^b	0.00 ^b	0.06 (0.00) ^b	0.08 ^b	0.05 ^b
	May	0.05 (0.01)	0.47	0.00	0.12 (0.00)	0.14	0.07
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.04 (0.00)	0.47	0.00	0.08 (0.00)	0.14	0.05

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

^b Data loss less than 48 hours as a result of updating field sensor.

Table 1 (cont'd). Year 2016 average, maximum, and minimum 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)	Max	Min	Avg (std. err)	Max	Min
Front 2	January	0.03 (0.00)	0.05	0.01	0.14 (0.00)	0.33	0.05
	February	0.03 (0.00)	0.05	0.00	0.13 (0.00)	0.32	0.05
	March	0.06 (0.00)	0.31	0.00	0.20 (0.00)	0.47	0.08
	April	0.08 (0.01)	3.75	0.00	0.25 (0.00)	0.44	0.17
	May	0.20 (0.02)	3.43	0.00	0.53 (0.00)	0.68	0.32
	June						
	July						
	August						
	September						
	October						
	November						
	December						
		Annual	0.11 (0.01)	3.75	0.00	0.22 (0.00)	0.68
Middle 1	January	0.04 (0.00) ^a	0.05 ^a	0.00 ^a	0.20 (0.00)	0.33	0.11
	February	0.04 (0.00)	0.09	0.00	0.23 (0.00)	0.33	0.16
	March	0.05 (0.00)	0.11	0.00	0.20 (0.00)	0.27	0.14
	April	0.07 (0.00)	0.25	0.00	0.21 (0.00) ^b	0.25 ^b	0.10 ^b
	May	0.14 (0.02)	1.18	0.00	0.28 (0.00)	0.42	0.21
	June						
	July						
	August						
	September						
	October						
	November						
	December						
		Annual	0.08 (0.01)	1.18	0.00	0.22 (0.00)	0.42

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

^b Data loss less than 48 hours as a result of updating field sensor.

Table 1 (cont'd). Year 2016 average, maximum, and minimum 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)	Max	Min	Avg (std. err)	Max	Min
Middle 2	January	0.03 (0.00) ^a	0.04 ^a	0.02 ^a	0.07 (0.00)	0.12	0.05
	February	0.03 (0.00)	0.05	0.00	0.09 (0.00)	0.16	0.06
	March	0.06 (0.00)	0.14	0.00	0.09 (0.00)	0.14	0.04
	April	0.08 (0.01)	0.45	0.00	0.11 (0.00) ^b	0.21 ^b	0.07 ^b
	May	0.13 (0.02)	1.17	0.00	0.25 (0.00)	0.32	0.17
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.09 (0.01)	1.17	0.00	0.11 (0.00)	0.32	0.04
Middle 3	January	0.04 (0.00) ^a	0.05 ^a	0.03 ^a	0.29 (0.01)	0.60	0.10
	February	0.03 (0.00)	0.05	0.02	0.24 (0.00)	0.50	0.03
	March	0.09 (0.02)	0.27	0.00	0.40 (0.01)	0.74	0.13
	April	0.07 (0.02)	0.53	0.00	0.30 (0.01) ^b	0.58 ^b	0.09 ^b
	May	0.26 (0.06)	2.04	0.00	0.75 (0.01)	1.40	0.37
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.13 (0.02)	2.04	0.00	0.37 (0.00)	1.40	0.03

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

^b Data loss less than 48 hours as a result of updating field sensor.

Table 1 (cont'd). Year 2016 average, maximum, and minimum 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)	Max	Min	Avg (std. err)	Max	Min
Middle 4	January	0.02 (0.00) ^a	0.06 ^a	0.00 ^a	1.02 (0.01)	1.52	0.20
	February	0.02 (0.00)	0.08	0.00	1.24 (0.01)	2.11	0.84
	March	0.06 (0.01)	0.45	0.00	1.40 (0.01)	2.48	0.48
	April	0.06 (0.01)	1.20	0.00	1.16 (0.01)	3.16	0.34
	May	0.22 (0.04)	2.74	0.00	1.73 (0.03)	3.02	0.92
	June						
	July						
	August						
	September						
	October						
	November						
	December						
		Annual	0.09 (0.01)	2.74	0.00	1.27 (0.01)	3.16
Middle 5	January	0.02 (0.00) ^a	0.10 ^a	0.00 ^a	0.29 (0.00) ^a	0.40 ^a	0.19 ^a
	February	0.05 (0.00) ^b	0.13 ^b	0.00 ^b	0.43 (0.01) ^a	0.76 ^a	0.26 ^a
	March	0.16 (0.01)	0.66	0.00	0.51 (0.01)	0.90	0.29
	April	0.14 (0.01)	1.89	0.00	0.43 (0.00)	0.87	0.31
	May	0.25 (0.02)	2.62	0.00	0.76 (0.00)	0.93	0.51
	June						
	July						
	August						
	September						
	October						
	November						
	December						
		Annual	0.16 (0.01)	2.62	0.00	0.48 (0.00)	0.93

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

^b Data loss less than 48 hours as a result of updating field sensor.

Table 1 (cont'd). Year 2016 average, maximum, and minimum 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)	Max	Min	Avg (std. err)	Max	Min
Swamp 1	January	0.03 (0.00)	0.06	0.00	0.09 (0.00)	0.11	0.08
	February	0.03 (0.00)	0.05	0.00	0.06 (0.00)	0.10	0.03
	March	0.04 (0.00)	0.05	0.00	0.06 (0.00)	0.07	0.05
	April	0.04 (0.00) ^b	0.05 ^b	0.00 ^b	0.06 (0.00) ^b	0.07 ^b	0.04 ^b
	May	0.04 (0.00)	0.05	0.00	0.06 (0.00)	0.07	0.03
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.03 (0.00)	0.06	0.00	0.07 (0.00)	0.11	0.03
Swamp 2	January	0.04 (0.00)	0.09	0.00	0.18 (0.00)	0.22	0.15
	February	0.06 (0.00)	0.11	0.00	0.15 (0.00)	0.18	0.12
	March	0.07 (0.00)	0.12	0.00	0.13 (0.00)	0.16	0.10
	April	0.08 (0.00) ^b	0.11 ^b	0.01 ^b	0.10 (0.00) ^b	0.14 ^b	0.08 ^b
	May	0.10 (0.01)	0.21	0.00	0.10 (0.00)	0.13	0.07
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.07 (0.00)	0.21	0.00	0.13 (0.00)	0.22	0.07

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

^b Data loss less than 48 hours as a result of updating field sensor.

Table 1 (cont'd). Year 2016 average, maximum, and minimum 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)	Max	Min	Avg (std. err)	Max	Min
Swamp 3	January	0.02 (0.00)	0.08	0.00	0.10 (0.00)	0.14	0.09
	February	0.04 (0.00)	0.09	0.00	0.09 (0.00)	0.12	0.08
	March	0.03 (0.00)	0.08	0.00	0.95 (0.00)	0.12	0.07
	April	0.03 (0.00) ^b	0.08 ^b	0.00 ^b	0.08 (0.00) ^b	0.12 ^b	0.06 ^b
	May	0.06 (0.01)	0.44	0.00	0.13 (0.00)	0.17	0.09
	June						
	July						
	August						
	September						
	October						
	November						
	December						
	Annual	0.03 (0.00)	0.44	0.00	0.10 (0.00)	0.17	0.06

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

^b Data loss less than 48 hours as a result of updating field sensor.

Table 2. Summary of year 2016 salinity data losses from Aquatroll sensors deployed at SHEP monitoring areas. Water level data losses may be beyond dates listed below. Sensors noted 'never failed' were replaced with new sensors with updated circuit boards, and minor data loss was incurred. 'Single hour' losses sometimes occur when data are downloaded in close temporal proximity to scheduled sensor measurements.

Site	Position	Data loss period		Discovered	Replaced
		Beginning	End		
Middle 4	Aboveground	11/30/2015 10:00	01/23/2016 00:00	01/13/2016	01/22/2016
Middle 3	Aboveground	12/19/2015 04:41	01/23/2016 00:00	01/13/2016	01/22/2016
Middle 2	Aboveground	12/19/2015 05:24	01/23/2016 00:00	01/13/2016	01/22/2016
Back 2	Aboveground	01/05/2016 00:20	01/23/2016 00:00	01/13/2016	01/22/2016
Middle 1	Aboveground	01/05/2016 02:53	01/23/2016 00:00	01/13/2016	01/22/2016
Middle 5	Aboveground	01/05/2016 00:47	01/23/2016 00:00	01/13/2016	01/22/2016
Back 3	Belowground	01/19/2016 06:36	02/13/2016 13:00	02/13/2016	02/13/2016
Middle 5	Belowground	01/19/2016 23:42	02/13/2016 18:00	02/13/2016	02/13/2016
Back 2	Belowground	01/23/2016 18:06	02/13/2016 12:00	02/13/2016	02/13/2016
Middle 5	Aboveground	02/13/2016 17:00	single hour	N/A	N/A
Middle 4	Belowground	03/14/2016 12:00	03/14/2016 15:00	N/A	N/A
Back 1	Aboveground	04/19/2016 16:49	04/21/2016 00:00	never failed	04/19/2016
Back 1	Belowground	04/19/2016 15:45	04/21/2016 00:00	never failed	04/19/2016
Back 3	Aboveground	04/19/2016 12:38	04/21/2016 00:00	never failed	04/19/2016
Back 3.5	Belowground	04/19/2016 13:00	04/21/2016 00:00	never failed	04/19/2016
Back 4	Aboveground	04/19/2016 13:59	04/21/2016 00:00	never failed	04/19/2016
Back 4	Belowground	04/19/2016 13:00	04/21/2016 00:00	never failed	04/19/2016
Front 1	Aboveground	04/19/2016 10:12	04/21/2016 00:00	never failed	04/19/2016
Front 1	Belowground	04/19/2016 09:55	04/21/2016 00:00	never failed	04/19/2016
Middle 1	Belowground	04/19/2016 10:45	04/21/2016 00:00	never failed	04/19/2016
Middle 2	Belowground	04/19/2016 10:17	04/21/2016 00:00	never failed	04/19/2016
Middle 3	Belowground	04/20/2016 09:00	single hour	N/A	N/A
Swamp 1	Aboveground	04/20/2016 16:00	04/21/2016 00:00	never failed	04/20/2016
Swamp 1	Belowground	04/20/2016 15:00	04/21/2016 00:00	never failed	04/20/2016
Swamp 2	Aboveground	04/20/2016 17:00	04/21/2016 00:00	never failed	04/20/2016
Swamp 2	Belowground	04/20/2016 17:00	04/21/2016 00:00	never failed	04/20/2016
Swamp 3	Aboveground	04/20/2016 19:00	04/21/2016 00:00	never failed	04/20/2016
Swamp 3	Belowground	04/20/2016 17:00	04/20/2016 19:00	never failed	04/20/2016

Table 3. Comparison of belowground salinity measurements taken May 2016 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 Salinity (psu)	Aquatroll Total Dissolved Solids (ppt)	YSI "spot check" (ppt)	YSI Measurement Time	Aquatroll Measurement Time
Back 1	0.1	0.2	0.1	05/18/2016 15:54	05/18/2016 15:00
Back 2	0.2	0.2	0.2	05/18/2016 09:26	05/18/2016 09:00
Back 3	0.2	0.3	0.6	05/18/2016 15:10	05/18/2016 14:00
Back 3.5	1.8	2.2	1.7	05/18/2016 13:45	05/18/2016 13:00
Back 4	2.5	3.0	2.5	05/18/2016 14:22	05/18/2016 14:00
Front 1	0.1	0.2	0.1	05/18/2016 10:16	05/18/2016 10:00
Front 2	0.6	0.8	0.8	05/18/2016 16:40	05/18/2016 14:00
Middle 1	0.3	0.3	0.2	05/18/2016 17:14	05/18/2016 17:00
Middle 2	0.2	0.3	0.2	05/18/2016 11:40	05/18/2016 11:00
Middle 3	0.7	0.9	0.7	05/18/2016 10:55	05/18/2016 10:00
Middle 4	2.5	3.0	2.3	05/18/2016 12:30	05/18/2016 12:00
Middle 5	0.8	1.0	0.8	05/18/2016 13:10	05/18/2016 13:00
Swamp 1	0.1	0.1	0.1	05/19/2016 11:16	05/19/2016 10:00
Swamp 2	0.1	0.1	0.1	05/19/2016 10:26	05/19/2016 10:00
Swamp 3	0.1	0.2	0.1	05/19/2016 09:34	05/19/2016 09:00