

January 11, 2019

Tim Luke
Idaho Department of Water Resources
PO Box 83720
Boise, ID 83720-0098

Subject: Sandy Pond Recharge 2018 Annual Report

Dear Tim,

Enclosed are daily data and calculations for recharge at Sandy Ponds during 2018. SCADA data for the pond's W-26 inflow weir show that inflow to Sandy Ponds began on April 7 and continued through October 21, totaling 9149 acre-feet.

Outflows from the ponds include 1) Morris's pond pump measured with a magnetic flowmeter, 2) Morris's pond overflow weir, 3) flow into the Sandy Pipe Vault measured with an ultrasonic meter, 4) evaporation estimated based on average ETIdaho2017 information, and 5) recharge to the aquifer.

Morris's pond pump's magnetic flowmeter indicated an annual volume of 224.9 acre-feet. SCADA readings for this site indicated an annual volume of 113.0 acre-feet. The cause of this discrepancy between flowmeter volume and SCADA data is unclear; the direct flowmeter readings are used for this report.

Total recorded SCADA volume of the Morris Pond Overflow Weir is 36.3 acre-feet. However, we believe this value is inaccurate. Butch Morris reported to me several times during 2018 that no flow was spilling through the overflow while the SCADA system indicated flows. Butch also reported to me on January 8, 2019 that to his knowledge, spill over the Morris Pond Overflow Weir only occurred once during 2018 with flow of about 100 gpm for a short period. We suspect the level sensor is providing erroneous readings and plans are in place to have it serviced or replaced in early 2019. The actual overflow volume is likely much less than 36.3 acre-feet, but this value is maintained for recharge calculations.

The ultrasonic flowmeter installed on the Sandy Pipe Outflow (inflow to the Vault) indicated a year-end total volume of 1126.3 acre-feet. The raw SCADA data for this meter indicates a total annual volume of 1494 acre-feet. Corbin Knowles updated the ultrasonic flowmeter's low-flow cutoff in early 2018 in an effort to address the erroneous readings apparent in 2017. The flowmeter does not totalize flow during an "Empty Pipe" event, but may still indicate a flow that the SCADA system uses for totalizing in the logger record. During 2018, identical daily flows were reported on the SCADA record for multiple consecutive days, particularly from 9/17 to 10/23 when a constant flow of 2.96 cfs was logged. Butch Morris confirmed that Sandy

Pipeline flow was shut off on or about 9/17, and therefore these flows are erroneous. The Sandy Pipe flowmeter volume of 1126.3 acre-feet is used for recharge calculations.

Flowmeters indicated 670.9 acre-feet were pumped from the vault (see table below) and zero flow was directed into the vault from the Farmers Box. Spill from the vault to Curren Ditch is the difference between Sandy Pipe inflow and Farmers Box inflow, less pumping: $1126.3 + 0.0 - 670.9 = 455.5$ acre-feet.

Pumping from Sandy Vault:

Morris Vault Pump	0.0
Musser Vault Pump	593.3
Candy Vault Pump	<u>77.6</u>
	670.9 acre-feet

Butch Morris confirmed during a phone call on January 8, 2019 that zero flow for the Morris Vault Pump and the Farmers Box Inflow for 2018 are both correct.

Evaporation from the ponds is calculated based on ETIdaho's Hagerman station for 238 days (April 7 through November 30) for the full 44-acre surface area and totals 118.1 acre-feet.

Computed recharge is:

W-26 Inflow	9149.0
Morris Pond Pump	- 224.9
Morris Pond Weir	- 36.3
Sandy Pipe Outflow	-1126.3
Evaporation	<u>- 118.1</u>
Total Recharge	7643.4 acre-feet

Please let me know if you have any questions:

Sincerely,



Scott N. King, P.E.
Supervising Engineer



cc: T.J. Budge
File: 535.0240

Sandy Ponds Recharge
2018

Date	Inflow - NSCC W-26 Weir (24-hr cfs) ¹	Outflow 1 - Sandy Pipeline (24-hr cfs) ²	Outflow 2 - Morris Pond Pump (24-hr cfs) ³	Outflow 3 - Morris Pond Weir (24-hr cfs) ⁴	Evaporation rate (mm/day) ⁵	Pond Surface Area (Acres) ⁶	Daily Evaporation (24-hr cfs) ⁷	Daily Recharge (24-hr cfs) ⁸	Daily Recharge (Ac-Ft)	Cumulative Recharge (Ac-Ft)	Note	RAW RECORDED: Outflow 1 - Sandy Pipeline (24-hr cfs) ²	RAW RECORDED: Outflow 3 - Morris Pond Weir (24-hr cfs) ⁴
1/1/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/2/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/3/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/4/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/5/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/6/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/7/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/8/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/9/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/10/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/11/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/12/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/13/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/14/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/15/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/16/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/17/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/18/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/19/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/20/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/21/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/22/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/23/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/24/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/25/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/26/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/27/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/28/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/29/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/30/2018					0.00	0.0	0.00	0.00	0.00	0.00			
1/31/2018					0.00	0.0	0.00	0.00	0.00	0.00			
2/1/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/2/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/3/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/4/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/5/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/6/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/7/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/8/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/9/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/10/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/11/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/12/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/13/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/14/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/15/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/16/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/17/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/18/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/19/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/20/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/21/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/22/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/23/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/24/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/25/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/26/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/27/2018					0.44	0.0	0.00	0.00	0.00	0.00			
2/28/2018					0.44	0.0	0.00	0.00	0.00	0.00			
3/1/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/2/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/3/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/4/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/5/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/6/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/7/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/8/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/9/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/10/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/11/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/12/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/13/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/14/2018					1.59	0.0	0.00	0.00	0.00	0.00			
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3/18/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/19/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/20/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/21/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/22/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/23/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/24/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/25/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/26/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/27/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/28/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/29/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/30/2018					1.59	0.0	0.00	0.00	0.00	0.00			
3/31/2018					1.59	0.0	0.00	0.00	0.00	0.00			

Sandy Ponds Recharge
2018

Date	Inflow - NSCC W-26 Weir (24-hr cfs) ¹	Outflow 1 - Sandy Pipeline (24-hr cfs) ²	Outflow 2 - Morris Pond Pump (24-hr cfs) ³	Outflow 3 - Morris Pond Weir (24-hr cfs) ⁴	Evaporation rate (mm/day) ⁵	Pond Surface Area (Acres) ⁶	Daily Evaporation (24-hr cfs) ⁷	Daily Recharge (24-hr cfs) ⁸	Daily Recharge (Ac-Ft)	Cumulative Recharge (Ac-Ft)	Note	RAW RECORDED: Outflow 1 - Sandy Pipeline (24-hr cfs) ²	RAW RECORDED: Outflow 3 - Morris Pond Weir (24-hr cfs) ⁴
4/1/2018		0.000	0.00	0.000	2.90	0.0	0.00	0.00	0.00	0.00	Changed Outflow 1 to zero since no inflow (4/1-4/6). Changed Outflow 3 to zero for same reason and Butch's confirmation (4/1-4/9).	0.019	0.044
4/2/2018		0.000	0.00	0.000	2.90	0.0	0.00	0.00	0.00	0.00		0.002	0.009
4/3/2018		0.000	0.00	0.000	2.90	0.0	0.00	0.00	0.00	0.00		0.002	0.001
4/4/2018		0.000	0.00	0.000	2.90	0.0	0.00	0.00	0.00	0.00		0.002	0.009
4/5/2018		0.000	0.00	0.000	2.90	0.0	0.00	0.00	0.00	0.00		0.002	0.012
4/6/2018		0.000	0.00	0.000	2.90	0.0	0.00	0.00	0.00	0.00		0.002	0.026
4/7/2018	7.72	0.000	0.00	0.000	2.90	44.0	0.21	7.51	14.90	14.90		0.002	0.025
4/8/2018	10.27	0.000	0.00	0.000	2.90	44.0	0.21	10.06	19.95	34.85		0.002	0.008
4/9/2018	22.51	0.000	0.00	0.000	2.90	44.0	0.21	22.30	44.23	79.08		0.002	0.001
4/10/2018	6.45	0.000	0.00	0.000	2.90	44.0	0.21	6.24	12.37	91.45		0.002	0.000
4/11/2018	3.07	0.000	0.00	0.000	2.90	44.0	0.21	2.85	5.66	97.11		0.002	0.000
4/12/2018	24.21	0.000	0.00	0.004	2.90	44.0	0.21	23.99	47.59	144.71		0.002	0.004
4/13/2018	20.46	0.000	0.00	0.000	2.90	44.0	0.21	20.25	40.16	184.87		0.002	0.000
4/14/2018	12.87	0.000	0.00	0.000	2.90	44.0	0.21	12.66	25.11	209.98		0.002	0.000
4/15/2018	15.28	0.000	0.00	0.000	2.90	44.0	0.21	15.07	29.89	239.87		0.002	0.000
4/16/2018	17.31	0.000	0.00	0.004	2.90	44.0	0.21	17.09	33.91	273.78		0.002	0.004
4/17/2018	9.61	0.000	0.00	0.001	2.90	44.0	0.21	9.40	18.64	292.42		0.002	0.001
4/18/2018	25.77	0.000	0.00	0.000	2.90	44.0	0.21	25.56	50.70	343.11		0.002	0.000
4/19/2018	35.67	0.000	0.00	0.000	2.90	44.0	0.21	35.46	70.33	413.45		0.002	0.000
4/20/2018	37.97	0.000	0.00	0.000	2.90	44.0	0.21	37.76	74.89	488.34		0.002	0.000
4/21/2018	27.42	0.000	0.00	0.008	2.90	44.0	0.21	27.20	53.95	542.29		0.002	0.008
4/22/2018	25.13	0.000	0.00	0.021	2.90	44.0	0.21	24.90	49.39	591.68		0.002	0.021
4/23/2018	29.32	0.000	0.00	0.000	2.90	44.0	0.21	29.11	57.74	649.42		0.002	0.000
4/24/2018	36.28	0.000	0.00	0.002	2.90	44.0	0.21	36.07	71.54	720.95	Per Butch Morris, Outflow 3 over Morris Pond Weir incorrect and should be zero at least until 5 days ago when Butch last at the pond.	0.002	0.002
4/25/2018	30.32	0.000	0.00	0.010	2.90	44.0	0.21	30.10	59.70	780.66		0.002	0.010
4/26/2018	31.14	0.000	0.00	0.005	2.90	44.0	0.21	30.92	61.34	841.99		0.002	0.005
4/27/2018	31.25	0.000	0.00	0.005	2.90	44.0	0.21	31.03	61.56	903.55		0.002	0.005
4/28/2018	30.26	0.000	0.00	0.016	2.90	44.0	0.21	30.03	59.57	963.12		0.002	0.016
4/29/2018	37.15	0.000	0.136	0.018	2.90	44.0	0.21	36.78	72.96	1036.08		0.002	0.018
4/30/2018	37.21	3.265	0.00	0.048	2.90	44.0	0.21	33.69	66.82	1102.90		3.265	0.048
5/1/2018	33.09	5.92	0.00	0.002	3.64	44.0	0.26	26.90	53.36	1156.26		5.92	0.002
5/2/2018	28.29	5.56	0.74	0.025	3.64	44.0	0.26	21.71	43.06	1199.31		5.56	0.025
5/3/2018	31.86	5.27	1.06	0.000	3.64	44.0	0.26	25.27	50.12	1249.43		5.27	0.000
5/4/2018	30.40	3.36	1.20	0.029	3.64	44.0	0.26	25.54	50.66	1300.09		3.36	0.029
5/5/2018	32.02	2.74	0.61	0.000	3.64	44.0	0.26	28.41	56.34	1356.44	Several days at same 2.74 cfs outflow possibly incorrect, left in record (5/5 - 5/10)	2.74	0.000
5/6/2018	36.51	2.74	0.00	0.000	3.64	44.0	0.26	33.51	66.46	1422.90		2.74	0.000
5/7/2018	33.61	2.74	0.00	0.000	3.64	44.0	0.26	30.61	60.71	1483.60		2.74	0.000
5/8/2018	32.32	2.74	0.06	0.002	3.64	44.0	0.26	29.26	58.03	1541.63		2.74	0.002
5/9/2018	34.55	2.74	0.13	0.011	3.64	44.0	0.26	31.41	62.29	1603.92		2.74	0.011
5/10/2018	38.52	2.74	0.77	0.006	3.64	44.0	0.26	34.74	68.90	1672.83		2.74	0.006
5/11/2018	43.67	4.95	0.78	0.002	3.64	44.0	0.26	37.67	74.72	1747.55		4.95	0.002
5/12/2018	49.39	7.26	0.00	0.001	3.64	44.0	0.26	41.86	83.03	1830.58		7.26	0.001
5/13/2018	57.18	9.55	0.00	0.001	3.64	44.0	0.26	47.36	93.95	1924.53		9.55	0.001
5/14/2018	54.75	11.41	0.00	0.000	3.64	44.0	0.26	43.08	85.44	2009.97		11.41	0.000
5/15/2018	41.89	9.37	0.00	0.000	3.64	44.0	0.26	32.26	63.98	2073.94		9.37	0.000
5/16/2018	35.16	8.01	0.83	0.000	3.64	44.0	0.26	26.06	51.68	2125.63	8.01	0.000	
5/17/2018	31.94	4.59	0.86	0.000	3.64	44.0	0.26	26.22	52.02	2177.64	4.59	0.000	
5/18/2018	32.39	3.44	0.16	0.000	3.64	44.0	0.26	28.53	56.59	2234.23	3.44	0.000	
5/19/2018	33.05	3.37	0.82	0.000	3.64	44.0	0.26	28.59	56.71	2290.94	3.37	0.000	
5/20/2018	30.86	2.83	0.87	0.000	3.64	44.0	0.26	26.89	53.33	2344.28	2.83	0.000	
5/21/2018	34.70	2.72	0.95	0.000	3.64	44.0	0.26	30.77	61.02	2405.30	Several days at same 2.72-2.73 cfs outflow possibly incorrect, left in record (5/21 - 5/25)	2.72	0.000
5/22/2018	38.44	2.73	1.18	0.008	3.64	44.0	0.26	34.26	67.95	2473.25		2.73	0.008
5/23/2018	38.24	2.72	1.30	0.000	3.64	44.0	0.26	33.95	67.34	2540.59		2.72	0.000
5/24/2018	32.64	2.72	1.35	0.000	3.64	44.0	0.26	28.30	56.13	2596.72		2.72	0.000
5/25/2018	29.36	2.72	1.38	0.000	3.64	44.0	0.26	24.99	49.57	2646.29		2.72	0.000
5/26/2018	29.50	4.00	1.02	0.000	3.64	44.0	0.26	24.21	48.02	2694.31		4.00	0.000
5/27/2018	35.00	4.88	0.28	0.000	3.64	44.0	0.26	29.58	58.68	2752.99		4.88	0.000
5/28/2018	39.43	4.77	0.00	0.000	3.64	44.0	0.26	34.39	68.22	2821.21		4.77	0.000
5/29/2018	38.58	4.69	0.37	0.000	3.64	44.0	0.26	33.26	65.97	2887.18		4.69	0.000
5/30/2018	35.99	4.15	0.00	0.000	3.64	44.0	0.26	31.58	62.63	2949.81		4.15	0.000
5/31/2018	36.15	3.17	0.00	0.000	3.64	44.0	0.26	32.72	64.90	3014.71	Two days at same 3.17 cfs possibly incorrect, left in record (5/31 - 6/1)	3.17	0.000
6/1/2018	36.35	3.17	0.00	0.000	4.72	44.0	0.34	32.84	65.14	3079.85		3.17	0.000
6/2/2018	31.03	3.14	0.96	0.022	4.72	44.0	0.34	26.56	52.69	3132.54		3.14	0.022
6/3/2018	26.28	3.08	1.37	0.008	4.72	44.0	0.34	21.48	42.61	3175.15		3.08	0.008
6/4/2018	23.68	2.84	1.24	0.000	4.72	44.0	0.34	19.26	38.20	3213.35		2.84	0.000
6/5/2018	17.41	3.69	1.11	0.002	4.72	44.0	0.34	12.27	24.34	3237.69		3.69	0.002
6/6/2018	17.93	5.18	0.22	0.005	4.72	44.0	0.34	12.19	24.18	3261.87		5.18	0.005
6/7/2018	26.92	5.13	0.66	0.000	4.72	44.0	0.34	20.79	41.23	3303.11		5.13	0.000
6/8/2018	31.61	5.13	0.50	0.000	4.72	44.0	0.34	25.63	50.84	3353.95		5.13	0.000
6/9/2018	21.29	5.26	0.89	0.002	4.72	44.0	0.34	14.80	29.35	3383.30		5.26	0.002
6/10/2018	19.77	4.85	0.59	0.001	4.72	44.0	0.34	13.99	27.74	3411.05	4.85	0.001	
6/11/2018	27.51	2.81	1.08	0.000	4.72	44.0	0.34	23.28	46.18	3457.23	Two days at same 2.81 cfs possibly incorrect, left in record (6/11 - 6/12)	2.81	0.000
6/12/2018	20.40	2.81	0.69	0.012	4.72	44.0	0.34	16.54	32.82	3490.04		2.81	0.012

Sandy Ponds Recharge
2018

Date	Inflow - NSCC W-26 Weir (24-hr cfs) ¹	Outflow 1 - Sandy Pipeline (24-hr cfs) ²	Outflow 2 - Morris Pond Pump (24-hr cfs) ³	Outflow 3 - Morris Pond Weir (24-hr cfs) ⁴	Evaporation rate (mm/day) ⁵	Pond Surface Area (Acres) ⁶	Daily Evaporation (24-hr cfs) ⁷	Daily Recharge (24-hr cfs) ⁸	Daily Recharge (Ac-Ft)	Cumulative Recharge (Ac Ft)	Note	RAW RECORDED: Outflow 1 - Sandy Pipeline (24-hr cfs) ²	RAW RECORDED: Outflow 3 - Morris Pond Weir (24-hr cfs) ⁴
9/11/2018	31.58	3.60	0.00	0.00	3.60	44.0	0.26	27.72	54.98	5582.58		3.60	0.00
9/12/2018	33.97	3.59	0.00	0.00	3.60	44.0	0.26	30.12	59.74	5642.32		3.59	0.00
9/13/2018	30.84	3.58	0.00	0.00	3.60	44.0	0.26	26.99	53.54	5695.87		3.58	0.00
9/14/2018	24.78	3.22	0.00	0.00	3.60	44.0	0.26	21.30	42.25	5738.11		3.22	0.00
9/15/2018	27.94	2.95	0.00	0.00	3.60	44.0	0.26	24.72	49.03	5787.15		2.95	0.00
9/16/2018	26.31	2.97	0.00	0.00	3.60	44.0	0.26	23.08	45.78	5832.93		2.97	0.00
9/17/2018	24.15	0.00	0.00	0.00	3.60	44.0	0.26	23.89	47.38	5880.31	Per call with Butch on 10/9, outflow to Sandy Pipeline was shut off on 9/17. Changed Outflow 1 from 2.96 to 0 for 9/17 through end of season.	2.96	0.00
9/18/2018	21.48	0.00	0.00	0.00	3.60	44.0	0.26	21.22	42.09	5922.40		2.96	0.00
9/19/2018	19.85	0.00	0.00	0.00	3.60	44.0	0.26	19.59	38.85	5961.25		2.96	0.00
9/20/2018	19.50	0.00	0.06	0.00	3.60	44.0	0.26	19.17	38.03	5999.29		2.96	0.00
9/21/2018	23.20	0.00	0.52	0.00	3.60	44.0	0.26	22.42	44.47	6043.75		2.96	0.00
9/22/2018	22.01	0.00	0.69	0.00	3.60	44.0	0.26	21.05	41.76	6085.52		2.96	0.00
9/23/2018	21.24	0.00	0.85	0.00	3.60	44.0	0.26	20.13	39.93	6125.44		2.96	0.00
9/24/2018	25.81	0.00	0.47	0.00	3.60	44.0	0.26	25.08	49.75	6175.19		2.96	0.00
9/25/2018	29.01	0.00	0.00	0.01	3.60	44.0	0.26	28.74	57.00	6232.19		2.96	0.01
9/26/2018	30.94	0.00	0.00	0.02	3.60	44.0	0.26	30.66	60.81	6293.01		2.96	0.02
9/27/2018	26.47	0.00	0.41	0.01	3.60	44.0	0.26	25.78	51.14	6344.15		2.96	0.01
9/28/2018	24.51	0.00	0.32	0.03	3.60	44.0	0.26	23.90	47.41	6391.56		2.96	0.03
9/29/2018	24.10	0.00	0.11	0.02	3.60	44.0	0.26	23.71	47.02	6438.59		2.96	0.02
9/30/2018	27.09	0.00	0.98	0.01	3.60	44.0	0.26	25.84	51.25	6489.84		2.96	0.01
10/1/2018	28.15	0.00	1.32	0.01	2.17	44.0	0.16	26.66	52.89	6542.73		2.96	0.01
10/2/2018	29.19	0.00	1.34	0.01	2.17	44.0	0.16	27.68	54.90	6597.63		2.96	0.01
10/3/2018	29.44	0.00	1.41	0.03	2.17	44.0	0.16	27.84	55.23	6652.86		2.96	0.03
10/4/2018	32.16	0.00	1.08	0.01	2.17	44.0	0.16	30.92	61.32	6714.18		2.96	0.01
10/5/2018	33.92	0.00	0.57	0.65	2.17	44.0	0.16	32.55	64.56	6778.74		2.96	0.65
10/6/2018	34.93	0.00	0.00	0.00	2.17	44.0	0.16	34.77	68.97	6847.71		2.96	0.00
10/7/2018	36.86	0.00	0.00	0.00	2.17	44.0	0.16	36.70	72.80	6920.50		2.96	0.00
10/8/2018	34.60	0.00	0.00	0.00	2.17	44.0	0.16	34.44	68.31	6988.82		2.96	0.00
10/9/2018	31.15	0.00	0.00	0.00	2.17	44.0	0.16	30.99	61.47	7050.29		2.96	0.00
10/10/2018	30.62	0.00	0.00	0.00	2.17	44.0	0.16	30.46	60.42	7110.71		2.96	0.00
10/11/2018	28.49	0.00	0.00	0.00	2.17	44.0	0.16	28.33	56.20	7166.91		2.96	0.00
10/12/2018	24.86	0.00	0.00	0.00	2.17	44.0	0.16	24.70	49.00	7215.90		2.96	0.00
10/13/2018	24.75	0.00	0.00	0.63	2.17	44.0	0.16	23.97	47.53	7263.44		2.96	0.63
10/14/2018	31.31	0.00	0.00	2.49	2.17	44.0	0.16	28.66	56.84	7320.28		2.96	2.49
10/15/2018	34.39	0.00	0.00	2.39	2.17	44.0	0.16	31.84	63.16	7383.44		2.96	2.39
10/16/2018	39.24	0.00	0.00	2.58	2.17	44.0	0.16	36.50	72.39	7455.84		2.96	2.58
10/17/2018	41.28	0.00	0.00	2.18	2.17	44.0	0.16	38.94	77.24	7533.08		2.96	2.18
10/18/2018	29.91	0.00	0.00	0.31	2.17	44.0	0.16	29.44	58.39	7591.47		2.96	0.31
10/19/2018	7.53	0.00	0.00	0.01	2.17	44.0	0.16	7.36	14.61	7606.08		2.96	0.01
10/20/2018	1.71	0.00	0.00	0.00	2.17	44.0	0.16	1.55	3.08	7609.15		2.96	0.00
10/21/2018	0.22	0.00	0.00	0.00	2.17	44.0	0.16	0.07	0.13	7609.28		2.96	0.00
10/22/2018	0.00	0.00	0.00	0.00	2.17	44.0	0.16	-0.16	-0.31	7608.97		2.96	0.00
10/23/2018	0.00	0.00	0.00	0.02	2.17	44.0	0.16	-0.18	-0.35	7608.62		2.96	0.02
10/24/2018					2.17	44.0	0.16	-0.16	-0.31	7608.31			
10/25/2018					2.17	44.0	0.16	-0.16	-0.31	7608.00			
10/26/2018					2.17	44.0	0.16	-0.16	-0.31	7607.68			
10/27/2018					2.17	44.0	0.16	-0.16	-0.31	7607.37			
10/28/2018					2.17	44.0	0.16	-0.16	-0.31	7607.06			
10/29/2018					2.17	44.0	0.16	-0.16	-0.31	7606.74			
10/30/2018					2.17	44.0	0.16	-0.16	-0.31	7606.43			
10/31/2018					2.17	44.0	0.16	-0.16	-0.31	7606.12			
11/1/2018					0.31	44.0	0.02	-0.02	-0.04	7606.07			
11/2/2018					0.31	44.0	0.02	-0.02	-0.04	7606.03			
11/3/2018					0.31	44.0	0.02	-0.02	-0.04	7605.98			
11/4/2018					0.31	44.0	0.02	-0.02	-0.04	7605.94			
11/5/2018					0.31	44.0	0.02	-0.02	-0.04	7605.89			
11/6/2018					0.31	44.0	0.02	-0.02	-0.04	7605.85			
11/7/2018					0.31	44.0	0.02	-0.02	-0.04	7605.80			
11/8/2018					0.31	44.0	0.02	-0.02	-0.04	7605.76			
11/9/2018					0.31	44.0	0.02	-0.02	-0.04	7605.71			
11/10/2018					0.31	44.0	0.02	-0.02	-0.04	7605.67			
11/11/2018					0.31	44.0	0.02	-0.02	-0.04	7605.62			
11/12/2018					0.31	44.0	0.02	-0.02	-0.04	7605.58			
11/13/2018					0.31	44.0	0.02	-0.02	-0.04	7605.53			
11/14/2018					0.31	44.0	0.02	-0.02	-0.04	7605.49			
11/15/2018					0.31	44.0	0.02	-0.02	-0.04	7605.44			
11/16/2018					0.31	44.0	0.02	-0.02	-0.04	7605.40			
11/17/2018					0.31	44.0	0.02	-0.02	-0.04	7605.35			
11/18/2018					0.31	44.0	0.02	-0.02	-0.04	7605.31			
11/19/2018					0.31	44.0	0.02	-0.02	-0.04	7605.27			
11/20/2018					0.31	44.0	0.02	-0.02	-0.04	7605.22			
11/21/2018					0.31	44.0	0.02	-0.02	-0.04	7605.18			
11/22/2018					0.31	44.0	0.02	-0.02	-0.04	7605.13			
11/23/2018					0.31	44.0	0.02	-0.02	-0.04	7605.09			
11/24/2018					0.31	44.0	0.02	-0.02	-0.04	7605.04			
11/25/2018					0.31	44.0	0.02	-0.02	-0.04	7605.00			
11/26/2018					0.31	44.0	0.02	-0.02	-0.04	7604.95			
11/27/2018					0.31	44.0	0.02	-0.02	-0.04	7604.91			
11/28/2018					0.31	44.0	0.02	-0.02	-0.04	7604.86			
11/29/2018					0.31	44.0	0.02	-0.02	-0.04	7604.82			
11/30/2018					0.31	44.0	0.02	-0.02	-0.04	7604.77			
12/1/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/2/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/3/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/4/2018					0.00	44.0	0.00	0.00	0.00	7604.77			

Sandy Ponds Recharge
2018

Date	Inflow - NSCC W-26 Weir (24-hr cfs) ¹	Outflow 1 - Sandy Pipeline (24-hr cfs) ²	Outflow 2 - Morris Pond Pump (24-hr cfs) ³	Outflow 3 - Morris Pond Weir (24-hr cfs) ⁴	Evaporation rate (mm/day) ⁵	Pond Surface Area (Acres) ⁶	Daily Evaporation (24-hr cfs) ⁷	Daily Recharge (24-hr cfs) ⁸	Daily Recharge (Ac-Ft)	Cumulative Recharge (Ac-Ft)	Note	RAW RECORDED: Outflow 1 - Sandy Pipeline (24-hr cfs) ²	RAW RECORDED: Outflow 3 - Morris Pond Weir (24-hr cfs) ⁴
12/5/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/6/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/7/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/8/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/9/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/10/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/11/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/12/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/13/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/14/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/15/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/16/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/17/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/18/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/19/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/20/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/21/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/22/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/23/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/24/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/25/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/26/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/27/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/28/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/29/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/30/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
12/31/2018					0.00	44.0	0.00	0.00	0.00	7604.77			
1/1/2019					0.00	44.0	0.00	0.00	0.00	7604.77			
Total 24-hr cfs	4612.6	643.7	57.0	18.3			59.6	3834.0				753.4	
Total acre feet	9149.0	1276.8	113.0	36.3			118.1	7604.8				1494.3	
Adjustment	0.0	-150.5	111.9	0.0			0.0	0.0				0.0	
Final acre feet	9148.99	1126.30	224.90	36.29			118.13	7643.38				1494.29	

¹ Sandy Pond inflow measured at North Side Canal Company W-26 Lateral Broad Crested Weir (found in SPF Files S:\PROJECTS\ thru L Projects\ Projects\GWA_535\0110_Sandy Pond Measurement\PROJECT\Data\Dataloggers\CR6-CP02_W26_DailyData - Column D - W26_CFS_Avg). Value is daily average of 15-minute readings.

² Sandy Ponds Outflow 1 measured at the Sandy Pipe immediately upstream of the Sandy Vault (found in SPF Files S:\PROJECTS\ thru L Projects\ Projects\GWA_535\0110_Sandy Pond Measurement\PROJECT\Data\Dataloggers\CR6-CP03_SandyVault_DailyData - Column E - Sandy Inlet_CFS_Avg). Value is daily average of 15-minute readings

³ Sandy Ponds Outflow 2 measured at the Butch Morris' pump out of the Morris Pond (found in SPF Files S:\PROJECTS\ thru L Projects\ Projects\GWA_535\0110_Sandy Pond Measurement\PROJECT\Data\Dataloggers\CR6-CP01_MorrisPond_DailyData - Column F - MorrisPump_CFS_Avg). Value is daily average of 15-minute readings Adjusted annual volume based on flowmeter readings.

⁴ Sandy Ponds Outflow 3 measured at the Morris Pond outlet weir (found in SPF Files S:\PROJECTS\ thru L Projects\ Projects\GWA_535\0110_Sandy Pond Measurement\PROJECT\Data\Dataloggers\CR6-CP01_MorrisPond_DailyData - Column D - MorrisWeir_CFS_Avg). Value is daily average of 15-minute readings

⁵ Evaporation is based on the average monthly Precipitation Deficit for the Hagerman 2 SW (NWS 103932) Station for Open Water - Shallow Systems (ponds, streams). The monthly average has been assumed for each day of the month.

⁶ No gauges are present for calculation of pond area. When water is present, pond area has been assumed to be 44 acres as described in 3rd Mitigation Plan report prepared by SPF. When water is not present, pond area is assumed as 0 acres.

⁷ Evaporation is calculated as (mm/day evaporation x 0.00328084 ft/mm x Pond Surface Area x 43,560 ft²/acre) / (86,400 sec/day)

⁸ Recharge is calculated as Inflow - Outflow 1 - Outflow 2 - Outflow 3 - Evaporation

Adjusted Value
Total Amount Recharged: **7643.38** Ac-Ft

Hagerman															
Open water - shallow systems (ponds/streams)															
Precipitation Deficit (Click here for a graph)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season ^a	Non Growing Season ^b	Annual
Mean^c	mm/day												mm		
Monthly ^d	-0.36	0.44	1.59	2.9	3.64	4.72	5.33	4.66	3.6	2.17	0.31	-0.78	862	0	862
Days	31	28	31	30	31	30	31	31	30	31	30	31			365
Monthly Total mm	0	12.3	49.3	87.0	112.8	141.6	165.2	144.5	108.0	67.3	9.3	0			897.31
Monthly Total df	0	1.8	7.1	12.6	16.3	20.4	23.9	20.9	15.6	9.7	1.3	0			129.53