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Department of Water Resources
Fishing Division

August 23, 2018

Regional Manager
Idaho Department of Water Resources
900 N. Skyline Drive, Suite A
Idaho Falls, ID 83402-1718

Re: Sam's Hollow Water Company – 2017 Annual Report
Project No. 370-04-2001

Dear Regional Manager:

Enclosed please find the 2017 annual report required by the approved mitigation plan for Sam's Hollow Water Company in Bear Lake. If you have any questions or need additional information, please do not hesitate to contact me.

Cordially,

Greg Sullivan, M.S., Engineer

Cc: Sam's Hollow Water Company
Enc: Sam's Hollow Water Company-3 Final Reports
Idaho Department of Water Resources-1 Final Report

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Project No. 370-01-1999

2017 Annual Report on Water Use and Mitigation for the Sam's Hollow Water Company

Prepared for:

**Sam's Hollow Water Company
Bear Lake, Idaho**

August 23, 2018

For information concerning this report, contact
Greg W. Sullivan, M.S., Engineer
Charles G. Brockway, Ph.D., P.E.



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2017 Annual Report on Water Use and Mitigation Sam's Hollow Water Company

Brockway Engineering, PLLC
August 23, 2018

Introduction

The Water Management and Operations Plan for Mitigation (the "Plan") dated June 19, 2006 for Sam's Hollow Water Company requires an annual report of water use on residences and facilities in use during the year. The Water Management and Operation Plan for Mitigation was amended February 10, 2015 by Rocky Mountain Environmental Associates Inc. The reporting requirements are outlined in the Plan, which was submitted to the Idaho Department of Water Resources. The Plan requires the submittal of the number and type of facilities (residences, commercial, and other) utilizing ground water during the year, the estimated depletion to Bear Lake resulting from the occupancy of the facilities, irrigated acres taken out of production within the project, and the volume of mitigation water returned to Bear Lake through the mitigation facilities.

The mitigation facilities consist of a water deliveries from the end of the irrigation system to Fish Haven Creek and a mitigation pipeline which conveys water to Bear Lake. The 2015 amended Plan changed the method of returning water to Bear Lake by discharging a portion of irrigation water back into Fish Haven Creek and then the water flows down Fish Haven Creek into Bear Lake. Water is also delivered to Bear Lake through a mitigation pipeline that collects water at the end of the irrigation system. Water delivered through the irrigation system, the Fish Haven Creek bypass pipe and the mitigation pipeline is to be measured before mitigation water returns to Bear Lake.

Sam's Hollow Water Company has shares in Fish Haven Water Users for delivery through three ditches from Fish Haven Creek to the project. Deliveries into the ditches are measured through calibrated flumes. During 2017, deliveries through Ditch No. 3, the lower ditch, were the source of water for mitigation. A portion of the flow through

Ditch No. 3 was delivered into a pond and thence through the flow meter and into Bear Lake.

Project Build-Out History

In 2006 there were no homes or water-using facilities in use on the Project. Project build out varies from year to year but has steadily increased. In 2011, the Club House was constructed in the Project area. Table 1 provides the year and number of residences constructed in the Project, type of wastewater treatment and if construction occurred within the current place of use of irrigation water right.

A total of 10 houses were constructed in 2017. Twelve homes have been constructed and connected to the Fish Haven Sewer District. One home was built that utilize on-site wastewater treatment in 2017. The total number of residential households constructed in the project area is 64. Locations of the residences are shown on the attached map. A total of 13 residential homes and the clubhouse have been constructed inside of the irrigation place of use and qualify for mitigation acres.

Table 1: Residence Units Constructed Information

Residence Units Constructed					
Year	On-site Wastewater treatment	Fish Haven Sewer District	Condominium	Inside Irrigation Place of Use	Total Residences
2006					0
2007	1				1
2008		9		5	10
2009		4		1	14
2010		3		2	17
2011		6			23
2012	7	8		2	38
2013		2		1	40
2014		7		1	47
2015		2			49
2016	2	3			54
2017	2	8		1	64
Total	12	52	0	13	64

Irrigated Acres

Mitigation for water use on residential and commercial units requires that irrigated acres formerly supplied with surface water be dried up to compensate for consumptive use depletion of the development. The 2008 annual report documented the fact that 2.05 acres had been removed from irrigation due to construction of roadways (note that other roads were in place prior to the approved mitigation plan and are not accounted for). The assumed area of house footprints, driveways, and other hardscape areas per residence is 4,000 ft². The assumed area of turf, garden area and landscaping areas per residence is 5,000 ft² for a total displaced area of 9,000 ft² per residence. The approximate area removed from irrigation for the clubhouse, pool area and parking lot is 1.0 acres or 43,560 ft². Based on procedures developed by Dr. Robert Hill and adopted in the Bear River Ground Water Management Plan, the consumptive depletion for grass pasture is 1.18 ac-ft/acre/year.

Table 2 provides the total accumulated mitigation from the construction of structures within the water right place of use from the start of the project until the end of the current reporting year of 2017.

Table 2: Summary of Mitigation Provided by Construction through 2017.

		ft ² /structure	Acres	AFA
Road Ways			2.05	2.42
Homes	13	9000	2.69	3.17
Condos	0	12000	0.00	0.00
Commercial	1	43560	1.00	1.18

Total Removed for Mitigation 5.74 Acres 6.77 AFA

Estimated Project Depletion

The estimated consumptive depletion from residences and other facilities was determined using procedures developed by Dr. Robert Hill and adopted in the Bear River Ground Water Management Plan. For the Sam's Hollow system, the depletion values for potable water and irrigation of residences and commercial facilities were developed and included in the Plan for the project. Table 3 was developed to assist in estimating depletion each year based on the facilities build out. Table 3 shows the

annual unit depletion and the number of units on line in 2017. The total estimated depletion from the sixty four (64) units and club house on line in 2017 is 22.00 acre feet.

Table 3. Depletion analysis for Sam's Hollow Water Company in 2017. All depletions are in acre-feet annually.

Entities with On-Site Sewage Disposal			
	Unit Depletion	Occupied Units	Total Depletion
Domestic Potable Water - Homesites	0.03	12	0.36
Irrigation - Homesites	0.14	12	1.68

Entities with St. Charles Sewer District Service			
	Unit Depletion	Occupied Units	Total Depletion
Domestic Potable Water - Homesites	0.19	52	9.88
Irrigation - Homesites	0.14	52	7.28
Domestic/Irrigating - Condominiums (Per Building = 4 units)	0.5	0	0.00
Irrigation - Condominiums	0.14	0	0.00
Potable Water - Commercial	2.8	1	2.80

All Depletion Values are in Acre-Feet Annually

The annual depletion value is based on a rate of 40.2% occupancy

Total Homesites	64
Total Condominiums	0
Total Commercial Sites	1
Total Depletion	22.00 afa

Water Supply Available for Mitigation

The 140.5 shares in Fish Haven Water Users owned by Sam's Hollow Water Company can be diverted through any of three ditches: the Upper North Ditch, Number 1 Ditch, and Number 3 Ditch. Each ditch has been instrumented with water measuring flumes and flow measurements have been recorded since May 22, 2004. The flumes were installed by the Fish Haven Water Users Company with assistance from Sam's Hollow Water Company and are being monitored by Sam's Hollow Water Company.

During 2017, discharge readings were obtained from June 4, 2017 through October 17, 2017 and are shown on the attached spreadsheet. This log shows that there was

approximately 2775.6 acre-feet of irrigation water diverted into Upper North Ramped Flume, Ditch No. 1 and Ditch No. 3 during the irrigation season of 2017, of which 418.5 acre-feet was allotted to Sam's Hollow Water Company. See Table 4.

Table 4. Discharge readings per month.

Month	Upper North acre feet	No 1 North acre feet	No. 3 North acre feet	Total acre feet
April	NA	NA	NA	NA
May	0.0	0.0	0.0	0.0
June	10.9	16.3	23.9	49.2
July	66.7	34.7	15.0	116.2
August	22.8	24.2	30.2	74.9
September	77.0	18.7	44.0	143.6
October	0.0	15.9	18.1	34.5
November	NA	NA	NA	NA
Total	177.4	109.9	131.2	418.5

Correspondence with Brent Skinner on March 12, 2010 indicated that 22.2 acres of previously irrigated land covered by the 140.5 shares in Fish Haven Water Users was dried up in 2009.

There have been 5.74 acres dried up due to construction of roads and buildings in the project irrigated area. The total irrigated acres that have been set aside to date for the project is 27.94 acres.

Mitigation Water Returned to Bear Lake

Water was returned to Bear Lake via the mitigation pipeline and was measured by the flow meter located just east of the Fish Haven Cemetery. The pipeline at the end of ditch 1, conveying water from the retention pond, under the highway, and to Bear Lake is an 8-inch PVC pipe with a Siemens SITRANS FM electromagnetic water meter Type MAG 8000 installed in the pipeline (see attached photograph). The meter has a totalizer and instantaneous discharge readout which reads in gallons and gallons per minute. The meter is maintained by Sam's Hollow staff.

The meter was installed in 2007 to record the mitigation water volume. For the 2017 season, mitigation flow commenced to Bear Lake on September 8, 2017. The mitigation

flow turn terminated on September 22, 2017. Table 5 shows the mitigation pipeline flow meter readings. The total volume returned to Bear Lake during the 2017 irrigation season was 11.86 acre feet.

Table 5. Flow Meter Readings for the Sam's Hollow Mitigation Pipeline.

Date	Reading (gallons)	Volume (acre-feet)
9/8/2017	29465200	90.43
9/22/2017	33330300	102.29

Total Mitigation Volume	3865100	11.86	acre-feet
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In the amended mitigation plan that was finalized in 2015, it purposed to change the method of returning mitigation water to Bear Lake. Instead of all of the water being delivered to Bear Lake through the meter that was installed in 2007, water will be measured and delivered into Fish Haven Creek. The diverted mitigation water is to be measured with a ramp flume installed on the bypass pipe. Operation and measuring direction for the bypass pipe and flume designed by McMillen Engineering are included in the amended 2015 mitigation plan.

Water has been diverted annually into Fish Haven Creek since 2015 and is supplying mitigation for the Sam's Hollow Water Company. At this time, no data has been provided to quantify the amount of mitigation water that has been diverted into Fish Haven Creek and ultimately delivered into Bear Lake. Any volume delivered to Fish Haven Creek in this manner would be additive to the amounts in Table 5.

The consumptive use reduction appurtenant to the 5.74 acres removed from irrigation provided 6.77 acre feet to mitigate for the project depletion in 2017, which was insufficient to provide the entire mitigation requirement. Therefore, 12.91 acres (15.23 acre feet) of additional irrigated acres beyond those dried up on the residential footprints and roadways will be added to the mitigation acres for the current development build-out.

The additional 12.91 acres of additional irrigated acres to be dried up will come from the 22.2 acres that were dried up in 2009. The remaining total of 9.29 acres of the 22.2 acres is available for future mitigation needs.

At the conclusion of 2017, total cumulative volume of water discharge into Bear Lake is 125.20 acre feet. The cumulative volume required for mitigation from project development is 133.09 acre feet (See Figure 1). However, this does not account for additional unmeasured mitigation water delivered to Fish Haven Creek.

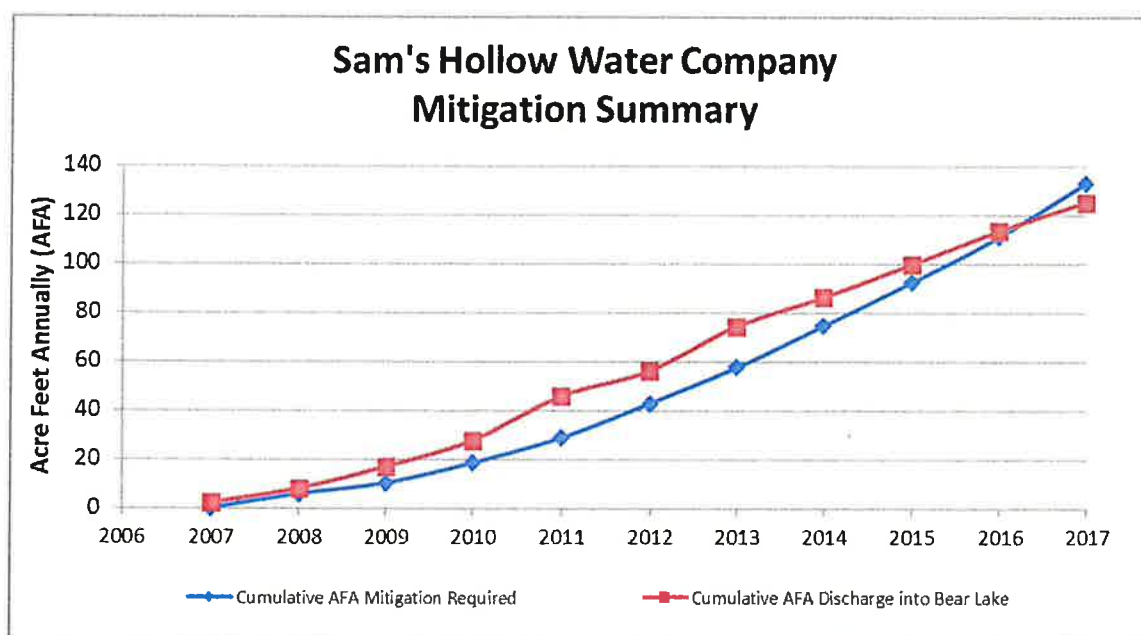


Figure 1: Sam's Hollow Water Company Mitigation Summary

Projection of 2018 Sufficiency of Mitigation Water

For 2018, based on a projected build-out, there will be 8 additional homes comprised of 7 residential homes outside of the irrigation area and 1 residential home within the water right place of use. Of the 8 additional homes, it is expected that there will be 1 additional residential home with on-site sewage treatment. The total expected residential units online will be 72 units. The club house will continue to be utilized with no additional conversion of irrigated areas to commercial uses. The calculated depletion for residences and commercial uses under these assumptions will be 24.48 acre feet. It is

estimated that the seasonal water availability for Sam's Hollow Water Company in 2018 will be adequate to provide mitigation water for the expected number of units on-line in 2018. Based on NRCS SNOTEL data for the Bear River Basin, the peak snow water equivalent was 86% of the average level. Data for the Bear River Basin was obtained May 16, 2018. The runoff for Fish Haven Creek will be considered below average based on the snow pack data, and it is anticipated that water supply will be adequate for mitigation needs. Mitigation flow to Bear Lake from Ditch 1 will need to commence during late summer or early fall. Mitigation flow into Fish Haven Creek will need to be measured and recorded so that it can be included in the total mitigation volume for the Sam's Hollow Water Company.

Regarding the consumptive use balance, the projected 72 units on line in 2018 (13 homes and the club house within the currently irrigated area) will provide a total of 5.94 acres or 7.01 acre-feet of the required 24.48 acre-feet estimated depletion for 2018. Therefore, 17.47 acre-feet must be provided from additional irrigation reduction in the amount of 14.80 acres. The 27.94 acres of previous irrigation retirement will be sufficient to mitigate for the proposed additional 2018 project depletion. There will be 7.40 acres remaining from the previous 27.94 mitigation acres after the expected build out for 2018.



Terminus of the Sam's Hollow mitigation pipeline.

Note: Date on photo is incorrect. The correct date is July 2007.



Development that has occurred at Sam's Hollow Water Company as of 2018



Development that has occurred at Sam's Hollow Water Company as of 2018

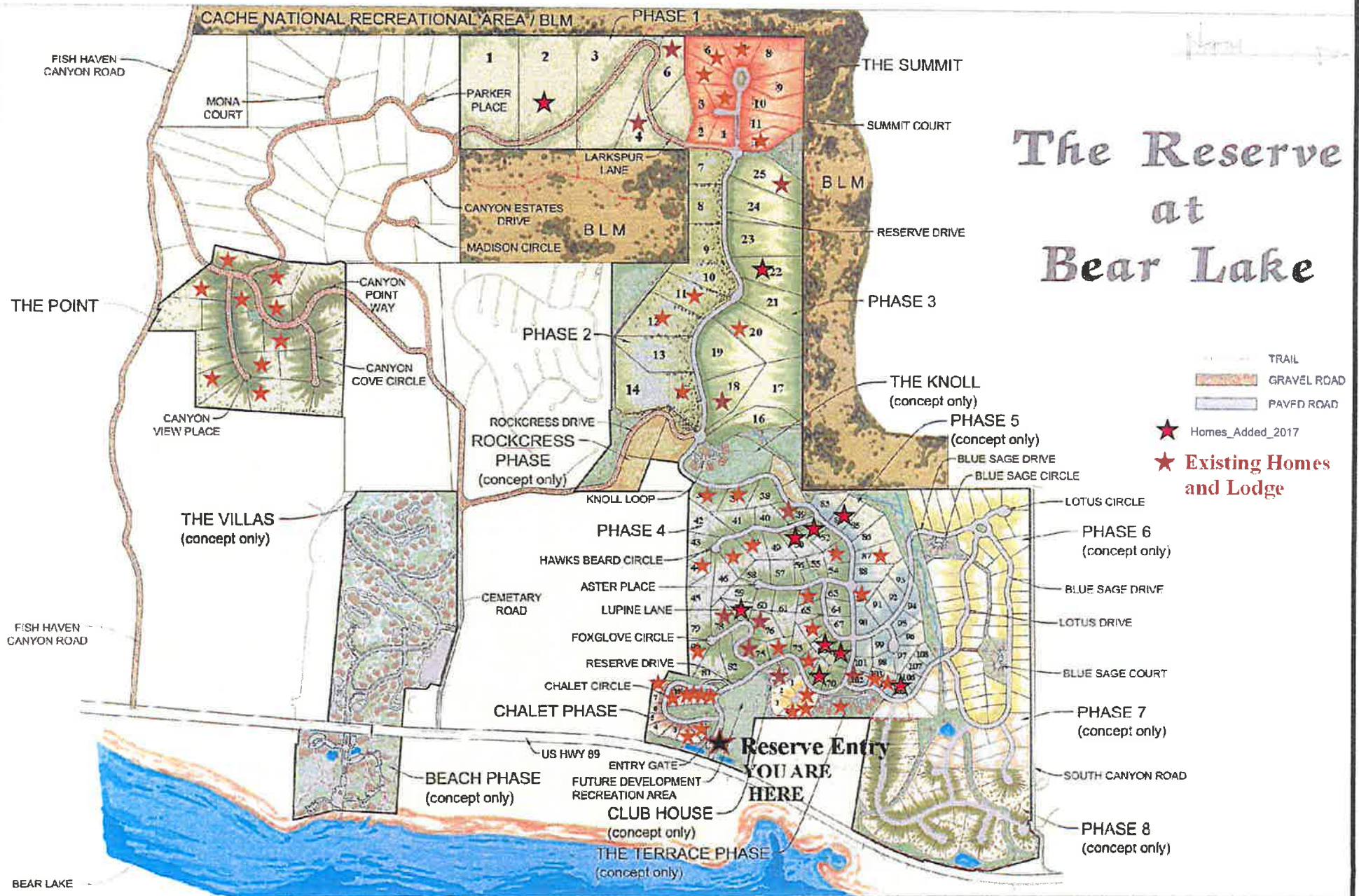


Development that has occurred at Sam's Hollow Water Company as of 2018



Development that has occurred at Sam's Hollow Water Company as of 2018

The Reserve at Bear Lake



SAM'S HOLLOW WATER COMPANY AVAILABLE IRRIGATION DIVERSIONS

Fish Haven Water Users Association

Water Year 2017 Measurements By The Reserve Staff

Date	Upper North Ramped Flume*						NO 1 NORTH " Parchal Flume"						No. 3 North 12" Ramped Flume						Total af/d	Sam's Hollow Total af/d
	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Sam's Hollow 99.5 shares 249.5 in ditch 39.9%	Accum af	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Sam's Hollow 20.0 shares 133.8 in ditch 15.0%	Accum af	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Sam's Hollow 21.0 shares 255.4 in ditch 8.2%	Accum af		
11-May																				
12-May																				
13-May																				
14-May																				
15-May																				
16-May																				
17-May																				
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26-May																				
27-May																				
28-May																				
29-May																				
30-May																				
31-May																				
1-Jun																				
2-Jun																				
3-Jun																				
4-Jun	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.82	7.51	14.88	14.88	1.22	1.22	14.88	1.22
5-Jun				0.00	0.00	0.00			0.00	0.00	0.00	0.00				14.88	1.22	2.45	14.88	1.22
6-Jun	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.82	7.51	14.88	14.88	1.22	3.67	14.88	1.22
7-Jun				0.00	0.00	0.00			0.00	0.00	0.00	0.00				14.88	1.22	4.89	14.88	1.22
8-Jun				0.00	0.00	0.00			0.00	0.00	0.00	0.00				14.88	1.22	6.12	14.88	1.22
9-Jun				0.00	0.00	0.00			0.00	0.00	0.00	0.00				14.88	1.22	7.34	14.88	1.22
10-Jun				0.00	0.00	0.00			0.00	0.00	0.00	0.00				14.88	1.22	8.56	14.88	1.22
11-Jun	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.82	7.51	14.88	14.88	1.22	9.79	14.88	1.22
12-Jun				0.00	0.00	0.00			0.00	0.00	0.00	0.00				14.88	1.22	11.01	14.88	1.22
13-Jun	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.82	7.51	14.88	14.88	1.22	12.23	14.88	1.22
14-Jun				0.00	0.00	0.00			1.26	0.19	0.19	0.19				14.88	1.22	13.46	16.14	1.41
15-Jun				0.00	0.00	0.00			2.52	0.38	0.57	0.57				14.88	1.22	14.68	17.40	1.60
16-Jun				0.00	0.00	0.00			3.79	0.57	1.13	1.13				14.88	1.22	15.90	18.67	1.79
17-Jun				0.00	0.00	0.00			5.05	0.75	1.89	1.89				14.88	1.22	17.13	19.93	1.98
18-Jun	0	0.00	0.00	0.00	0.00	0.00	0.48	3.19	6.31	6.31	0.94	2.83	0.82	7.51	14.88	14.88	1.22	18.35	21.19	2.17
19-Jun				0.00	0.00	0.00			6.75	1.01	3.84	3.84				14.88	1.22	19.57	21.63	2.23
20-Jun				0.00	0.00	0.00			7.18	1.07	4.91	4.91				14.88	1.22	20.80	22.06	2.30
21-Jun	0	0.00	0.00	0.00	0.00	0.00	0.54	3.85	7.62	7.62	1.14	6.05	0.82	7.51	14.88	14.88	1.22	22.02	22.50	2.36
22-Jun				0.83	0.33	0.33			7.62	1.14	7.19	7.19				11.16	0.92	22.94	18.78	2.06
23-Jun				1.66	0.66	0.99			7.62	1.14	8.33	8.33				7.44	0.61	23.55	15.89	2.08
24-Jun				2.49	0.99	1.98			7.62	1.14	9.47	9.47				3.72	0.31	23.86	13.00	2.11
25-Jun	0.32	1.68	3.32	3.32	1.32	3.31	0.54	3.85	7.62	1.14	10.61	10.61	0	0.00	0.00	0.00	0.00	23.86	10.11	2.13
26-Jun				3.32	1.32	4.63			7.62	1.14	11.75	11.75				0.00	0.00	23.86	10.94	2.46
27-Jun	0.32	1.68	3.32	3.32	1.32	5.95	0.54	3.85	7.62	1.14	12.88	12.88	0	0.00	0.00	0.00	0.00	23.86	10.94	2.46
28-Jun				3.71	1.48	7.43			7.62	1.14	14.02	14.02				0.00	0.00	23.86	10.94	2.46
29-Jun				4.11	1.64	9.07			7.62	1.14	15.16	15.16				0.00	0.00	23.86	11.33	2.62
30-Jun				4.51	1.80	10.87			7.62	1.14	16.30	16.30				0.00	0.00	23.86	11.73	2.78
1-Jul				4.90	1.95	12.82			7.62	1.14	17.44	17.44				0.00	0.00	23.86	12.12	2.94
2-Jul	0.43	2.68	5.30	5.30	2.11	14.94	0.54	3.85	7.62	1.14	18.58	18.58	0	0.00	0.00	0.00	0.00	23.86	12.52	3.09
3-Jul				5.30	2.11	17.05			6.76	1.01	19.59	19.59				0.00	0.00	23.86	12.06	3.12
4-Jul	0.43	2.68	5.30	5.30	2.11	19.16	0.46	2.98	5.90	0.88	20.47	20.47	0	0.00	0.00	0.00	0.00	23.86	11.20	2.99
5-Jul				5.30	2.11	21.27			5.90	0.88	21.35	21.35				0.00	0.00	23.86	11.20	2.99
6-Jul				5.30	2.11	23.39			5.90	0.88	22.23	22.23				0.00	0.00	23.86	11.20	2.99
7-Jul				5.30	2.11	25.50			5.90	0.88	23.12	23.12				0.00	0.00	23.86	11.20	2.99
8-Jul				5.30	2.11	27.61			5.90	0.88	24.00	24.00				0.00	0.00	23.86	11.20	2.99
9-Jul	0.43	2.68	5.30	5.30	2.11	29.72	0.46	2.98	5.90	0.88	24.88	24.88	0	0.00	0.00	0.00	0.00	23.86	11.20	2.99
10-Jul				5.80	2.31	32.04			5.90	0.88	25.76	25.76				0.00	0.00	23.86	11.20	2.99
11-Jul	0.48	3.19	6.31	6.31	2.52	34.55	0.46	2.98	5.90	0.88	26.64	26.64	0	0.00	0.00	0.00	0.00	23.86	11.70	3.20
12-Jul				6.11	2.44	36.99			5.90	0.88	27.52	27.52				0.00	0.00	23.86	12.21	3.40
13-Jul				5.91	2.35	39.35			5.90	0.88	28.41	28.41				0.00	0.00	23.86	12.01	3.32

Date	Upper North Ramped Flume*						NO 1 NORTH " Parchal Flume"						No. 3 North 12" Ramped Flume						Total af/d	Sam's Hollow Total af/d
	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Sam's Hollow 99.5 shares 249.5 in ditch 39.9%	Accum af	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Sam's Hollow 20.0 shares 133.8 in ditch 15.0%	Accum af	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Sam's Hollow 21.0 shares 255.4 in ditch 8.2%	Accum af		
14-Jul				5.70	2.27	41.62				5.90	0.88	29.29				0.00	0.00	23.86	11.81	3.24
15-Jul				5.50	2.19	43.81				5.90	0.88	30.17				0.00	0.00	23.86	11.60	3.16
16-Jul	0.43	2.68	5.30	5.30	2.11	45.92	0.46	2.98	5.90	0.88	31.05		0	0.00	0.00	0.00	0.00	23.86	11.40	3.08
17-Jul				5.30	2.11	48.04				8.07	1.21	32.26				6.31	0.52	24.38	19.68	3.84
18-Jul	0.43	2.68	5.30	5.30	2.11	50.15	0.65	5.17	10.25	10.25	1.53	33.79	0.74	6.37	12.61	12.62	1.04	25.42	28.16	4.68
19-Jul				5.30	2.11	52.26				10.25	1.53	35.32				12.62	1.04	26.46	28.16	4.68
20-Jul				5.30	2.11	54.37				10.25	1.53	36.85				12.62	1.04	27.49	28.16	4.68
21-Jul				5.30	2.11	56.49				10.25	1.53	38.39				12.62	1.04	28.53	28.16	4.68
22-Jul				5.30	2.11	58.60				10.25	1.53	39.92				12.62	1.04	29.57	28.16	4.68
23-Jul	0.43	2.68	5.30	5.30	2.11	60.71	0.65	5.17	10.25	10.25	1.53	41.45	0.74	6.37	12.61	12.62	1.04	30.61	28.16	4.68
24-Jul				5.30	2.11	62.82				10.25	1.53	42.98				12.62	1.04	31.64	28.16	4.68
25-Jul	0.43	2.68	5.30	5.30	2.11	64.94	0.65	5.17	10.25	10.25	1.53	44.52	0.74	6.37	12.61	12.62	1.04	32.68	28.16	4.68
26-Jul				5.30	2.11	67.05				9.46	1.41	45.93				12.62	1.04	33.72	27.37	4.56
27-Jul				5.30	2.11	69.16				8.67	1.30	47.23				12.62	1.04	34.76	26.59	4.45
28-Jul				5.30	2.11	71.27				7.88	1.18	48.41				12.62	1.04	35.79	25.80	4.33
29-Jul				5.30	2.11	73.39				7.10	1.06	49.47				12.62	1.04	36.83	25.01	4.21
30-Jul	0.43	2.68	5.30	5.30	2.11	75.50	0.48	3.19	6.31	6.31	0.94	50.41	0.74	6.37	12.61	12.62	1.04	37.87	24.23	4.09
31-Jul				5.30	2.11	77.61				4.21	0.63	51.04				12.62	1.04	38.91	22.12	3.78
1-Aug				5.30	2.11	79.72				2.10	0.31	51.35				12.62	1.04	39.94	20.02	3.46
2-Aug	0.43	2.68	5.30	5.30	2.11	81.84	0	0.00	0.00	0.00	0.00	51.35	0.74	6.37	12.61	12.62	1.04	40.98	17.91	3.15
3-Aug				3.97	1.58	83.42				0.00	0.00	51.35				12.62	1.04	42.02	17.91	3.15
4-Aug				2.65	1.06	84.48				0.00	0.00	51.35				12.62	1.04	43.05	16.59	2.62
5-Aug				1.32	0.53	85.00				0.00	0.00	51.35				12.62	1.04	44.09	15.27	2.09
6-Aug	0	0.00	0.00	0.00	0.00	85.00	0	0.00	0.00	0.00	0.00	51.35	0.74	6.37	12.61	12.62	1.04	45.13	13.94	1.57
7-Aug				0.00	0.00	85.00				0.00	0.00	51.35				12.62	1.04	46.17	12.62	1.04
8-Aug	0	0.00	0.00	0.00	0.00	85.00	0	0.00	0.00	0.00	0.00	51.35	0.74	6.37	12.61	12.62	1.04	47.20	12.62	1.04
9-Aug				0.00	0.00	85.00				1.26	0.19	51.54				13.25	1.09	48.29	14.51	1.28
10-Aug				0.00	0.00	85.00				2.52	0.38	51.92				13.88	1.14	49.43	16.40	1.52
11-Aug				0.00	0.00	85.00				3.79	0.57	52.49				14.51	1.19	50.63	18.29	1.76
12-Aug				0.00	0.00	85.00				5.05	0.75	53.24				15.14	1.24	51.87	20.18	2.00
13-Aug	0	0.00	0.00	0.00	0.00	85.00	0.48	3.19	6.31	6.31	0.94	54.18	0.85	7.96	15.76	15.76	1.30	53.17	22.08	2.24
14-Aug				0.00	0.00	85.00				6.31	0.94	55.13				14.19	1.17	54.33	20.50	2.11
15-Aug	0	0.00	0.00	0.00	0.00	85.00	0.48	3.19	6.31	6.31	0.94	56.07	0.74	6.37	12.61	12.62	1.04	55.37	18.93	1.98
16-Aug				0.00	0.00	85.00				6.31	0.94	57.02				12.62	1.04	56.41	18.93	1.98
17-Aug				0.00	0.00	85.00				6.31	0.94	57.96				12.62	1.04	57.45	18.93	1.98
18-Aug				0.00	0.00	85.00				6.31	0.94	58.90				12.62	1.04	58.48	18.93	1.98
19-Aug				0.00	0.00	85.00				6.31	0.94	59.85				12.62	1.04	59.52	18.93	1.98
20-Aug	0	0.00	0.00	0.00	0.00	85.00	0.48	3.19	6.31	6.31	0.94	60.79	0.74	6.37	12.61	12.62	1.04	60.56	18.93	1.98
21-Aug				0.00	0.00	85.00				6.31	0.94	61.73				12.62	1.04	61.60	18.93	1.98
22-Aug	0	0.00	0.00	0.00	0.00	85.00	0.48	3.19	6.31	6.31	0.94	62.68	0.74	6.37	12.61	12.62	1.04	62.63	18.93	1.98
23-Aug				0.00	0.00	85.00				7.10	1.06	63.74				11.53	0.95	63.58	18.63	2.01
24-Aug				0.00	0.00	85.00				7.88	1.18	64.92				10.44	0.86	64.44	18.32	2.04
25-Aug				0.00	0.00	85.00				8.67	1.30	66.21				9.35	0.77	65.21	18.02	2.07
26-Aug				0.00	0.00	85.00				9.46	1.41	67.63				8.26	0.68	65.89	17.72	2.09
27-Aug	0	0.00	0.00	0.00	0.00	85.00	0.65	5.17	10.25	10.25	1.53	69.16	0.52	3.62	7.17	7.17	0.59	66.48	17.42	2.12
28-Aug				5.51	2.20	87.20				10.25	1.53	70.69				7.17	0.59	67.07	17.42	2.12
29-Aug	0.68	5.56	11.01	11.01	4.39	91.59	0.65	5.17	10.25	10.25	1.53	72.23	0.52	3.62	7.17	7.17	0.59	67.66	22.93	4.32
30-Aug				11.01	4.39	95.99				10.25	1.53	73.76				8.26	0.68	68.34	29.52	6.60
31-Aug				11.01	4.39	100.38				10.25	1.53	75.29				9.35	0.77	69.11	30.61	6.69
1-Sep				11.01	4.39	104.77				10.25	1.53	76.82				10.44	0.86	69.96	31.70	6.78
2-Sep				11.01	4.39	109.16				10.25	1.53	78.35				11.53	0.95	70.91	32.79	6.87
3-Sep	0.68	5.56	11.01	11.01	4.39	113.56	0.65	5.17	10.25	10.25	1.53	79.89	0.74	6.37	12.61	12.62	1.04	71.95	33.88	6.96
4-Sep				8.66	3.45	117.01				10.25	1.53	81.42				12.62	1.04	72.99	33.88	6.96
5-Sep	0.48	3.19	6.31	6.31	2.52	119.53	0.65	5.17	10.25	10.25	1.53	82.95	0.74	6.37	12.61	12.62	1.04	74.02	31.53	6.02
6-Sep				6.31	2.52	122.04				9.72	1.45	84.40				12.62	1.04	75.06	28.65	5.01
7-Sep				6.31	2.52	124.56				9.19	1.37	85.78				12.62	1.04	76.10	28.12	4.93
8-Sep				6.31	2.52	127.08				8.67	1.30	87.07				12.62	1.04	77.14	27.60	4.85
9-Sep				6.31	2.52	129.59				8.14	1.22	88.29				12.62	1.04	78.17	27.07	4.77
10-Sep	0.48	3.19	6.31	6.31	2.52	132.11	0.54	3.85	7.62	7.62	1.14	89.43	0.74	6.37	12.61	12.62	1.04	79.21	26.54	4.69
11-Sep				6.31	2.52	134.63				7.62	1.14	90.57				19.32	1.59	80.80	33.24	5.24
12-Sep	0.48	3.19	6.31	6.31	2.52	137.14	0.54	3.85	7.62	7.62	1.14	91.71	1.16	13.14	26.01	26.02	2.14	82.94	39.94	5.79
13-Sep				6.31	2.52	139.66				6.09	0.91	92.62				26.02	2.14	85.08	38.42	5.57
14-Sep				6.31	2.52	142.18				4.57	0.68	93.30				26.02	2.14	87.22	36.90	5.34
15-Sep				6.31	2.52	144.69				3.05	0.46	93.76				26.02	2.14	89.36	35.37	5.11
16-Sep				6.31	2.52	147.21				1.52	0.23	93.98				26.02	2.14	91.49	33.85	4.88
17-Sep	0.48	3.19	6.31	6.31	2.52	149.73	0	0.00	0.00	0.00	0.00	93.98	1.16	13.14	26.01	26.02	2.14	93.63	32.33	4.66
18-Sep				6.31	2.52	152.24				0.00	0.00	93.98				26.02	2.14	95.77	32.33	4.66
19-Sep	0.48	3.19	6.31	6.31	2.52	154.76	0	0.00	0.00	0.00	0.00	93.98	1.16	13.14	26.01	26.02	2.14	97.91	32.33	4.66
20-Sep				6.31	2.52	157.28				0.00	0.00	93.98				26.02	2.14	100.05	32.33	4.66

Date	Upper North Ramped Flume*						NO 1 NORTH " Parchal Flume"						No. 3 North 12" Ramped Flume						Sam's Hollow Total	
	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Sam's Hollow 99.5 shares 249.5 in ditch 39.9%	Accum af	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Sam's Hollow 20.0 shares 133.8 in ditch 15.0%	Accum af	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Sam's Hollow 21.0 shares 255.4 in ditch 8.2%	Accum af	Total af/d	Hollow Total af/d
21-Sep				6.31	2.52	159.79				0.00	0.00	93.98				26.02	2.14	102.19	32.33	4.66
22-Sep				6.31	2.52	162.31				0.00	0.00	93.98				26.02	2.14	104.33	32.33	4.66
23-Sep				6.31	2.52	164.83				0.00	0.00	93.98				26.02	2.14	106.47	32.33	4.66
24-Sep	0.48	3.19	6.31	6.31	2.52	167.34	0	0.00	0.00	0.00	0.00	93.98	1.16	13.14	26.01	26.02	2.14	108.61	32.33	4.66
25-Sep				6.31	2.52	169.86				0.00	0.00	93.98				16.82	1.38	109.99	23.13	3.90
26-Sep	0.48	3.19	6.31	6.31	2.52	172.38	0	0.00	0.00	0.00	0.00	93.98	0.54	3.85	7.62	7.62	0.63	110.61	13.93	3.14
27-Sep				5.05	2.01	174.39				0.00	0.00	93.98				7.62	0.63	111.24	13.93	3.14
28-Sep				3.79	1.51	175.90				0.00	0.00	93.98				7.62	0.63	111.87	12.67	2.64
29-Sep				2.52	1.01	176.91				0.00	0.00	93.98				7.62	0.63	112.49	11.41	2.14
30-Sep				1.26	0.50	177.41				0.00	0.00	93.98				7.62	0.63	113.12	10.14	1.63
1-Oct	0	0.00	0.00	0.00	0.00	177.41	0	0.00	0.00	0.00	0.00	93.98	0.54	3.85	7.62	7.62	0.63	113.75	8.88	1.13
2-Oct				0.00	0.00	177.41				0.00	0.00	93.98				11.25	0.92	114.67	11.25	0.92
3-Oct	0	0.00	0.00	0.00	0.00	177.41	0	0.00	0.00	0.00	0.00	93.98	0.82	7.51	14.88	14.88	1.22	115.89	14.88	1.22
4-Oct				0.00	0.00	177.41				1.52	0.23	94.21				14.88	1.22	117.12	16.40	1.45
5-Oct				0.00	0.00	177.41				3.05	0.46	94.67				14.88	1.22	118.34	17.93	1.68
6-Oct				0.00	0.00	177.41				4.57	0.68	95.35				14.88	1.22	119.56	19.45	1.91
7-Oct				0.00	0.00	177.41				6.09	0.91	96.26				14.88	1.22	120.79	20.97	2.13
8-Oct	0	0.00	0.00	0.00	0.00	177.41	0.54	3.85	7.62	7.62	1.14	97.40	0.82	7.51	14.88	14.88	1.22	122.01	22.50	2.36
9-Oct				0.00	0.00	177.41				7.62	1.14	98.54				14.88	1.22	123.24	22.50	2.36
10-Oct	0	0.00	0.00	0.00	0.00	177.41	0.54	3.85	7.62	7.62	1.14	99.68	0.82	7.51	14.88	14.88	1.22	124.46	22.50	2.36
11-Oct				0.00	0.00	177.41				7.62	1.14	100.82				14.88	1.22	125.68	22.50	2.36
12-Oct				0.00	0.00	177.41				7.62	1.14	101.96				14.88	1.22	126.91	22.50	2.36
13-Oct				0.00	0.00	177.41				7.62	1.14	103.09				14.88	1.22	128.13	22.50	2.36
14-Oct				0.00	0.00	177.41				7.62	1.14	104.23				14.88	1.22	129.35	22.50	2.36
15-Oct	0	0.00	0.00	0.00	0.00	177.41	0.54	3.85	7.62	7.62	1.14	105.37	0.82	7.51	14.88	14.88	1.22	130.58	22.50	2.36
16-Oct				0.00	0.00	177.41				7.62	1.14	106.51				7.44	0.61	131.19	15.06	1.75
17-Oct	0	0.00	0.00	0.00	0.00	177.41	0.54	3.85	7.62	7.62	1.14	107.65	0	0.00	0.00	0.00	0.00	131.19	7.62	1.14
18-Oct				0.00	0.00	177.41				6.09	0.91	108.56				0.00	0.00	131.19	6.10	0.91
19-Oct				0.00	0.00	177.41				4.57	0.68	109.24				0.00	0.00	131.19	4.57	0.68
20-Oct				0.00	0.00	177.41				3.05	0.46	109.70				0.00	0.00	131.19	3.05	0.46
21-Oct				0.00	0.00	177.41				1.52	0.23	109.93				0.00	0.00	131.19	1.53	0.23
22-Oct				0.00	0.00	177.41	0	0.00	0.00	0.00	0.00	109.93	0	0.00	0.00	0.00	0.00	131.19	0.00	0.00
23-Oct				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
24-Oct				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
25-Oct				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
26-Oct				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
27-Oct				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
28-Oct				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
29-Oct				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
30-Oct				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
31-Oct				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
1-Nov				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
2-Nov				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
3-Nov				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
4-Nov				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
5-Nov				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
6-Nov				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
7-Nov				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
8-Nov				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
9-Nov				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
10-Nov				0.00	0.00	177.41				0.00	0.00	109.93				0.00	0.00	131.19	0.00	0.00
May Total				0.00	0.00					0.00	0.00					0.00	0.00		133.92	11.01
June Total				27.26	10.87					109.01	16.30					290.18	23.86		427.02	74.93
July Total				167.36	66.74					232.31	34.74					183.01	15.05		639.17	104.18
August Total				57.09	22.77					162.17	24.25					367.32	30.20		759.53	119.15
Sept Total				193.16	77.03					125.03	18.70					535.34	44.01		672.17	91.43
Oct. Total				0.00	0.00					106.62	15.94					219.77	18.07		105.41	12.25
Annual Total				444.86	177.41					735.14	109.93					1595.63	131.19		2775.6	418.5 afa

SAM'S HALLOW WATER COMPANY MITIGATION
 Water Year 2017 Measurements By The Reserve Staff

Date	Fish Haven Creek Bypass Ramped Flume				
	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Accumulated af
11-May					
12-May					
13-May					
14-May					
15-May					
16-May					
17-May					
18-May					
19-May					
20-May					
21-May					
22-May					
23-May					
24-May					
25-May					
26-May					
27-May					
28-May					
29-May					
30-May					
31-May					
1-Jun					
2-Jun					
3-Jun					
4-Jun	0	0.00	0.00	0.00	0.00
5-Jun				0.00	0.00
6-Jun	0	0.00	0.00	0.00	0.00
7-Jun				0.00	0.00
8-Jun				0.00	0.00
9-Jun				0.00	0.00
10-Jun				0.00	0.00
11-Jun	0	0.00	0.00	0.00	0.00
12-Jun				0.00	0.00
13-Jun	0	0.00	0.00	0.00	0.00
14-Jun				0.00	0.00
15-Jun				0.00	0.00
16-Jun				0.00	0.00
17-Jun				0.00	0.00
18-Jun	0	0.00	0.00	0.00	0.00
19-Jun				0.00	0.00
20-Jun				0.00	0.00
21-Jun	0	0.00	0.00	0.00	0.00
22-Jun				0.00	0.00
23-Jun				0.00	0.00
24-Jun				0.00	0.00
25-Jun	0	0.00	0.00	0.00	0.00
26-Jun				0.00	0.00
27-Jun	0	0.00	0.00	0.00	0.00
28-Jun				0.00	0.00
29-Jun				0.00	0.00
30-Jun				0.00	0.00
1-Jul				0.00	0.00
2-Jul	0	0.00	0.00	0.00	0.00
3-Jul				0.00	0.00
4-Jul	0	0.00	0.00	0.00	0.00
5-Jul				0.00	0.00
6-Jul				0.00	0.00
7-Jul				0.00	0.00
8-Jul				0.00	0.00
9-Jul	0	0.00	0.00	0.00	0.00
10-Jul				0.00	0.00
11-Jul	0	0.00	0.00	0.00	0.00
12-Jul				0.00	0.00
13-Jul				0.00	0.00

Date	Fish Haven Creek Bypass Ramped Flume				
	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Accumulated af
14-Jul				0.00	0.00
15-Jul				0.00	0.00
16-Jul	0	0.00	0.00	0.00	0.00
17-Jul				0.00	0.00
18-Jul	0	0.00	0.00	0.00	0.00
19-Jul				0.00	0.00
20-Jul				0.00	0.00
21-Jul				0.00	0.00
22-Jul				0.00	0.00
23-Jul	0	0.00	0.00	0.00	0.00
24-Jul				0.00	0.00
25-Jul	0	0.00	0.00	0.00	0.00
26-Jul				0.00	0.00
27-Jul				0.00	0.00
28-Jul				0.00	0.00
29-Jul				0.00	0.00
30-Jul	0	0.00	0.00	0.00	0.00
31-Jul				0.00	0.00
1-Aug				0.00	0.00
2-Aug	0	0.00	0.00	0.00	0.00
3-Aug				0.00	0.00
4-Aug				0.00	0.00
5-Aug				0.00	0.00
6-Aug	0	0.00	0.00	0.00	0.00
7-Aug				0.00	0.00
8-Aug	0	0.00	0.00	0.00	0.00
9-Aug				0.00	0.00
10-Aug				0.00	0.00
11-Aug				0.00	0.00
12-Aug				0.00	0.00
13-Aug	0	0.00	0.00	0.00	0.00
14-Aug				0.00	0.00
15-Aug	0	0.00	0.00	0.00	0.00
16-Aug				0.00	0.00
17-Aug				0.00	0.00
18-Aug				0.00	0.00
19-Aug				0.00	0.00
20-Aug	0	0.00	0.00	0.00	0.00
21-Aug				0.00	0.00
22-Aug	0	0.00	0.00	0.00	0.00
23-Aug				0.00	0.00
24-Aug				0.00	0.00
25-Aug				0.00	0.00
26-Aug				0.00	0.00
27-Aug	0	0.00	0.00	0.00	0.00
28-Aug				0.00	0.00
29-Aug	0	0.00	0.00	0.00	0.00
30-Aug				0.00	0.00
31-Aug				0.00	0.00
1-Sep				0.00	0.00
2-Sep				0.00	0.00
3-Sep	0	0.00	0.00	0.00	0.00
4-Sep				0.00	0.00
5-Sep	0	0.00	0.00	0.00	0.00
6-Sep				0.00	0.00
7-Sep				0.00	0.00
8-Sep				0.00	0.00
9-Sep				0.00	0.00
10-Sep	0	0.00	0.00	0.00	0.00
11-Sep				0.00	0.00
12-Sep	0	0.00	0.00	0.00	0.00
13-Sep				0.00	0.00
14-Sep				0.00	0.00
15-Sep				0.00	0.00
16-Sep				0.00	0.00
17-Sep	0	0.00	0.00	0.00	0.00
18-Sep				0.00	0.00
19-Sep	0	0.00	0.00	0.00	0.00

Date	Fish Haven Creek Bypass Ramped Flume				
	Gage ft	Discharge cfs	Measured af/d	Estimated af/d	Accumulated af
20-Sep				0.00	0.00
21-Sep				0.00	0.00
22-Sep				0.00	0.00
23-Sep				0.00	0.00
24-Sep	0	0.00	0.00	0.00	0.00
25-Sep				0.00	0.00
26-Sep	0	0.00	0.00	0.00	0.00
27-Sep				0.00	0.00
28-Sep				0.00	0.00
29-Sep				0.00	0.00
30-Sep				0.00	0.00
1-Oct	0	0.00	0.00	0.00	0.00
2-Oct				0.00	0.00
3-Oct	0	0.00	0.00	0.00	0.00
4-Oct				0.00	0.00
5-Oct				0.00	0.00
6-Oct				0.00	0.00
7-Oct				0.00	0.00
8-Oct	0	0.00	0.00	0.00	0.00
9-Oct				0.00	0.00
10-Oct	0	0.00	0.00	0.00	0.00
11-Oct				0.00	0.00
12-Oct				0.00	0.00
13-Oct				0.00	0.00
14-Oct				0.00	0.00
15-Oct	0	0.00	0.00	0.00	0.00
16-Oct				0.00	0.00
17-Oct	0	0.00	0.00	0.00	0.00
18-Oct				0.00	0.00
19-Oct				0.00	0.00
20-Oct				0.00	0.00
21-Oct				0.00	0.00
22-Oct				0.00	0.00
23-Oct				0.00	0.00
24-Oct				0.00	0.00
25-Oct				0.00	0.00
26-Oct				0.00	0.00
27-Oct				0.00	0.00
28-Oct				0.00	0.00
29-Oct				0.00	0.00
30-Oct				0.00	0.00
31-Oct				0.00	0.00
1-Nov				0.00	0.00
2-Nov				0.00	0.00
3-Nov				0.00	0.00
4-Nov				0.00	0.00
5-Nov				0.00	0.00
6-Nov				0.00	0.00
7-Nov				0.00	0.00
8-Nov				0.00	0.00
9-Nov				0.00	0.00
10-Nov				0.00	0.00

May Total	0.00
June Total	0.00
July Total	0.00
August Total	0.00
Sept Total	0.00
Oct. Total	0.00
Annual Total	0.00

