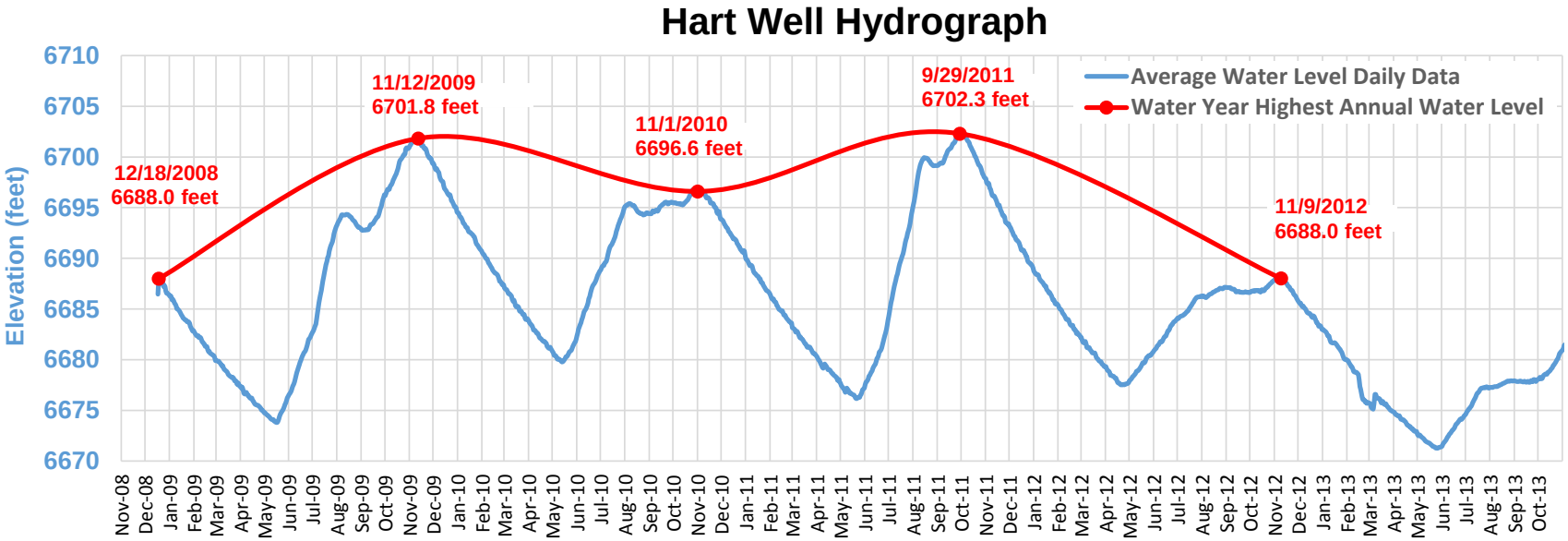
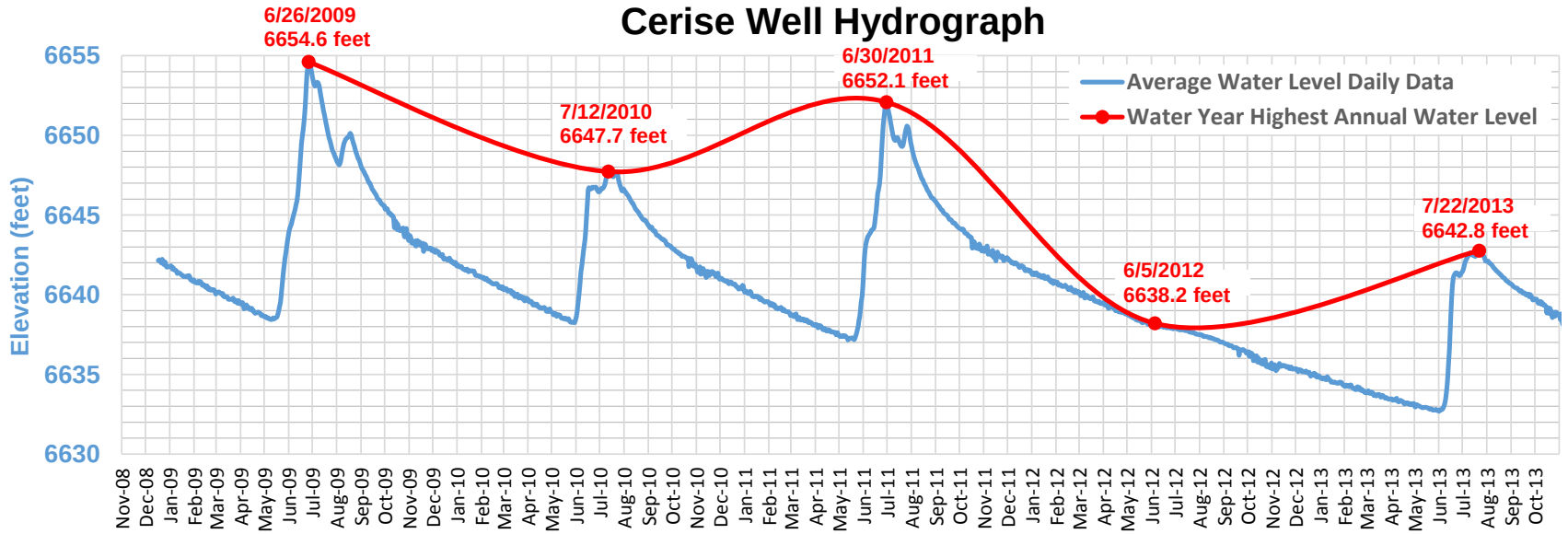
Figure 9: West Watershed



Note: Highest Annual Water Levels in 2009, 2011, and 2012 were manually adjusted.



Note: Highest Annual Water Level in 2012 was manually adjusted.

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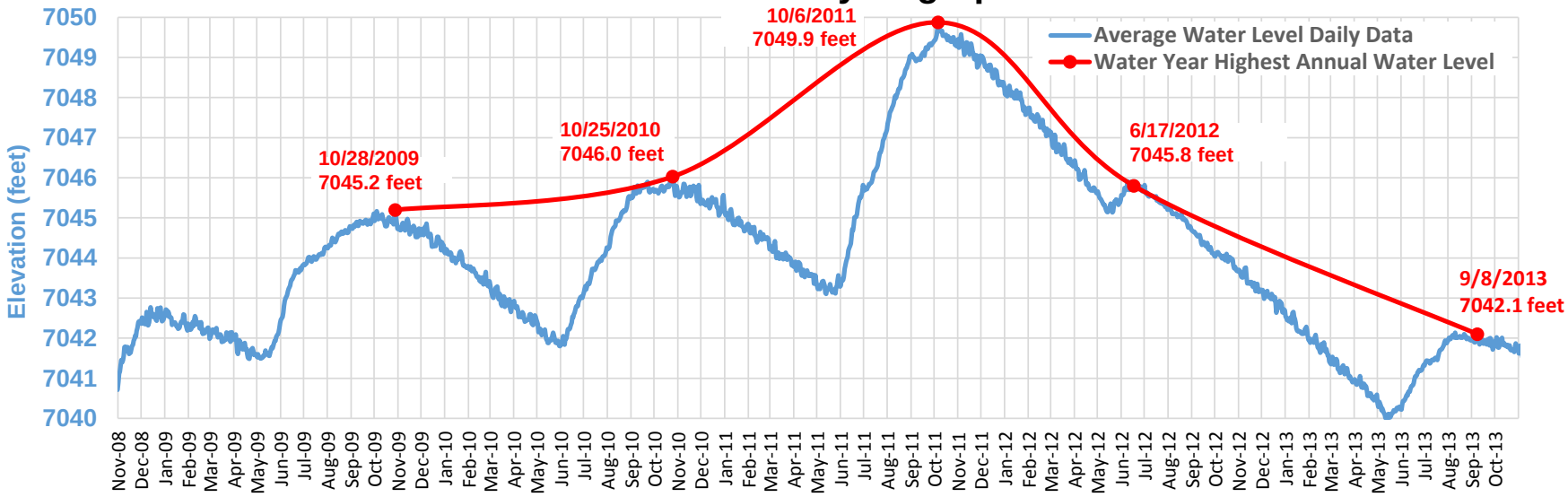
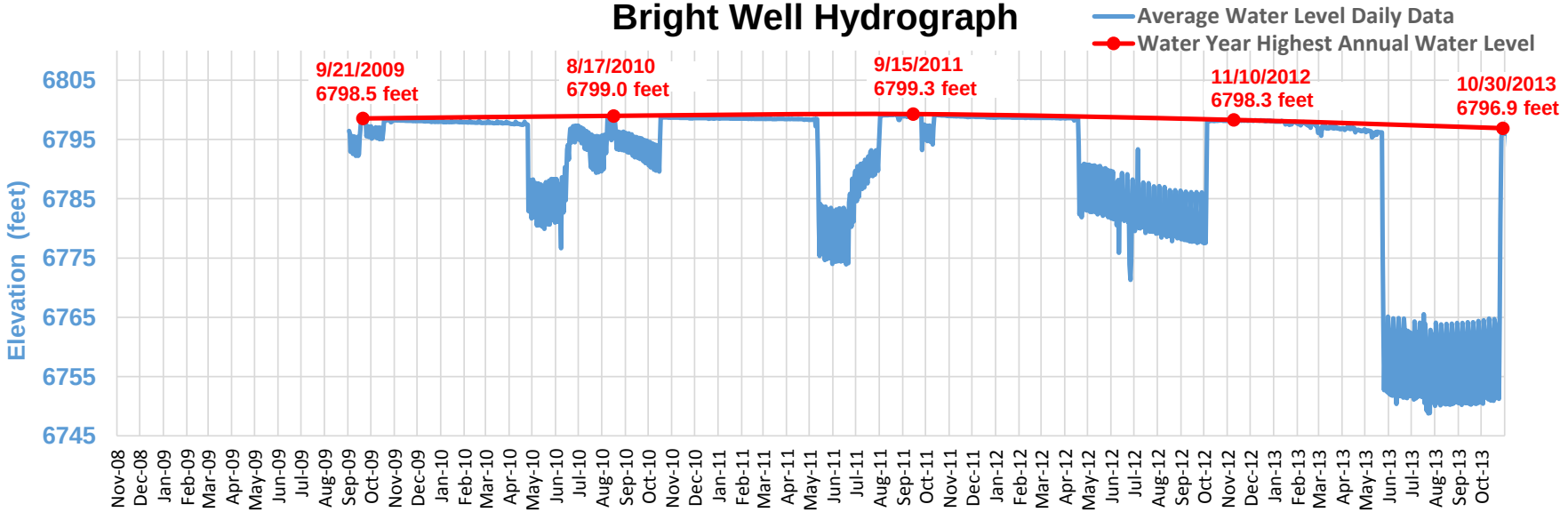
Figure 10: Central Watershed

Mitchell Well Hydrograph



Note: Highest Annual Water Levels in 2012 and 2013 were manually adjusted.

Bright Well Hydrograph



Note: Highest Annual Water Levels in 2012 and 2013 were manually adjusted.

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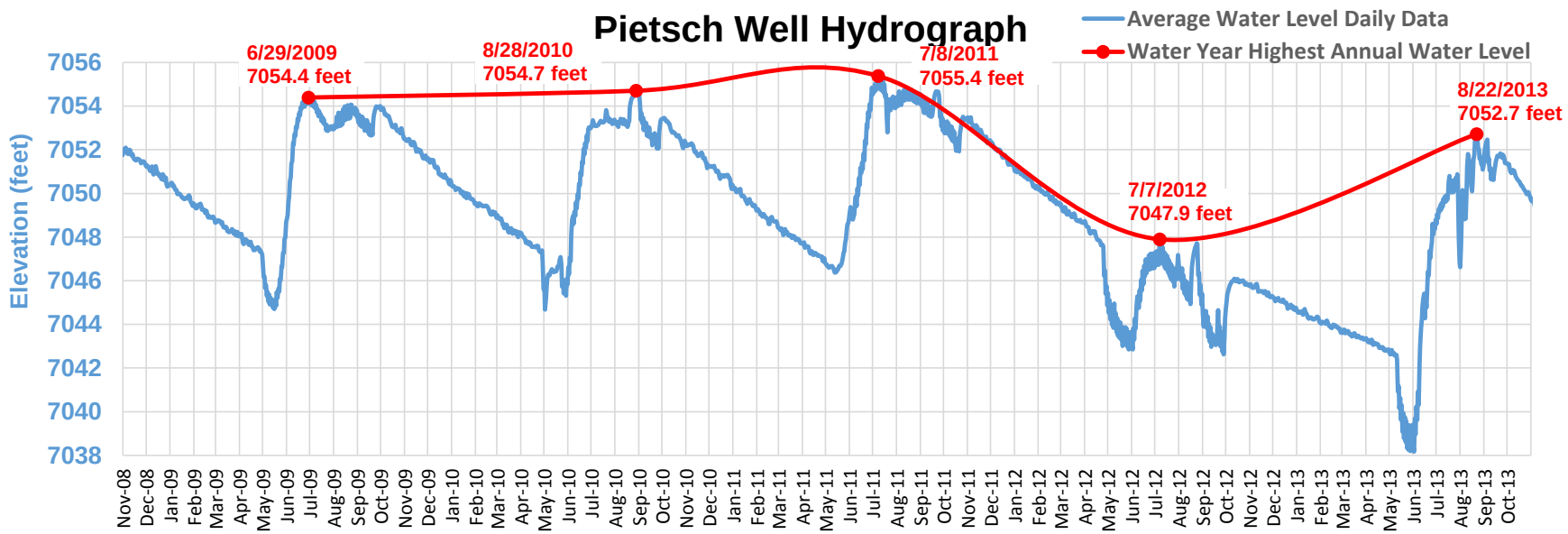
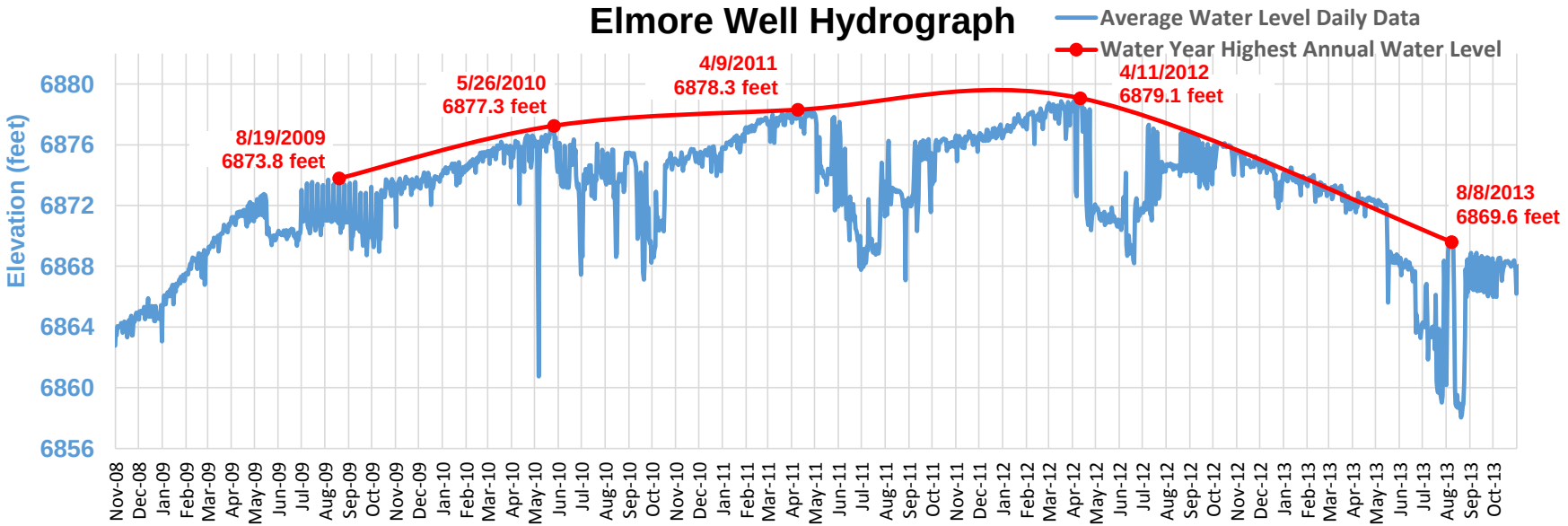
Figure 11: East Watershed



Note: Highest Annual Water Level in 2012 was manually adjusted.



Note: Highest Annual Water Level in 2013 was manually adjusted.

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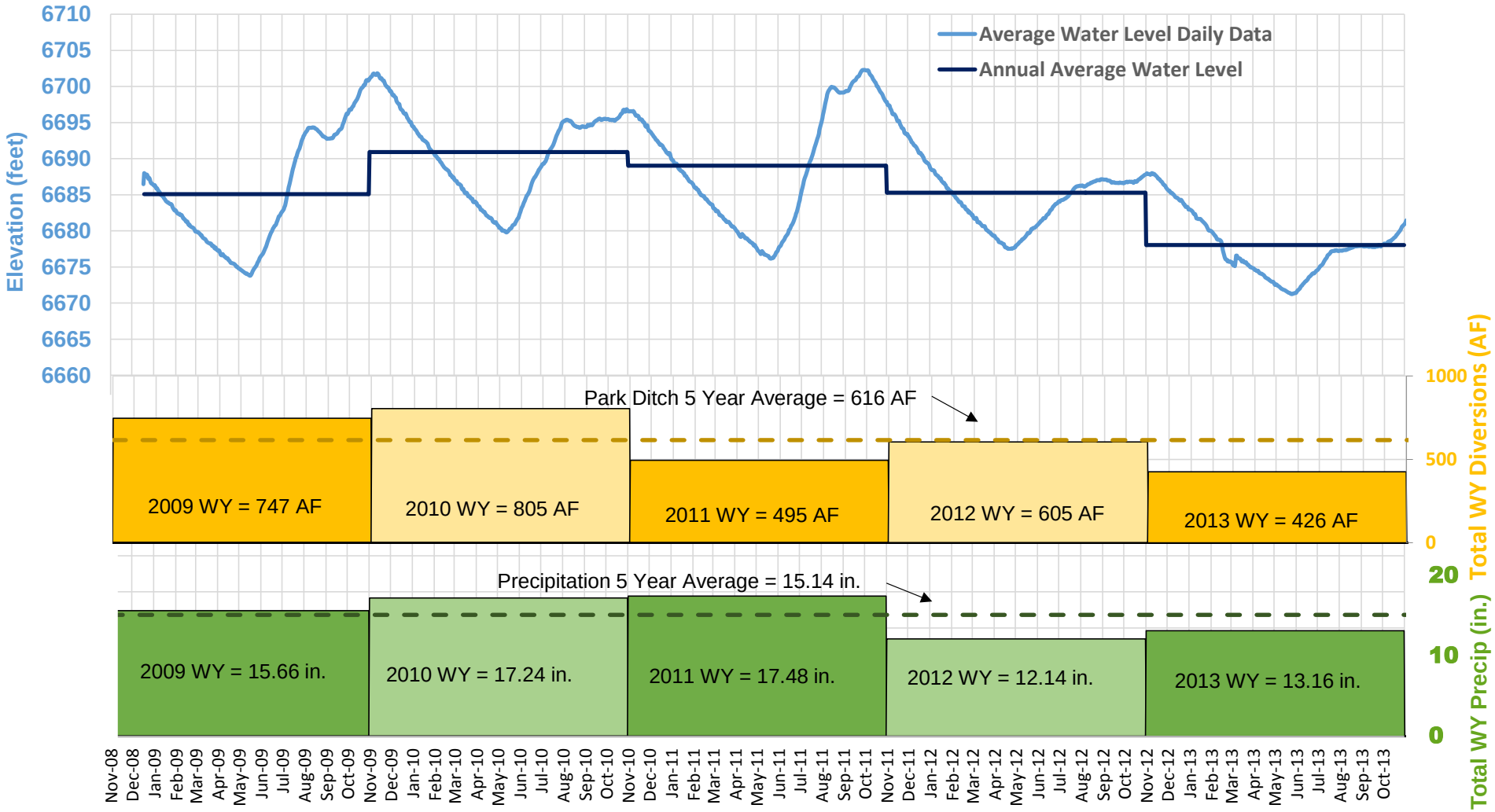
Figure 12
Hart Well Hydrograph



Note: Data was divided into water years (WY), Highest Annual Water Levels in WY 2009, 2011 & 2012 was manually adjusted.

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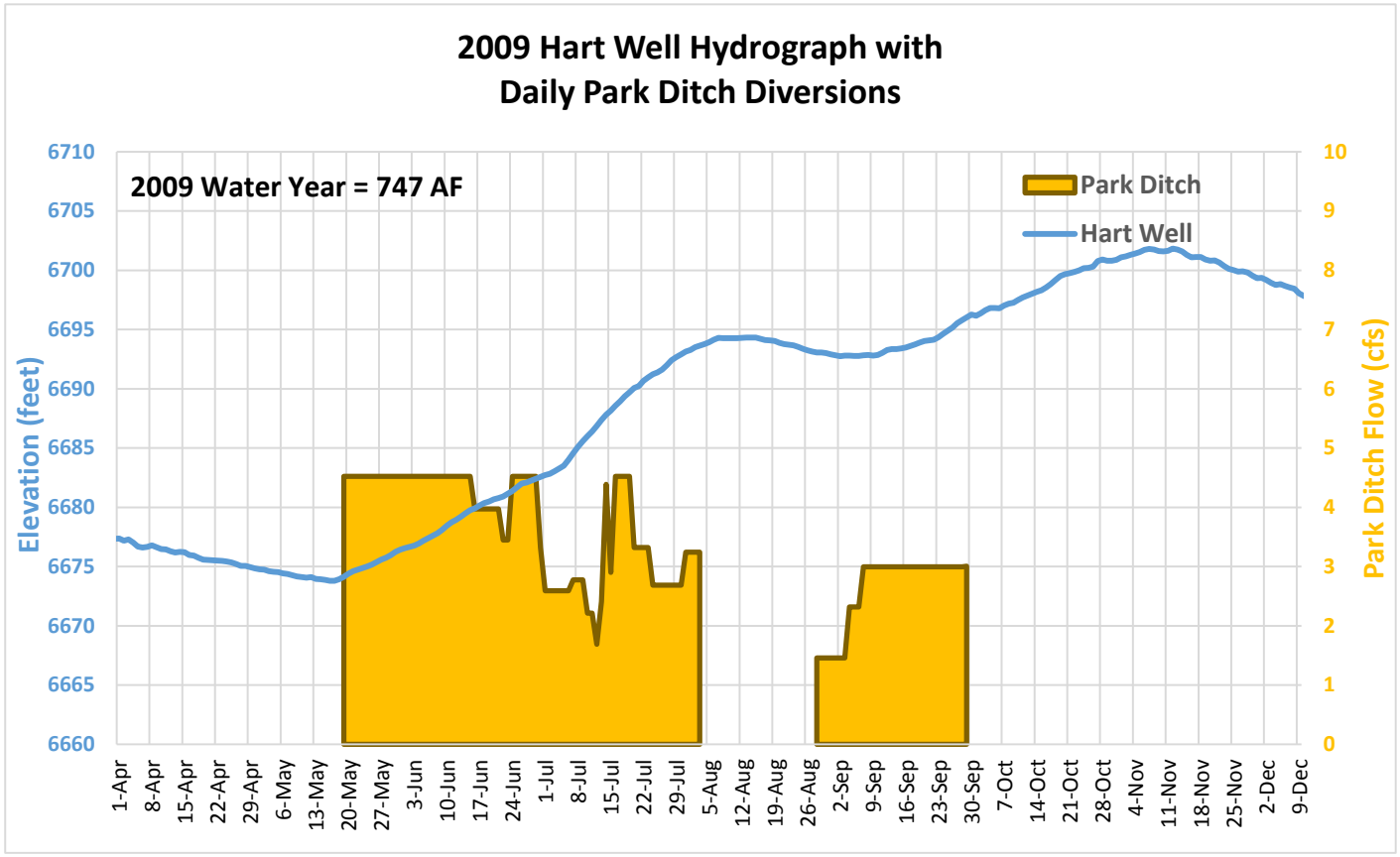
Figure 13



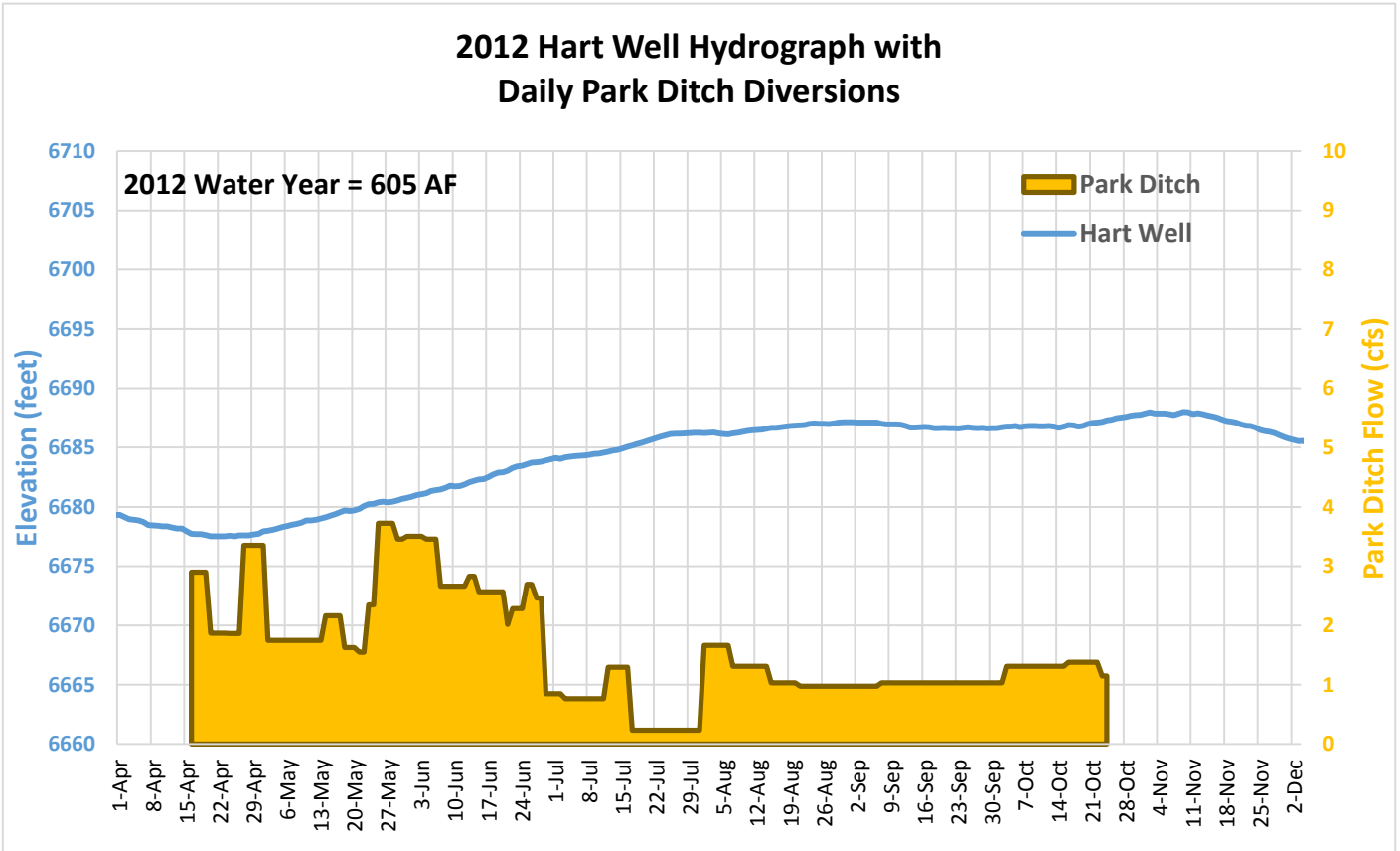


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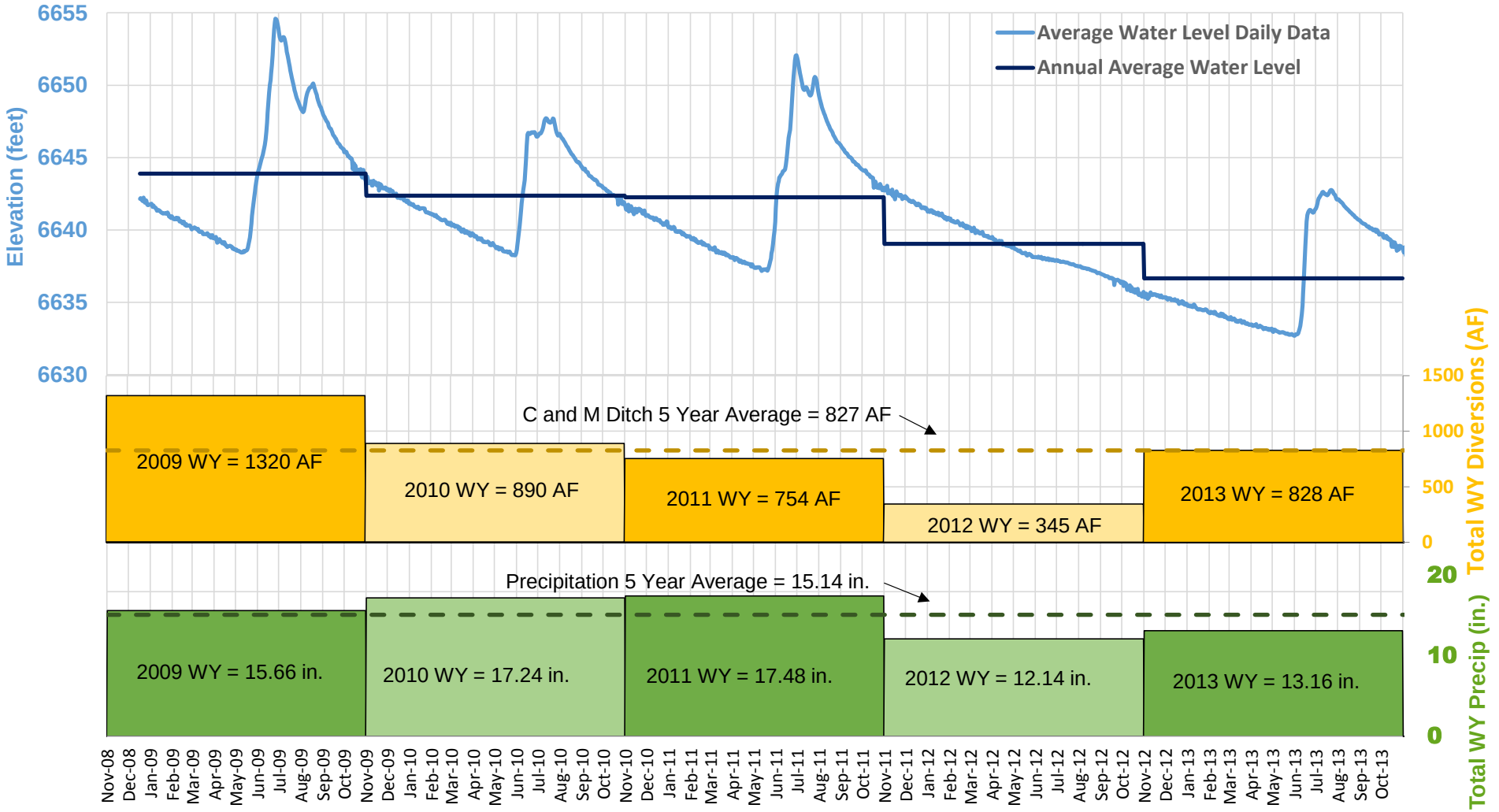
Figure 14

Cerise Well Hydrograph



Note: Data was divided into water years (WY), Highest Annual Water Level in WY 2012 was manually adjusted.

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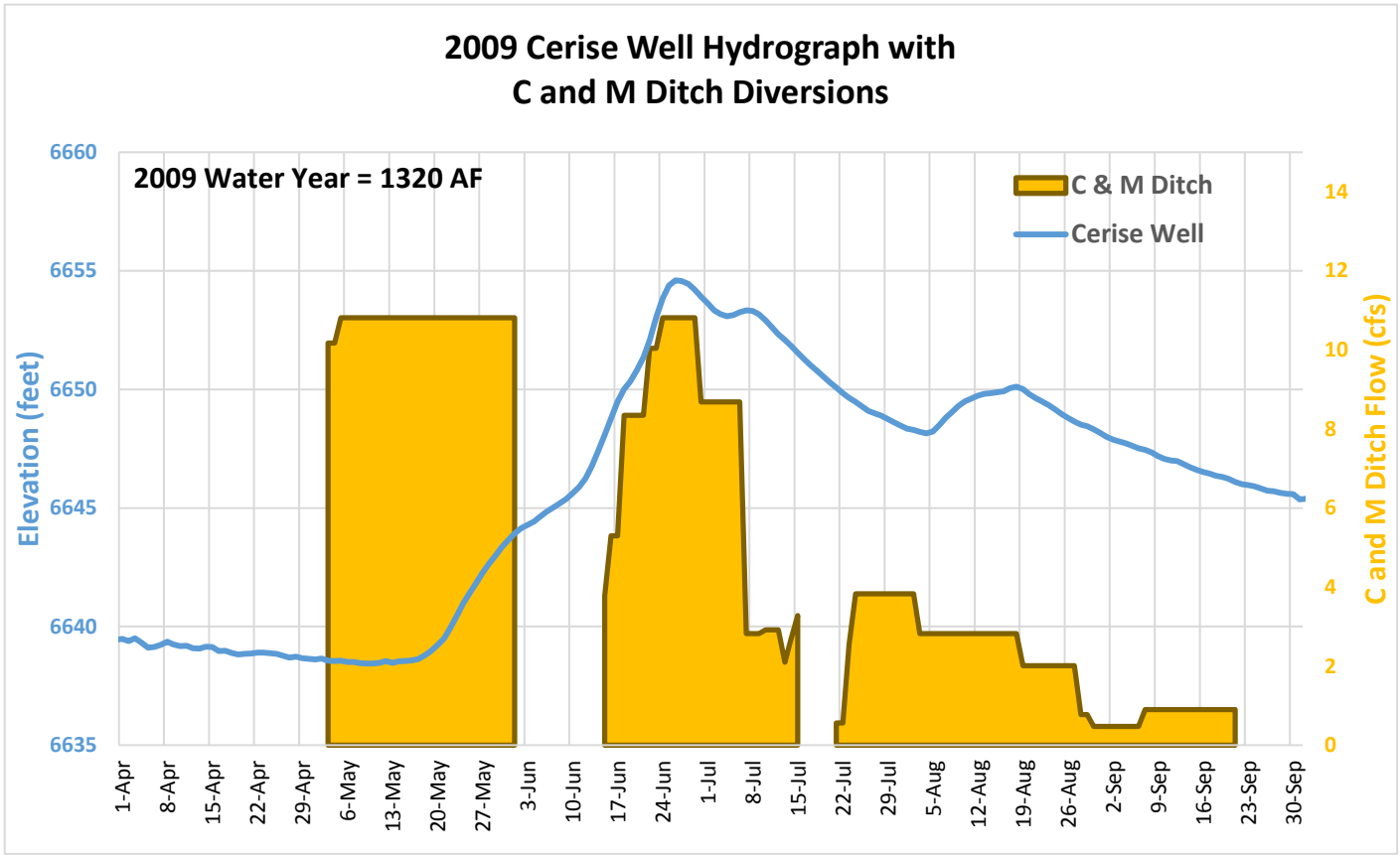
Figure 15



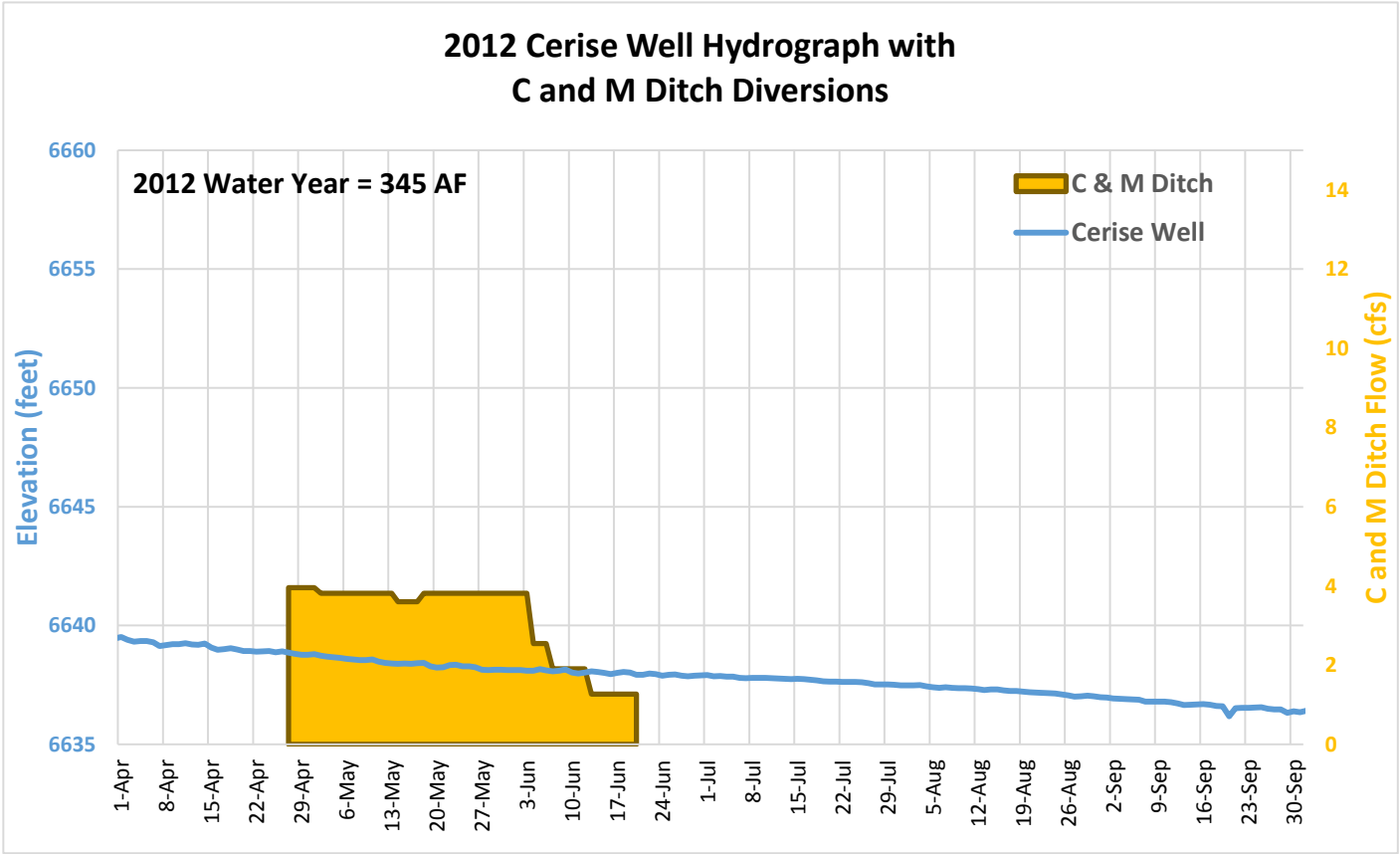


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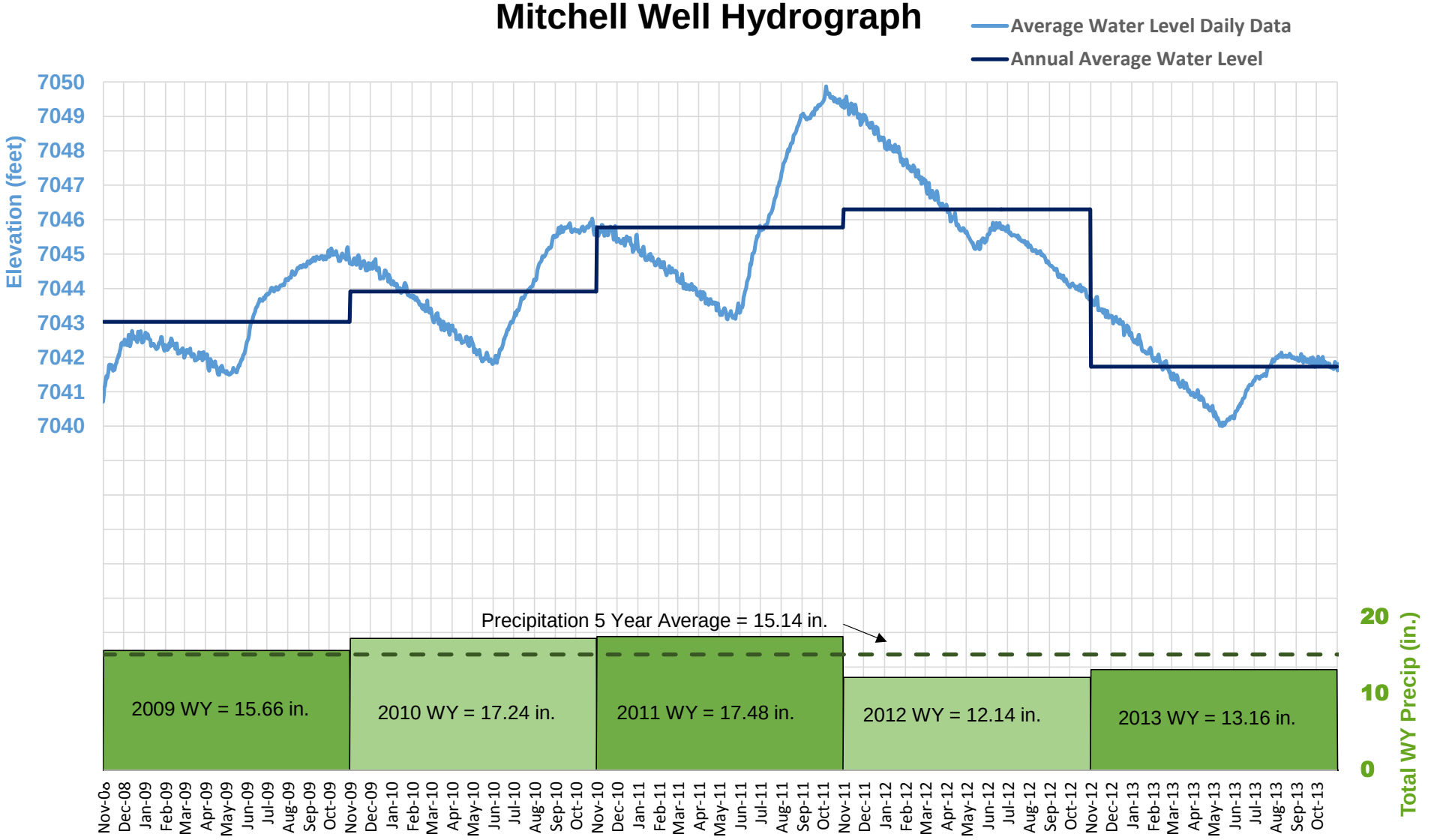
Figure 16

Mitchell Well Hydrograph



Note: Data was divided into water years (WY), Highest Annual Water Levels in WY 2012 & 2013 was manually adjusted.

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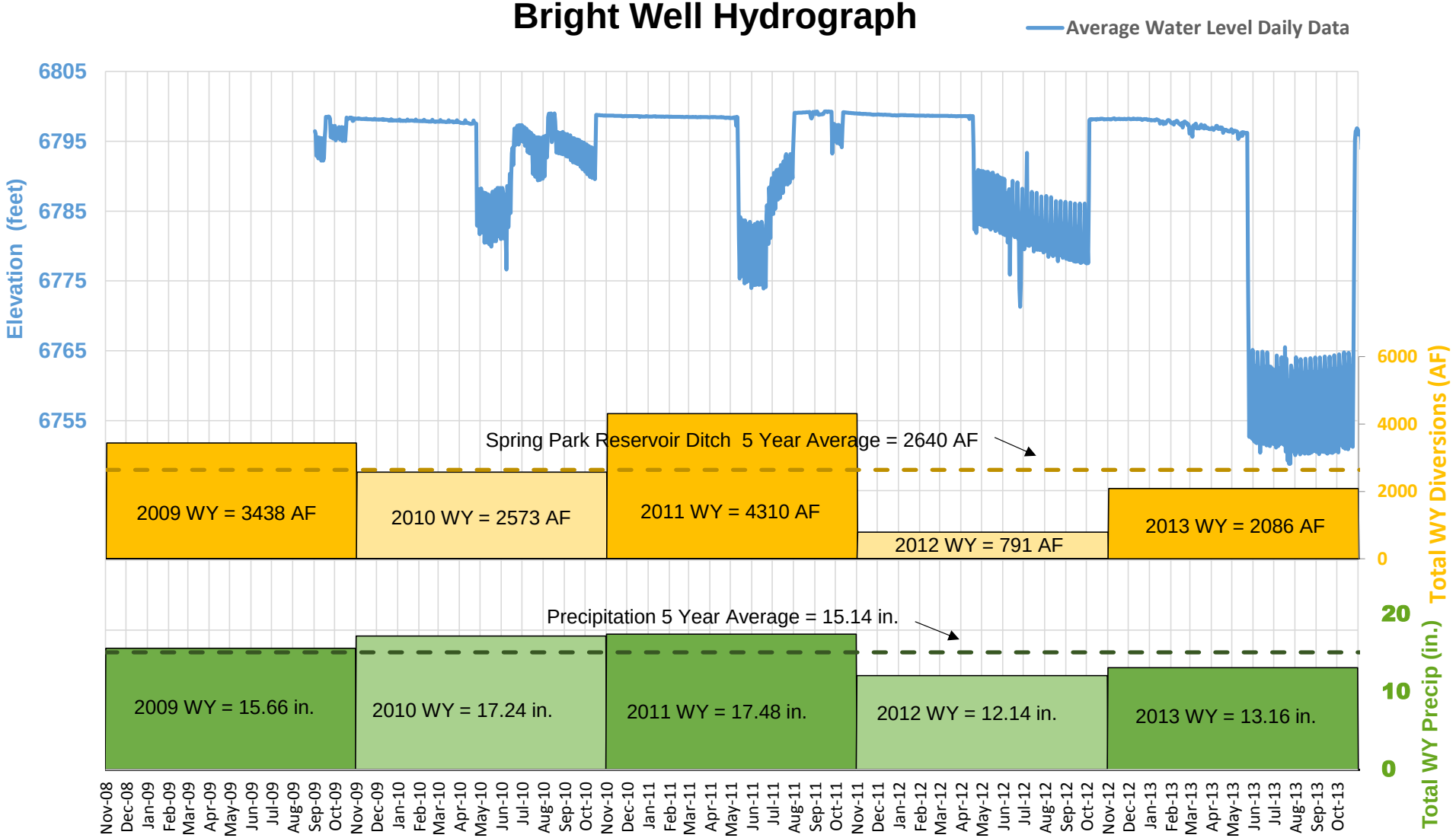
Figure 17

Bright Well Hydrograph



Note: Data was divided into water years (WY), Highest Annual Water Levels in WY 2012 & 2013 were manually adjusted.

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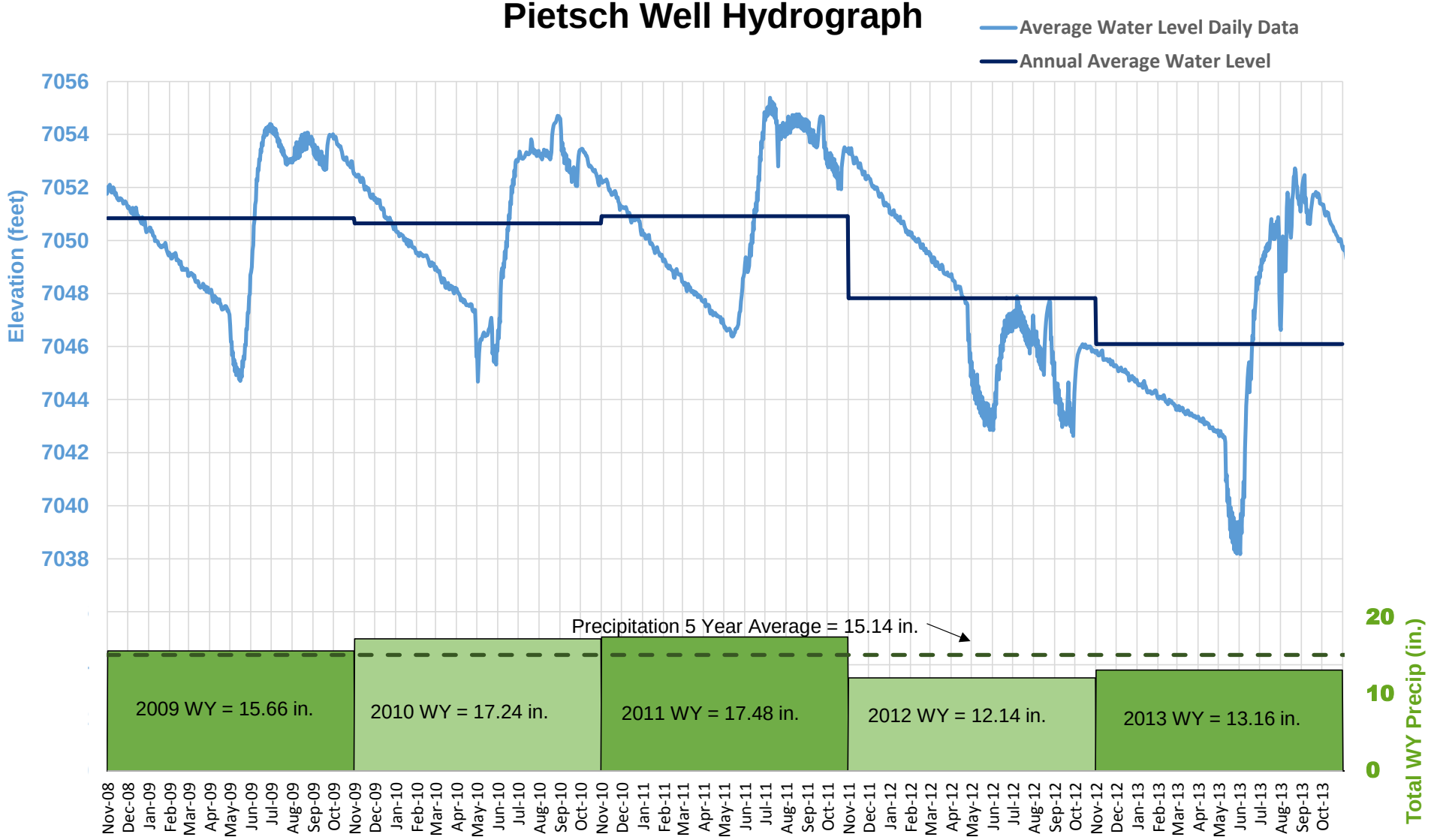
Figure 18

Pietsch Well Hydrograph



Note: Data was divided into water years (WY), Highest Annual Water Level in WY 2012 was manually adjusted.

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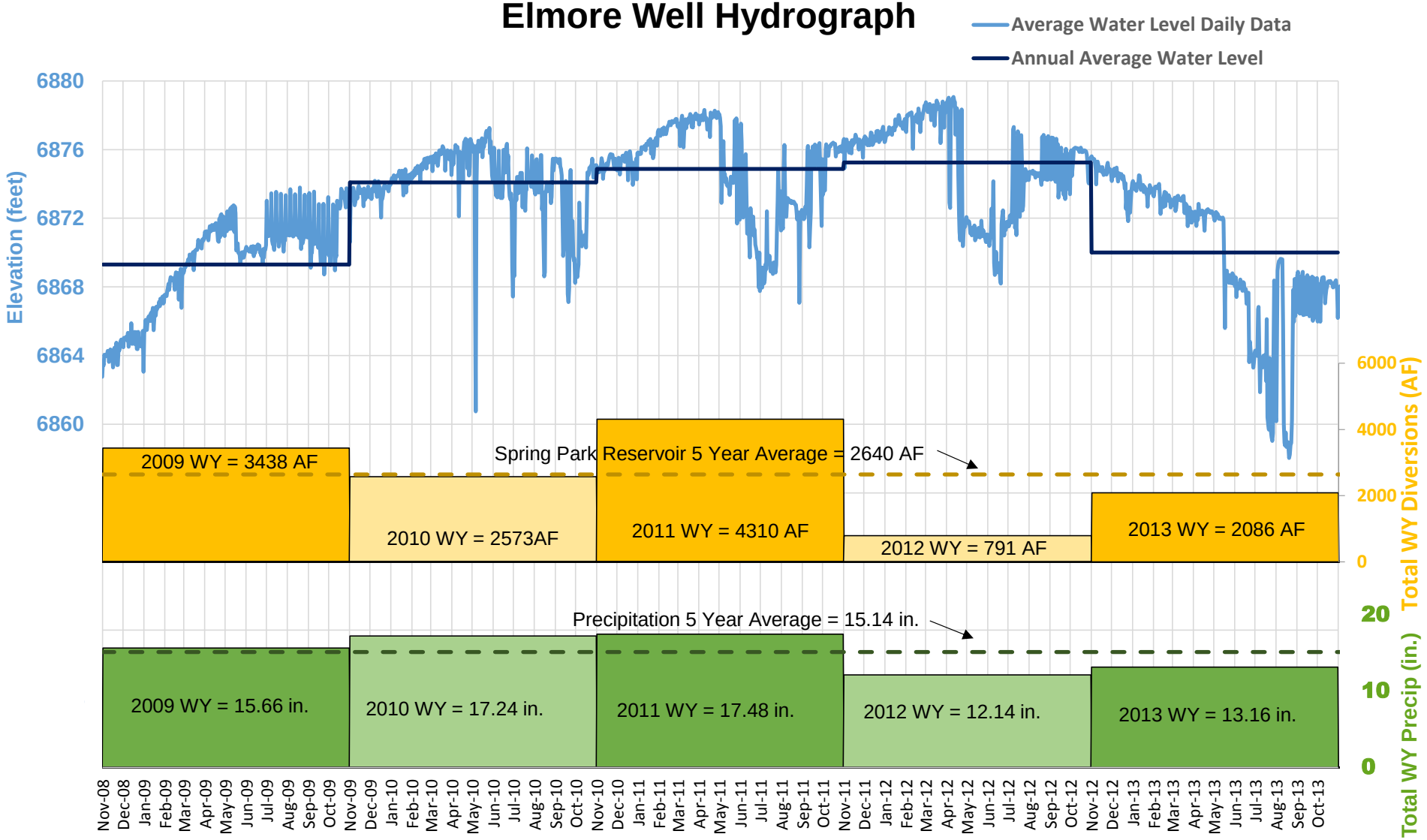
Figure 19

Elmore Well Hydrograph



Note: Data was divided into water years (WY), Highest Annual Water Level in WY 2013 was manually adjusted.

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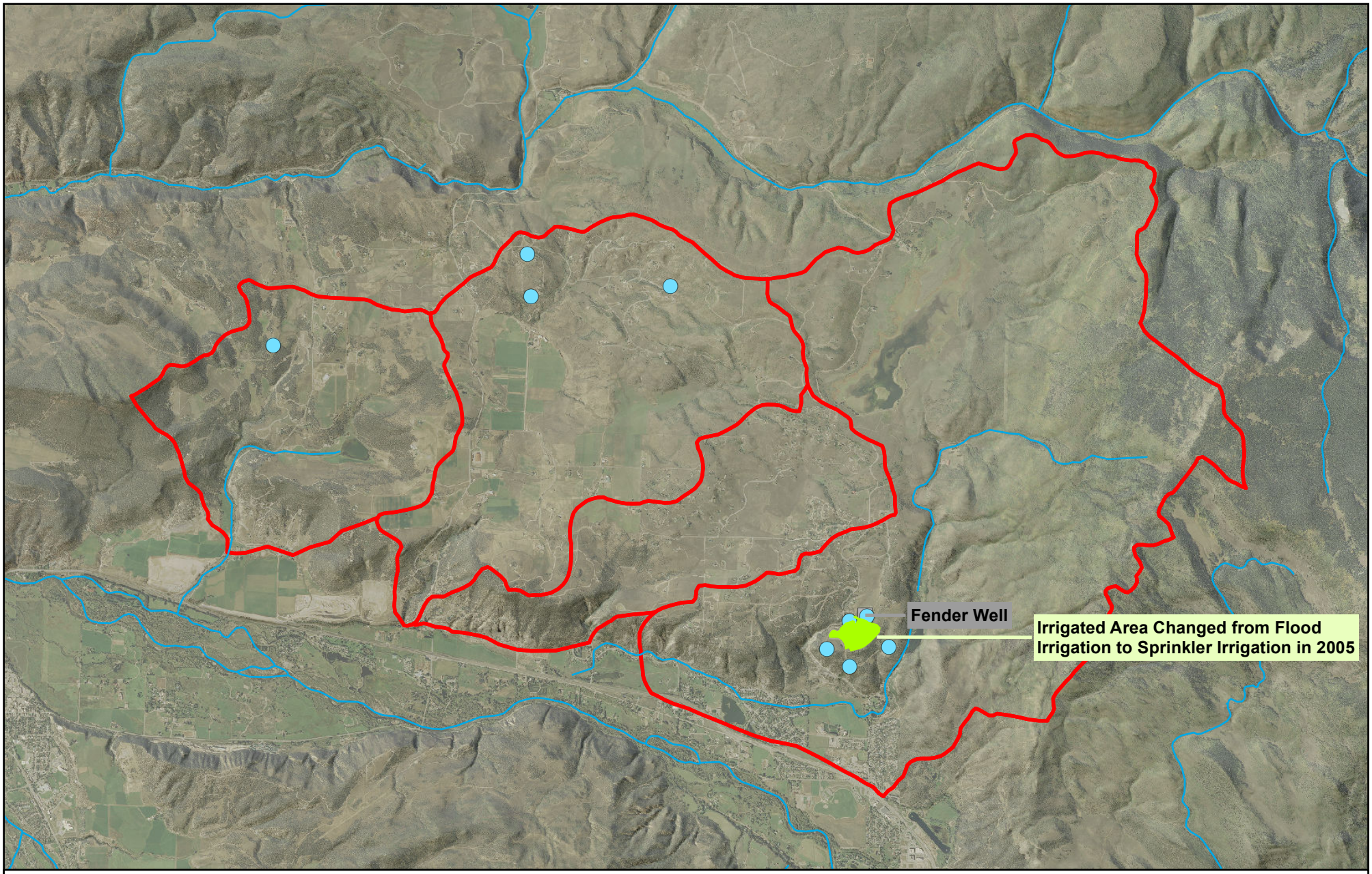

Source: 2013 NAIP Aerial Photography

Figure 20: Missouri Heights Replacement Wells

Wells Replaced During Study Period (2009-2013)

0 0.5 1 2 Miles

1 in = 1 mile

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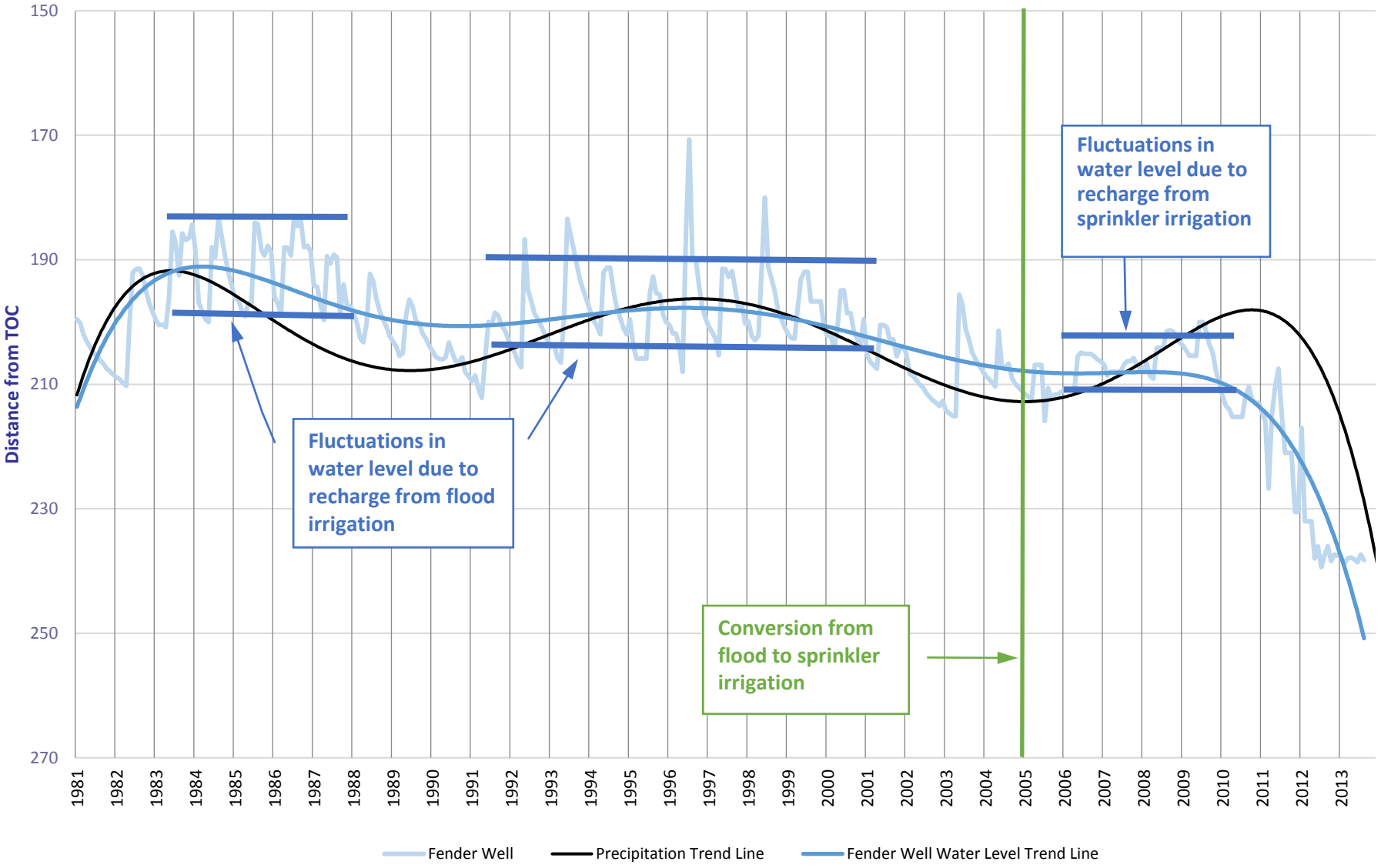
Date: 3/7/2014
File: 033-8.1.6
Drawn: RKM
Approved: EFM

Figure 21
Fender Well Hydrograph



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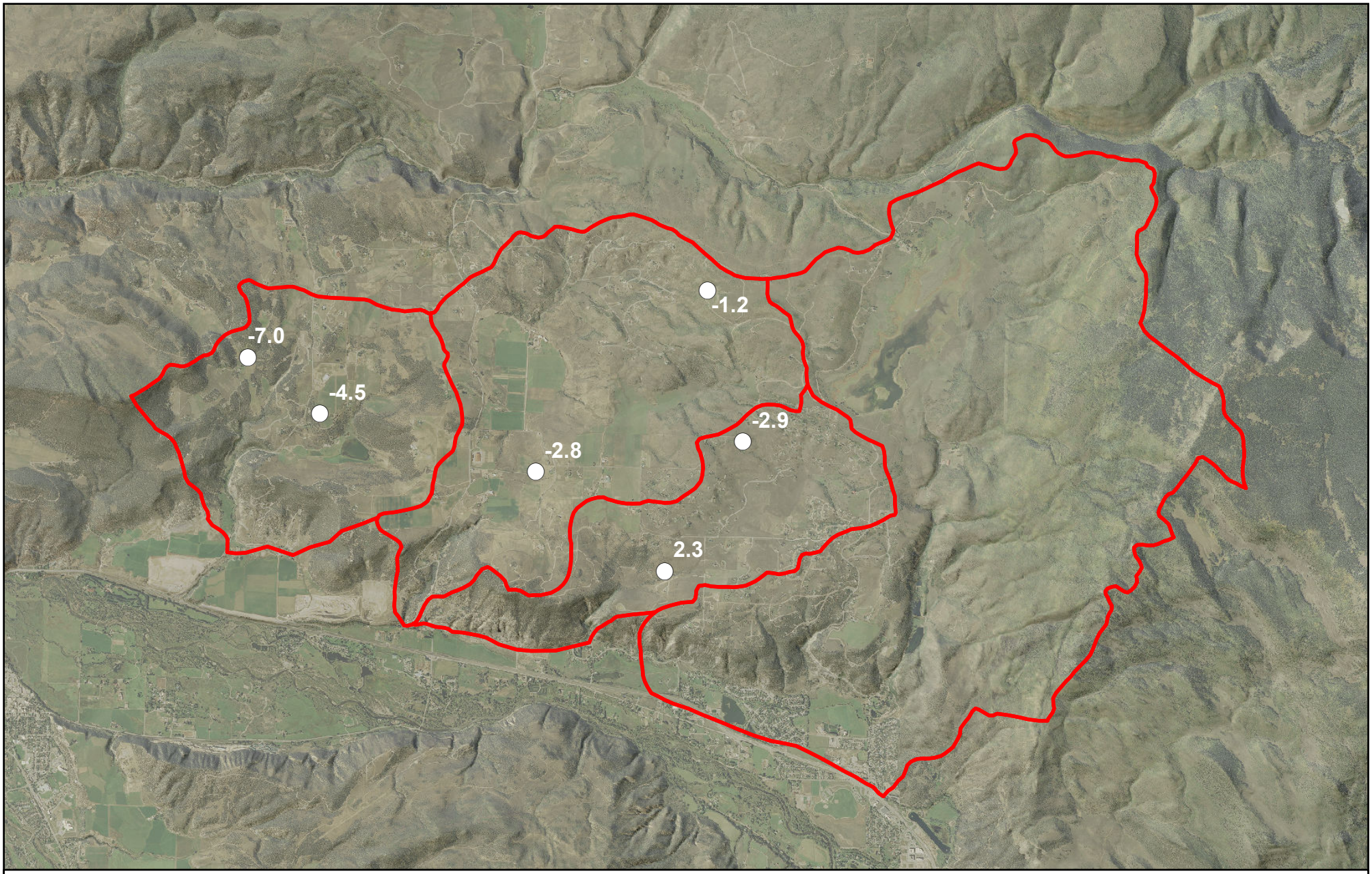

Source: 2013 NAIP
Aerial Photography

Figure 22: Water Level Change Between Dec-2008 and Dec-2013

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0 0.5 1 2
Miles

1 in = 1 mile

Date: 3/6/2014
File: 033-8.1.6
Drawn: RKM
Approved: EFM

Table 1
Phase II Well Site Summary

Well Name	Well Construction Report				Observed Static Water Level (feet)
	Year Well Drilled	Well Depth (feet)	Pump Depth (feet)	Static Water Level (feet)	
Hart Well	1968	190	ND	ND	64
Cerise Well	2001	170	160	120	112.5
Mitchell Well	2000	663	ND	510	498
Bright Well	1995	200	190	130	125.5
Pietsch Well	1994	300	280	240	227.6
Elmore Well	1995	220	210	125	145

ND = No Data

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Table 2

Annual Highest Groundwater Level Summary

(All elevation values are in feet)

Year	West Watershed			
	Hart		Cerise	
2009	12/18/2008	6688.0	12/18/2008	6688.0
2010	11/12/2009	6701.8	7/12/2010	6647.7
2011	11/1/2010	6696.6	6/30/2011	6652.1
2012	9/29/2011	6702.3	6/5/2012	6638.2
2013	11/9/2012	6688.0	7/22/2013	6642.8

Year	Central Watershed			
	Mitchell		Bright	
2009	10/28/2009	7045.2	9/21/2009	6798.5
2010	10/25/2010	7046.0	8/17/2010	6799.0
2011	10/6/2011	7049.9	9/15/2011	6799.3
2012	6/17/2012	7045.8	11/10/2012	6798.3
2013	9/8/2013	7042.1	10/30/2013	6796.9

Year	East Watershed			
	Pietsch		Elmore	
2009	6/29/2009	7054.4	8/19/2009	6873.8
2010	8/28/2010	7054.7	5/26/2010	6877.3
2011	7/8/2011	7055.4	4/9/2011	6878.3
2012	7/7/2012	7047.9	4/11/2012	6879.1
2013	8/22/2013	7052.7	8/8/2013	6869.6

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Table 3

Hart Well 2008 Water Quality Results

Status	Contaminant	Results	Units	National Standards		MDL
Inorganic Analytes - Metals						
	Calcium	40.3	mg/L	--		0.2
	Magnesium	22.8	mg/L	--		0.2
	Potassium	0.9	mg/L	--		0.3
	Sodium	49.9	mg/L	20	Guidance Level	0.3
Wet Chemistry						
	Alkalinity (Total as CaCO3)	244	mg/L	--		2
B	Chloride	11	mg/L	250	EPA Secondary	1
	Conductivity	515	umhos/cm			
	Hardness	194	mg/L	--		1
B	Nitrogen, Nitrate	0.42	mg/L	10	EPA Primary	0.02
B	Nitrogen, Nitrite	U	mg/L	1	EPA Primary	0.02
	pH	8.4	pH Units	6.5 to 8.5	EPA Secondary	0.1
B	Sulfate	40	mg/L	250	EPA Secondary	1
B	Total Dissolved Solids	316	mg/L	500	EPA Secondary	10
A	Turbidity	6.8	NTU	1	EPA Action Level	0.1

Hart Well 2013 Water Quality Results

Status	Contaminant	Results	Units	National Standards		MDL
Inorganic Analytes - Metals						
	Calcium	41	mg/L	--		0.2
	Magnesium	21	mg/L	--		0.2
	Potassium	1.4	mg/L	--		0.3
	Sodium	48.7	mg/L	20	Guidance Level	0.3
Wet Chemistry						
	Alkalinity (Total as CaCO3)	229	mg/L	--		2
B	Chloride	10	mg/L	250	EPA Secondary	1
	Conductivity	552	umhos/cm			
	Hardness	189	mg/L	--		1
B	Nitrogen, Nitrate	0.42	mg/L	10	EPA Primary	0.02
B	Nitrogen, Nitrite	U	mg/L	1	EPA Primary	0.02
	pH	8.3	pH Units	6.5 to 8.5	EPA Secondary	0.1
B	Sulfate	38	mg/L	250	EPA Secondary	1
B	Total Dissolved Solids	305	mg/L	500	EPA Secondary	10
B	Turbidity	0.2	NTU	1	EPA Action Level	0.1

Notes:

B - Below National Standards

A - Above National Standards

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Table 4

Pietsch Well 2008 Water Quality Results

Status	Contaminant	Results	Units	National Standards		MDL
Inorganic Analytes - Metals						
	Calcium	0.4	mg/L	--		0.2
	Magnesium	0.3	mg/L	--		0.2
	Potassium	0.3	mg/L	--		0.3
	Sodium	115	mg/L	20	Guidance Level	0.3
Wet Chemistry						
	Alkalinity (Total as CaCO3)	218	mg/L	--		2
B	Chloride	5	mg/L	250	EPA Secondary	1
	Conductivity	440	umhos/cm			
	Hardness	2	mg/L	--		1
B	Nitrogen, Nitrate	0.43	mg/L	10	EPA Primary	0.02
B	Nitrogen, Nitrite	U	mg/L	1	EPA Primary	0.02
	pH	8.3	pH Units	6.5 to 8.5	EPA Secondary	0.1
B	Sulfate	20	mg/L	250	EPA Secondary	1
B	Total Dissolved Solids	278	mg/L	500	EPA Secondary	10
B	Turbidity	U	NTU	1	EPA Action Level	0.1

Pietsch Well 2013 Water Quality Results

Status	Contaminant	Results	Units	National Standards		MDL
Inorganic Analytes - Metals						
	Calcium	35.7	mg/L	--		0.2
	Magnesium	26.9	mg/L	--		0.2
	Potassium	2.7	mg/L	--		0.3
	Sodium	14.6	mg/L	20	Guidance Level	0.3
Wet Chemistry						
	Alkalinity (Total as CaCO3)	192	mg/L	--		2
B	Chloride	6	mg/L	250	EPA Secondary	1
	Conductivity	434	umhos/cm			
	Hardness	200	mg/L	--		1
B	Nitrogen, Nitrate	0.31	mg/L	10	EPA Primary	0.02
B	Nitrogen, Nitrite	U	mg/L	1	EPA Primary	0.02
	pH	8.4	pH Units	6.5 to 8.5	EPA Secondary	0.1
B	Sulfate	20.4	mg/L	250	EPA Secondary	1
B	Total Dissolved Solids	228	mg/L	500	EPA Secondary	10
B	Turbidity	0.2	NTU	1	EPA Action Level	0.1

Notes:

B - Below National Standards

A - Above National Standards

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Table 5

Elmore Well 2008 Water Quality Results

Status	Contaminant	Results	Units	National Standards		MDL
Inorganic Analytes - Metals						
	Calcium	47.4	mg/L	--		0.2
	Magnesium	29.9	mg/L	--		0.2
	Potassium	2.2	mg/L	--		0.3
	Sodium	21.9	mg/L	20	Guidance Level	0.3
Wet Chemistry						
	Alkalinity (Total as CaCO3)	250	mg/L	--		2
B	Chloride	9	mg/L	250	EPA Secondary	1
	Conductivity	489	umhos/cm			
	Hardness	241	mg/L	--		1
B	Nitrogen, Nitrate	3.35	mg/L	10	EPA Primary	0.02
B	Nitrogen, Nitrite	U	mg/L	1	EPA Primary	0.02
	pH	8.3	pH Units	6.5 to 8.5	EPA Secondary	0.1
B	Sulfate	20	mg/L	250	EPA Secondary	1
B	Total Dissolved Solids	295	mg/L	500	EPA Secondary	10
B	Turbidity	0.3	NTU	1	EPA Action Level	0.1

Elmore Well 2013 Water Quality Results

Status	Contaminant	Results	Units	National Standards		MDL
Inorganic Analytes - Metals						
	Calcium	46.8	mg/L	--		0.2
	Magnesium	28.4	mg/L	--		0.2
	Potassium	2.3	mg/L	--		0.3
	Sodium	22.2	mg/L	20	Guidance Level	0.3
Wet Chemistry						
	Alkalinity (Total as CaCO3)	226	mg/L	--		2
B	Chloride	11	mg/L	250	EPA Secondary	1
	Conductivity	527	umhos/cm			
	Hardness	234	mg/L	--		1
B	Nitrogen, Nitrate	2.81	mg/L	10	EPA Primary	0.02
B	Nitrogen, Nitrite	U	mg/L	1	EPA Primary	0.02
	pH	8.3	pH Units	6.5 to 8.5	EPA Secondary	0.1
B	Sulfate	23.1	mg/L	250	EPA Secondary	1
B	Total Dissolved Solids	285	mg/L	500	EPA Secondary	10
B	Turbidity	0.1	NTU	1	EPA Action Level	0.1

Notes:

B - Below National Standards

A - Above National Standards

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Table 6

Phase II Well Site Elevation Summary

(All elevation values are in feet)

Well Name	Surface Elevation (TOC)	Dec-2013 Groundwater Elevation	Top of Screen	Bottom of Well
Hart Well	6750	6680	unknown	6560
Cerise Well	6760	6638	6630	6590
Mitchell Well	7540	7041	6977	6877
Bright Well	6924	6795	6784	6724
Pietsch Well	7280	7048	7030	6980
Elmore Well	7000	6867	6810	6780

Note:
Surface Elevations are from USGS Digital Elevation Model (DEM)

Table 7
Water Level Change from 2008 through 2013

Well Name	2008	2009	2010	2011	2012	2013
Hart Well	0.0	9.8	4.9	3.9	-2.7	-7.0
Cerise Well	0.0	0.1	-1.5	-0.4	-7.1	-4.5
Mitchell Well	0.0	2.0	2.8	6.1	0.4	-1.2
Bright Well	0.0	0.0	0.5	0.7	0.1	-2.8
Pietsch Well	0.0	0.2	0.0	0.9	-5.9	-2.9
Elmore Well	0.0	8.7	10.3	11.8	9.1	2.3

Note:
Water levels are the average December water levels for Phase II wells.

Table 8

Influx of Water to the Missouri Heights Hydrologic System

Basin Area = 15,276 acres

	Missouri Heights Ditch Diversions (AF)						Precipitation			
Year	Park	C & M	Monarch	Needham	Mtn Meadow	Total AF	(inches)	(feet)	Total AF	Total AF
1994	867	1,088	391	1,709	3,038	7,094	13.1	1.09	16,654	23,749
1995	1,207	1,587	207	2,745	7,906	13,651	20.5	1.71	26,107	39,758
1996	947	1,037	150	2,055	5,595	9,786	18.7	1.55	23,750	33,536
1997	1,669	784	278	2,350	5,005	10,086	19.2	1.60	24,378	34,464
1998	1,231	1,326	80	2,644	6,515	11,796	16.7	1.39	21,244	33,039
1999	592	1,572	200	2,855	4,096	9,316	17.1	1.42	21,719	31,035
2000	428	587	127	2,205	4,354	7,700	12.4	1.03	15,796	23,496
2001	816	739	397	1,757	4,569	8,279	14.3	1.19	18,202	26,481
2002	193	375	70	814	927	2,379	12.8	1.07	16,278	18,657
2003	444	957	292	1,994	5,178	8,864	13.5	1.12	17,147	26,011
2004	517	932	219	1,937	2,455	6,061	13.4	1.12	17,070	23,130
2005	761	1,283	172	2,241	6,752	11,210	15.6	1.30	19,819	31,029
2006	801	1,122	249	2,373	5,182	9,727	16.1	1.34	20,498	30,226
2007	327	1,131	437	2,592	4,310	8,796	13.4	1.11	17,014	25,810
2008	687	1,017	353	2,603	6,445	11,104	14.7	1.23	18,737	29,841
2009	747	1,320	274	2,827	5,314	10,483	15.7	1.31	19,935	30,418
2010	805	890	213	2,026	2,482	6,416	17.2	1.44	21,947	28,362
2011	495	754	160	1,959	1,896	5,263	17.5	1.46	22,252	27,515
2012	605	345	6	1,211	0	2,168	12.1	1.01	15,454	17,622
2013	426	828	220	1,591	2,925	5,989	13.2	1.10	16,753	22,741
1994-2008 Average	**766**	**1,036**	**241**	**2,192**	**4,822**	9,057	**15.42**	**1.28**	19,628	**28,684**
2009-2013 Average	**616**	**827**	**174**	**1,923**	**2,523**	6,063	**15.14**	**1.26**	19,268	**25,332**

	Diversion	Percent	Precip	Percent	Total
1994-2008 Average	9,057	32%	19,628	68%	**28,684**
2009-2013 Average	6,063	24%	19,268	76%	**25,332**

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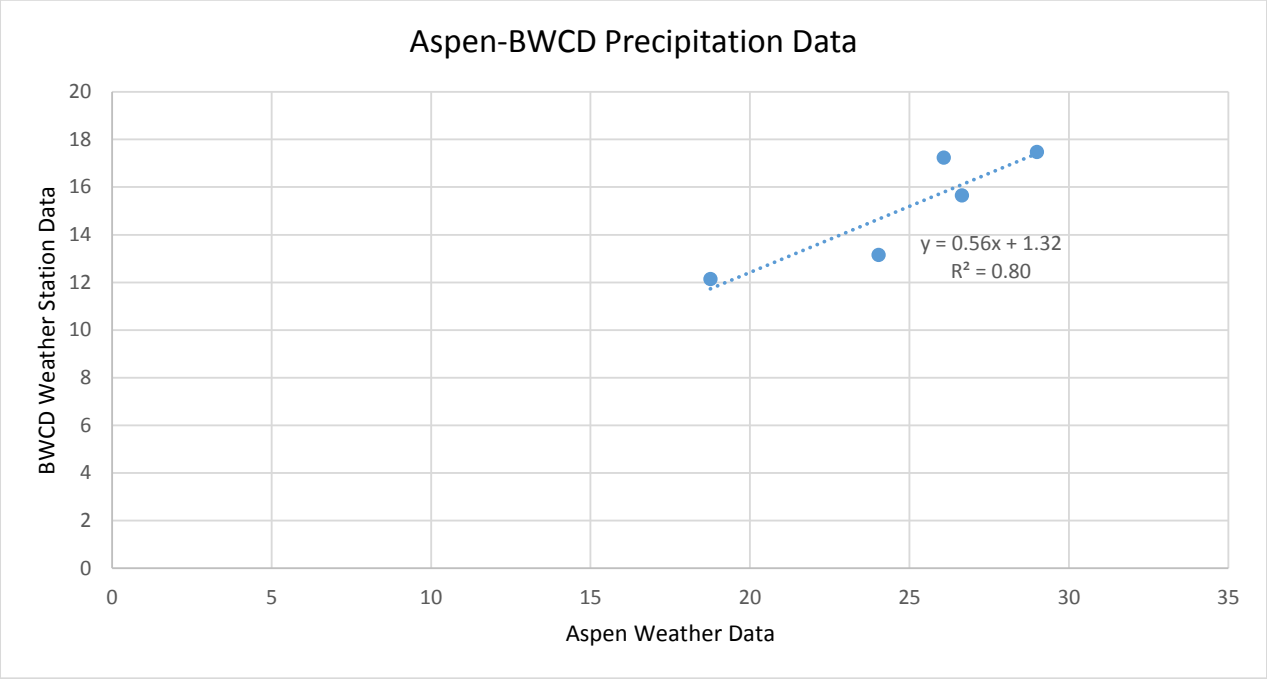
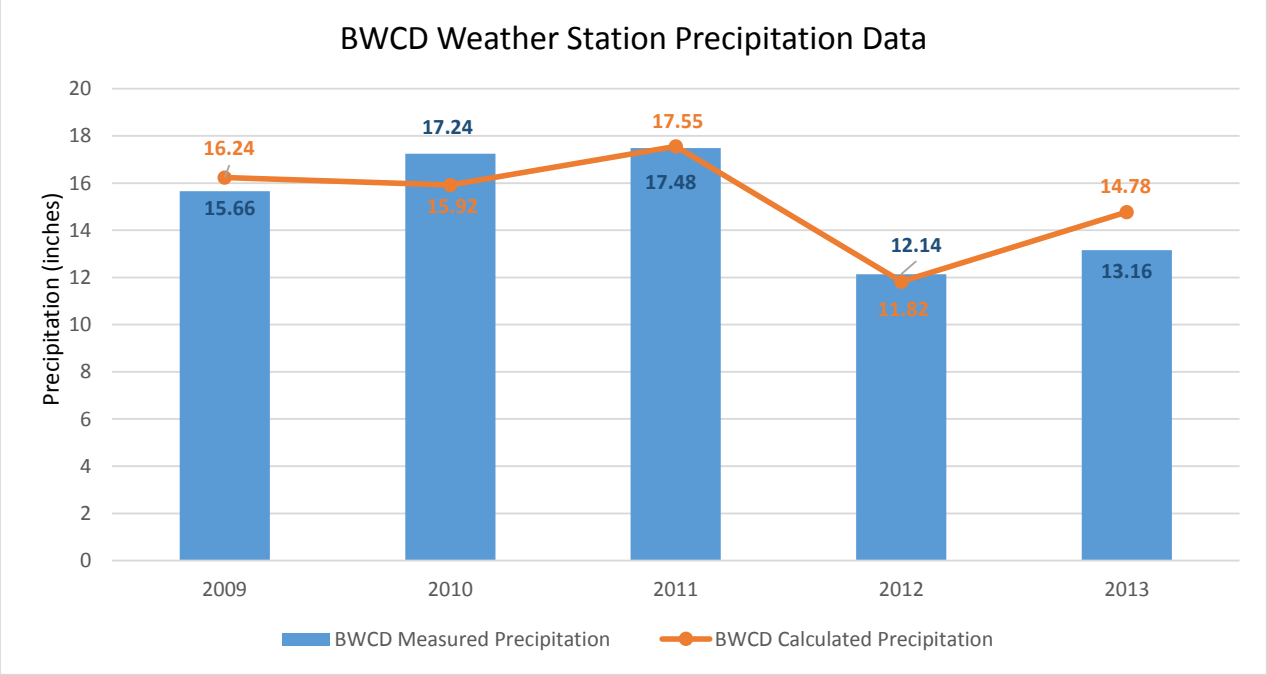
APPENDIX A: CARBONDALE AND LEON GEOLOGIC MAPS

APPENDIX B: PRECIPITATION ANALYSIS RESULTS

Total Annual Precipitation Data

Water Year	Weather Station BWCD	Weather Station Aspen	BWCD Calculated	Percent Difference
2009	15.66	26.64	16.24	103.7%
2010	17.24	26.07	15.92	92.3%
2011	17.48	28.99	17.55	100.4%
2012	12.14	18.76	11.82	97.4%
2013	13.16	24.03	14.78	112.3%
			Ave.	101.2%





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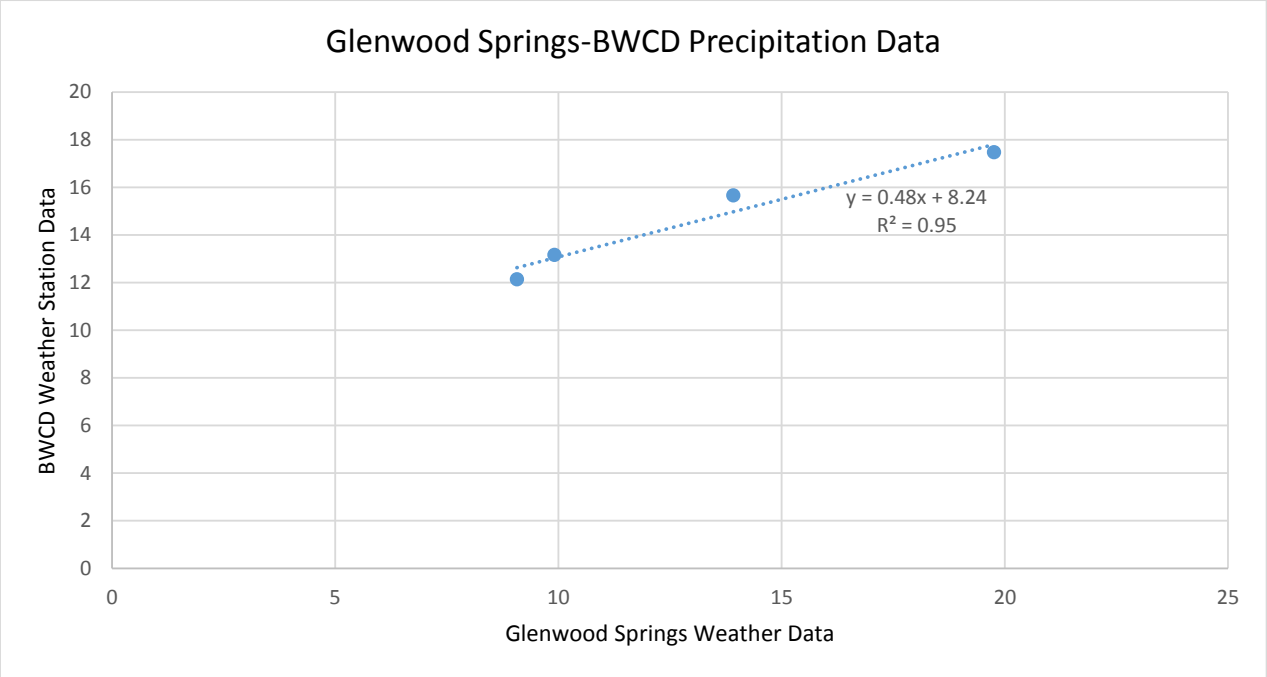
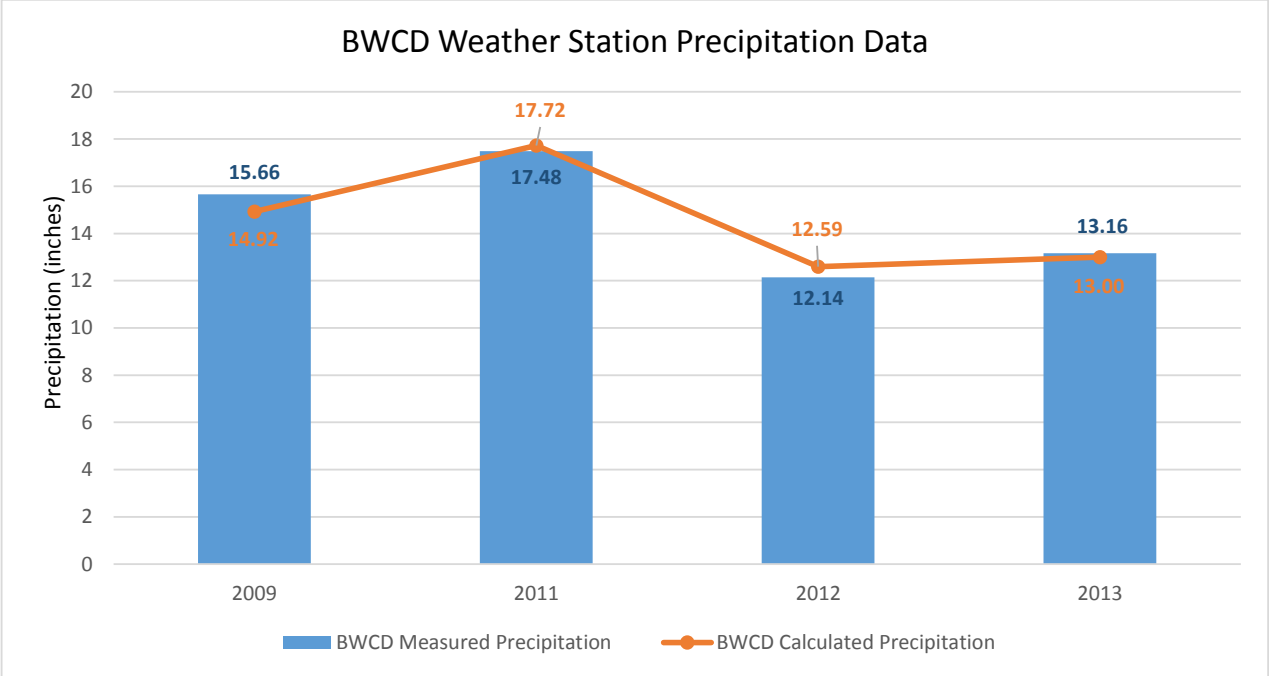
Total Annual Precipitation Data

Water Year	Weather Station BWCD	Weather Station Glewood	BWCD Calculated	Percent Difference
2009	15.66	13.92	14.92	95.3%
2011	17.48	19.76	17.72	101.4%
2012	12.14	9.07	12.59	103.7%
2013	13.16	9.91	13.00	98.8%
			Ave.	99.8%

*2010 Outlier data removed





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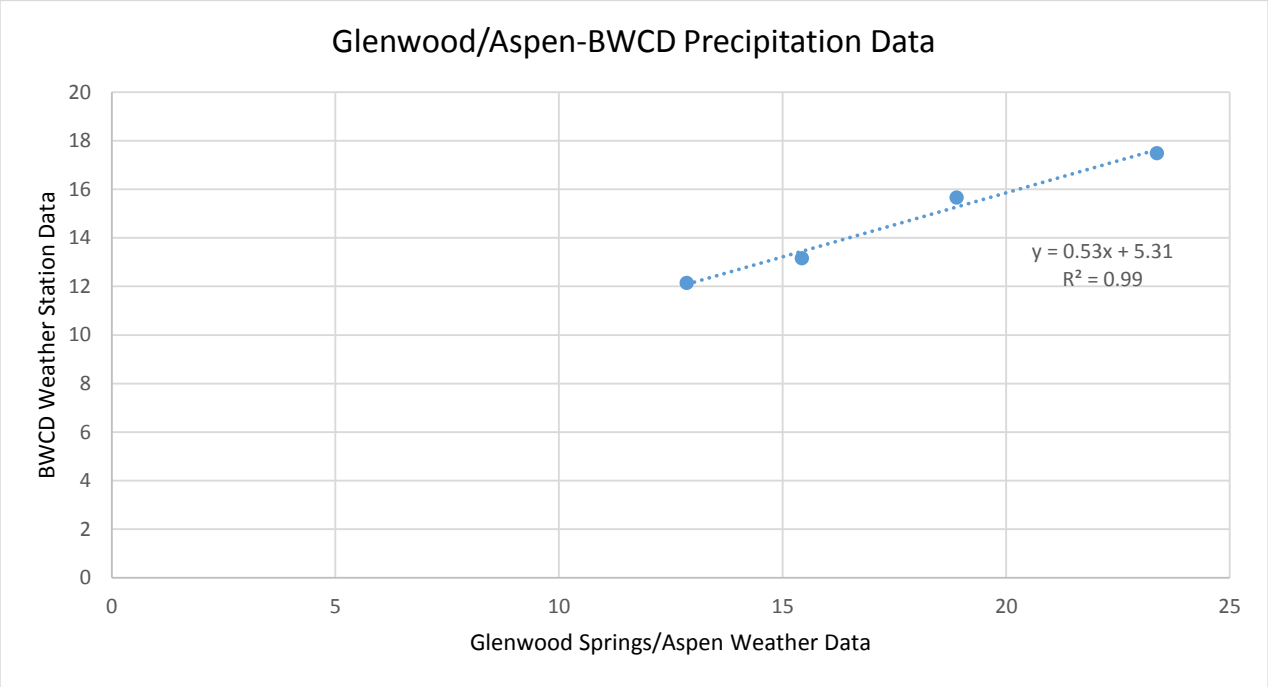
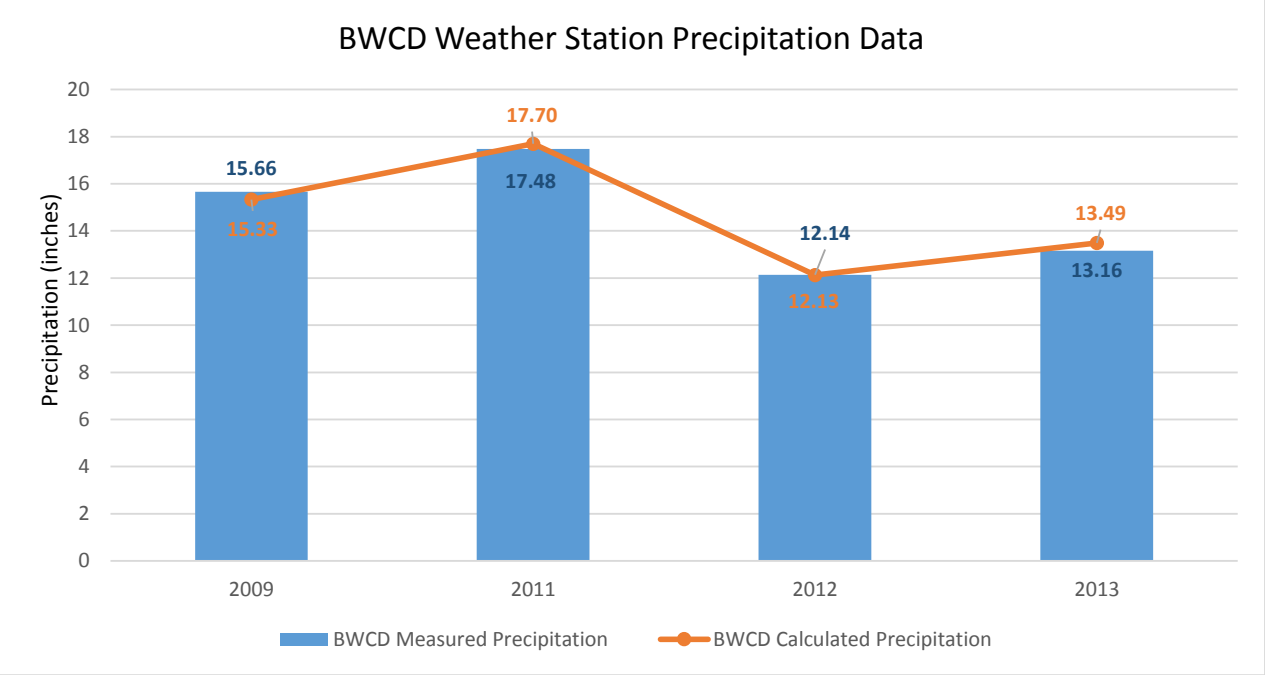
Total Annual Precipitation Data

Water Year	Weather Station BWCD	Aspen Glewood	BWCD Calculated	Percent Difference
2009	15.66	18.90	15.33	97.9%
2011	17.48	23.37	17.70	101.2%
2012	12.14	12.86	12.13	99.9%
2013	13.16	15.44	13.49	102.5%
			Ave.	100.4%

*2010 Outlier data removed





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Aspen Weather Station Data

Water Year	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1980	2.25	2.00	1.79	2.11	2.54	2.63	2.08	1.26	0.52	1.17	0.85	1.61	20.80
1981	1.38	1.45	0.28	0.89	3.64	1.63	3.45	0.71	2.35	1.38	1.56	2.03	20.75
1982	1.23	3.53	2.6	0.83	3	1.61	2.05	1.02	1.69	0.95	3.35	1.58	23.44
1983	2.39	0.92	0.47	1.6	3.68	2.8	4.75	0.89	0.82	1.78	0.61	1.75	22.46
1984	5.05	4.88	0.64	1.78	4.07	2.71	1.45	4.35	3.2	3.46	1.14	5.47	38.20
1985	1.5	3.1	0.33	2.4	4.1	2.75	2.3	1	2.43	0.61	5.08	3.2	28.80
1986	4.3	0.89	1.79	2.11	1.3	2.63	1.54	1.63	2	2.45	2.95	0.75	24.33
1987	0.15	0.85	1.55	2.5	2.11	1	1.45	2.53	1.25	2.09	0.62	1.4	17.50
1988	1.62	2.17	2.55	0.95	1.56	1.21	1.95	1.86	0.84	0.75	1.85	0.22	17.53
1989	3.6	1.54	1.5	3.78	3.2	2.21	1	0.4	1.73	1.19	0.99	0.44	21.58
1990	2	2.00	0.86	1.17	1.82	3.8	0.9	0.5	2.3	0.99	1.78	3.42	21.54
1991	2.5	1.81	1.35	1.22	3.23	3.28	1.39	2.22	1.45	1.59	1.7	2.2	23.94
1992	1.76	0.56	1.19	0.98	3.52	1.46	3.09	0.89	1.89	1.73	1.91	0.98	19.96
1993	4.01	1.43	1.67	4.08	2.54	3.43	2.43	1.13	1.64	1.82	1.99	2.71	28.88
1994	2.25	1.49	0.98	2.97	1.62	2.55	1.08	0.83	0.32	1.71	1.01	2.05	18.86
1995	3.06	2.00	1.71	3.84	5.54	3.26	5.41	2.4	2.77	1.46	2.09	1.43	34.97
1996	1.87	2.00	2.54	4.73	2.54	3.12	1.31	1.2	1.8	0.56	2.32	3.55	27.54
1997	3.03	2.82	3.4	1.58	1.93	3.67	2.64	1.2	0.4	1.78	2.62	3.3	28.37
1998	1.89	0.99	1.77	2.54	3.16	3.05	0.56	1.34	4.26	1.1	0.98	1.94	23.58
1999	3.31	1.79	2.58	2.55	1.45	3.88	3.72	1.08	2.63	2.75	2.67	1.49	29.90
2000	0.42	1.24	2.31	2.3	2.81	1.69	2.04	1.06	1.79	1.8	2.01	0.5	19.97
2001	2.42	1.28	0.78	1.21	1.67	2.59	2.74	1.6	2.29	2.97	2.12	1.03	22.70
2002	2.39	1.29	1.71	1.39	2.2	1.42	0.21	0	1.69	1.22	3.29	1.8	18.61
2003	2.55	1	0.55	1.62	2.97	2.47	2.91	1.35	0.49	0.9	2.7	0.5	20.01
2004	3	2.3	1.91	2.37	0.89	1.73	1.03	1.59	1.35	0.79	2.59	1.69	21.24
2005	2.99	1.3	3.89	1.98	1.68	2.48	1.3	1.76	1.84	2.12	2.65	3.51	27.50
2006	2.41	2.69	2.75	1.14	2.15	0.99	1.06	0.3	3.54	1.52	2.74	2.56	23.85
2007	2.65	1.41	1.93	2.11	1.85	1.78	2.03	0.87	3.74	1.2	2.74	2.95	25.26
2008	0.46	5.28	4.24	3.16	3.55	2.51	2.56	0.6	0.9	1.52	0.83	0.71	26.32
2009	2.12	4.62	2.85	1.27	2.63	2.84	2.54	1.47	2.06	1.06	1.42	1.76	26.64
2010	1.37	1.91	0.86	2.48	2.25	3.97	1.7	1.55	1.92	4.92	0.71	2.43	26.07
2011	2.39	2.56	1.84	2.74	2.89	6.38	2.47	0.81	3.17	0.85	0.92	1.97	28.99
2012	1.71	0.76	2.38	1.64	0.55	1.76	1.07	1.26	2.39	2.29	1.45	1.5	18.76
2013	0.44	2.11	1.22	1.67	1.83	3.99	2.41	0.12	2.41	2.08	4.27	1.48	24.03
Average	2.25	2.00	1.79	2.11	2.54	2.63	2.08	1.26	1.94	1.66	2.02	1.94	24.20

Notes:

The 1980-2013 average was used in months with missing data

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Glenwood Springs Weather Station Data

Water Year	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1980	1.29	1.21	2.65	2.73	1.78	0.47	2.41	0.05	1.97	0.90	1.92	2.57	19.94
1981	0.86	0.90	0.73	1.16	2.01	1.15	1.76	1.42	2.59	1.53	1.47	4.02	19.60
1982	0.98	2.16	2.60	0.69	2.83	0.37	1.53	0.48	0.79	1.14	4.40	1.86	19.83
1983	1.28	0.51	0.55	1.59	1.61	2.41	3.61	2.80	1.54	1.42	0.49	1.44	19.25
1984	2.69	3.61	0.42	0.23	1.33	1.97	2.33	0.98	1.63	2.02	0.66	4.21	22.07
1985	0.75	2.14	1.00	1.16	3.24	3.13	1.67	1.13	1.76	1.23	3.61	2.48	23.30
1986	2.06	1.81	0.58	1.93	1.63	1.53	1.73	0.89	0.99	0.85	3.09	2.41	19.50
1987	2.89	0.56	1.22	1.15	1.00	1.33	1.73	0.46	1.55	1.07	1.22	1.77	15.95
1988	1.33	1.53	2.49	0.81	0.97	0.93	1.73	0.22	0.25	2.51	2.16	0.27	15.20
1989	1.91	1.01	1.34	2.79	0.65	1.09	0.38	0.37	0.80	1.25	1.89	1.73	15.21
1990	0.67	0.62	0.34	0.57	1.02	1.63	1.13	0.86	1.89	0.61	1.45	2.74	13.53
1991	1.15	1.09	0.77	0.20	2.03	1.03	0.82	2.75	0.86	1.21	1.30	1.50	14.71
1992	0.98	0.38	0.35	1.16	1.27	0.08	2.82	0.38	1.17	1.13	1.61	1.71	13.04
1993	2.03	0.51	1.61	2.65	2.60	3.00	3.58	1.07	0.50	1.55	1.08	1.74	21.92
1994	0.67	0.40	0.25	1.23	0.38	1.55	0.41	0.77	0.65	1.29	1.60	2.89	12.09
1995	2.48	1.09	1.51	2.54	1.67	1.81	5.82	1.90	2.04	0.88	1.81	1.15	24.70
1996	2.55	2.81	4.44	2.72	0.67	1.96	1.21	0.74	1.18	0.30	2.92	2.33	23.83
1997	1.61	2.52	3.84	0.40	0.77	1.84	2.36	1.32	1.65	1.67	4.03	2.82	24.83
1998	1.39	0.80	2.19	1.44	2.05	1.82	0.44	2.23	2.11	1.79	1.35	2.67	20.28
1999	0.56	0.61	0.97	0.91	0.60	3.97	3.39	1.02	0.50	1.98	2.28	0.45	17.24
2000	0.13	0.99	1.99	0.10	1.10	0.36	1.08	0.85	0.75	1.14	0.64	0.10	9.23
2001	0.79	1.20	0.55	0.89	1.00	1.05	1.65	0.60	1.05	1.13	1.70	1.74	13.35
2002	1.25	1.15	0.19	0.31	0.61	1.24	0.00	0.00	0.45	0.73	3.49	1.91	11.33
2003	1.66	0.38	0.00	0.83	0.79	0.88	3.39	0.47	0.69	1.19	2.26	0.00	12.54
2004	0.88	1.15	0.34	0.42	0.77	2.84	0.82	1.14	0.27	0.00	1.62	1.28	11.53
2005	1.30	1.12	1.20	0.98	1.21	1.54	0.62	0.89	0.00	0.77	2.91	1.60	14.15
2006	1.25	0.83	0.93	0.11	3.11	1.59	0.81	0.34	1.16	2.85	1.46	3.82	18.26
2007	0.92	0.30	0.51	0.67	0.70	0.38	0.24	0.23	0.00	1.18	2.88	0.70	8.71
2008	0.88	0.61	1.75	1.61	1.73	0.92	1.52	0.32	0.49	0.75	1.49	0.19	12.26
2009	1.00	1.38	0.84	0.93	0.43	0.89	3.00	1.85	0.66	0.77	1.15	1.02	13.92
2010	0.70	1.32	0.69	0.98	0.00	1.55	0.38	0.85	1.08	1.58	0.81	1.66	11.60
2011	0.83	1.35	0.31	0.86	1.73	3.83	2.74	0.66	3.28	1.61	1.10	1.46	19.76
2012	0.40	0.12	0.76	1.21	0.35	1.43	0.18	0.19	1.87	1.22	1.00	0.34	9.07
2013	0.26	0.76	0.93	0.10	1.36	1.23	1.45	0.00	0.66	1.18	1.43	0.55	9.91
Average	1.25	1.14	1.20	1.12	1.32	1.55	1.73	0.89	1.14	1.25	1.89	1.74	16.22

Notes:

The 1980-2013 average was used in months with missing data

When data from the NOAA weather station was missing, available data from Weather Underground South Glenwood Springs Data was used

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BWCD Weather Station Data

Water Year	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
2008										0.92	0.94	0.57	
2009	0.78	2.79	1.31	0.98	1.59	2.03	2.03	1.74	1.06	0.25	0.08	1.02	15.66
2010	0.13	1.89	1.22	1.84	1.06	2.54	1.03	1.54	1.41	1.73	0.84	2.01	17.24
2011	1.09	0.82	1.03	1.43	1.53	3.12	2.05	0.55	1.93	0.88	1.27	1.78	17.48
2012	1.18	0.27	1.17	1.45	0.73	1.19	0.64	0.22	2.26	1.35	1.24	0.44	12.14
2013	1.10	1.54	1.34	0.19	0.77	1.32	1.41	0.01	1.09	0.31	2.52	1.56	13.16
Average	0.86	1.46	1.21	1.18	1.14	2.04	1.43	0.81	1.55	0.90	1.19	1.36	15.14

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APPENDIX C: IRRIGATION DIVERSION RECORDS

Missouri Heights Park Ditch Diversion Records

Diversion Summary in Acre Feet

YEAR	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOTAL
1994	0	0	0	0	0	0	136	301	244	66	81	39	**867**
1995	0	0	0	0	0	0	72	246	366	191	99	233	**1207**
1996	0	0	0	0	0	0	26	236	163	186	127	209	**947**
1997	27	0	0	0	0	0	127	242	139	402	351	381	**1669**
1998	0	0	0	0	0	0	246	295	173	234	282	0	**1231**
1999	0	0	0	0	0	0	44	130	122	162	110	25	**592**
2000	0	0	0	0	0	0	86	93	63	53	57	75	**428**
2001	0	0	0	0	0	0	167	84	141	152	134	139	**816**
2002	0	0	0	0	0	4	85	40	14	17	22	11	**193**
2003	0	0	0	0	0	0	162	136	79	20	23	23	**444**
2004	0	0	0	0	0	34	205	93	42	15	60	69	**517**
2005	0	0	0	0	0	0	234	223	169	36	90	8	**761**
2006	0	0	0	0	0	0	165	183	151	101	127	73	**801**
2007	0	0	0	0	0	0	17	91	98	64	32	24	**327**
2008	0	0	0	0	0	0	48	220	163	131	35	89	**687**
2009	0	0	0	0	0	0	117	256	185	31	159	0	**747**
2010	0	0	0	0	0	0	27	277	149	62	107	184	**805**
2011	0	0	0	0	0	0	0	142	166	98	89	0	**495**
2012	0	0	0	0	0	76	141	156	37	74	61	61	**605**
2013	0	0	0	0	0	0	104	90	70	45	54	64	**426**
1994-2008 Average	**2**					**3**	**121**	**174**	**142**	**122**	**109**	**93**	**766**
2009-2013 Average						**15**	**78**	**184**	**121**	**62**	**94**	**62**	**616**

Note: Diversions were reduced to 26.6% (133 acres out of 500 acres) of total diversions to account for only diversions that irrigated fields within the Missouri Heights Study Area

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Missouri Heights C and M Ditch Diversion Records

Diversion Summary in Acre Feet

YEAR	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOTAL
1994	0	0	0	0	0	0	359	318	139	29	123	121	**1088**
1995	53	0	0	0	0	0	353	477	169	226	156	152	**1587**
1996	0	0	0	0	0	0	41	448	220	148	65	116	**1037**
1997	71	0	0	0	0	0	177	264	189	84	0	0	**784**
1998	0	0	0	0	0	0	311	408	358	162	86	0	**1326**
1999	0	0	0	0	0	99	487	405	235	144	141	62	**1572**
2000	0	0	0	0	0	0	166	268	106	21	10	17	**587**
2001	0	0	0	0	0	0	204	284	120	72	55	5	**739**
2002	0	0	0	0	0	24	235	117	0	0	0	0	**375**
2003	0	0	0	0	0	0	413	336	191	18	0	0	**957**
2004	0	0	0	0	0	69	482	308	71	1	0	0	**932**
2005	0	0	0	0	0	0	426	533	223	101	0	0	**1283**
2006	0	0	0	0	0	0	534	349	170	69	0	0	**1122**
2007	0	0	0	0	0	0	497	380	133	53	39	30	**1131**
2008	0	0	0	0	0	0	205	454	223	72	63	0	**1017**
2009	0	0	0	0	0	0	619	302	221	146	32	0	**1320**
2010	0	0	0	0	0	0	80	379	237	160	34	0	**890**
2011	0	0	0	0	0	0	0	328	276	44	106	0	**754**
2012	0	0	0	0	0	31	233	81	0	0	0	0	**345**
2013	0	0	0	0	0	0	380	380	68	0	0	0	**828**
1994-2008 Average	**8**					**13**	**326**	**356**	**170**	**80**	**49**	**33**	**1036**
2009-2013 Average						**6**	**263**	**294**	**160**	**70**	**34**	**0**	**827**

Note: Diversions were reduced to 63.6% (260 acres out of 409 acres) of total diversions to account for only diversions that irrigated fields within the Missouri Heights Study Area

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Missouri Heights Needham Ditch Diversion Records

Diversion Summary in Acre Feet

YEAR	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOTAL
1994	0	0	0	0	0	0	509	537	172	151	168	173	**1709**
1995	92	0	0	0	0	0	410	918	521	371	175	259	**2745**
1996	0	0	0	0	0	0	276	903	334	172	200	170	**2055**
1997	132	0	0	0	0	7	501	595	430	222	224	238	**2350**
1998	46	0	0	0	0	0	457	831	616	181	199	314	**2644**
1999	59	0	0	0	0	256	920	902	212	170	165	171	**2855**
2000	163	0	0	0	0	0	752	529	170	175	184	233	**2205**
2001	0	0	0	0	0	0	432	648	176	173	150	178	**1757**
2002	0	0	0	0	0	20	223	160	151	117	125	18	**814**
2003	0	0	0	0	0	0	427	732	110	224	247	253	**1994**
2004	0	0	0	0	0	0	699	620	181	150	141	147	**1937**
2005	48	0	0	0	0	0	0	935	466	190	265	336	**2241**
2006	0	0	0	0	0	0	971	675	173	175	169	211	**2373**
2007	0	0	0	0	0	0	920	753	331	204	187	196	**2592**
2008	0	0	0	0	0	0	623	845	634	182	165	153	**2603**
2009	0	0	0	0	0	0	932	904	441	192	175	183	**2827**
2010	0	0	0	0	0	0	502	798	205	182	185	154	**2026**
2011	0	0	0	0	0	0	0	572	666	373	200	148	**1959**
2012	0	0	0	0	0	0	402	165	170	170	165	139	**1211**
2013	0	0	0	0	0	0	456	578	171	168	141	77	**1591**
1994-2008 Average	**36**					**19**	**541**	**706**	**312**	**190**	**184**	**203**	**2192**
2009-2013 Average							**458**	**603**	**331**	**217**	**173**	**140**	**1923**

Note: Diversions were reduced to 92.3% (687 acres out of 744 acres) of total diversions to account for only diversions that irrigated fields within the Missouri Heights Study Area

RESOURCE ENGINEERING, INC.
909 Colorado Avenue / Glenwood Springs, CO 81601
Voice: (970) 945-6777 - Web: www.resource-eng.com

Missouri Heights Monarch Ditch Diversion Records

Diversion Summary in Acre Feet

YEAR	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOTAL
1994	0	0	0	0	0	0	222	170	0	0	0	0	**391**
1995	0	0	0	0	0	0	0	79	128	0	0	0	**207**
1996	0	0	0	0	0	0	40	110	0	0	0	0	**150**
1997	0	0	0	0	0	0	175	95	8	0	0	0	**278**
1998	0	0	0	0	0	0	28	43	9	0	0	0	**80**
1999	0	0	0	0	0	0	76	124	0	0	0	0	**200**
2000	0	0	0	0	0	0	97	30	0	0	0	0	**127**
2001	0	0	0	0	0	2	125	176	73	16	5	0	**397**
2002	0	0	0	0	0	3	67	0	0	0	0	0	**70**
2003	0	0	0	0	0	0	129	163	0	0	0	0	**292**
2004	0	0	0	0	0	0	111	108	0	0	0	0	**219**
2005	0	0	0	0	0	0	72	101	0	0	0	0	**172**
2006	0	0	0	0	0	0	74	176	0	0	0	0	**249**
2007	0	0	0	0	0	0	97	193	148	0	0	0	**437**
2008	0	0	0	0	0	0	31	176	128	19	0	0	**353**
2009	0	0	0	0	0	0	65	153	57	0	0	0	**274**
2010	0	0	0	0	0	0	31	151	31	0	0	0	**213**
2011	0	0	0	0	0	0	0	123	38	0	0	0	**160**
2012	0	0	0	0	0	0	6	0	0	0	0	0	**6**
2013	0	0	0	0	0	0	94	126	0	0	0	0	**220**
1994-2008 Average						**0**	**89**	**116**	**33**	**2**	**0**		**241**
2009-2013 Average							**39**	**110**	**25**				**174**

Note: Diversions were reduced to 50% (2.5 cfs out of 5.0 cfs) of total diversions to account for only diversions that irrigated fields within the Missouri Heights Study Area

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Missouri Heights Mountain Meadow Ditch Diversion Records

Diversion Summary in Acre Feet

YEAR	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOTAL
1994	115	148	148	134	148	143	1948	253	0	0	0	0	**3038**
1995	66	62	62	56	40	621	2512	3009	1472	8	0	0	**7906**
1996	101	105	105	98	135	800	2938	1313	0	0	0	0	**5595**
1997	60	62	62	56	33	238	2641	1675	181	0	0	0	**5005**
1998	0	0	0	0	454	1579	2376	1984	123	0	0	0	**6515**
1999	0	0	0	0	464	687	2050	895	0	0	0	0	**4096**
2000	0	0	0	0	119	1436	2602	196	0	0	0	0	**4354**
2001	0	0	0	0	165	1081	2781	544	0	0	0	0	**4569**
2002	0	0	0	0	173	754	0	0	0	0	0	0	**927**
2003	0	0	0	0	20	1301	3158	699	0	0	0	0	**5178**
2004	0	0	0	0	286	1053	1102	14	0	0	0	0	**2455**
2005	0	0	0	0	79	1821	3195	1657	0	0	0	0	**6752**
2006	0	0	0	0	167	2381	2348	286	0	0	0	0	**5182**
2007	0	0	0	0	654	1839	1817	0	0	0	0	0	**4310**
2008	0	0	0	0	0	716	2504	2776	449	0	0	0	**6445**
2009	0	0	0	0	0	127	3300	1717	170	0	0	0	**5314**
2010	0	0	0	0	0	0	945	1537	0	0	0	0	**2482**
2011	0	0	0	0	0	193	1477	1617	279	0	0	0	**3566**
2012	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2013	0	0	0	0	386	646	1661	232	0	0	0	0	**2925**
1988-2008 Average	**23**	**25**	**25**	**23**	**196**	**1097**	**2265**	**1020**	**148**	**1**	**0**	**0**	**4822**
2009-2013 Average					**77**	**193**	**1477**	**1020**	**90**	**0**	**0**	**0**	**2857**

Note:

1: All of the diversions from the Mountain Meadow Ditch irrigated fields are located in Missouri Heights, so no reduction was take

2: Mountain Meadow Ditch diversions equal total diversions minus reservoir releases.

3: Per water commissioner comments, the 2009-2013 average was used in April and May 2011, due to lack of diversion records

RESOURCE ENGINEERING, INC.
909 Colorado Avenue / Glenwood Springs, CO 81601
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Missouri Heights Spring Park Reservoir Diversion Records

Diversion Summary in Acre Feet

YEAR	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOTAL
1994	0	0	0	0	0	0	1446	530	601	442	0	0	**3018**
1995	0	0	0	0	0	0	1203	3009	1490	792	470	41	**7005**
1996	0	0	0	0	0	0	2908	1313	649	704	188	59	**5822**
1997	0	0	0	0	0	0	1373	1440	805	531	0	0	**4149**
1998	0	0	0	0	0	0	1206	1294	481	603	190	83	**3856**
1999	0	0	0	0	14	305	419	573	565	399	104	324	**2703**
2000	0	0	0	0	0	79	988	657	639	194	0	109	**2666**
2001	0	0	0	0	0	0	1079	480	553	449	250	104	**2915**
2002	0	0	0	0	0	373	240	20	0	0	0	0	**633**
2003	0	0	0	0	0	59	698	369	0	0	0	0	**1126**
2004	0	0	0	0	0	0	679	14	0	0	0	0	**693**
2005	0	0	0	0	0	0	1686	1206	0	0	0	0	**2892**
2006	0	0	0	0	0	59	1458	286	0	0	0	0	**1804**
2007	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2008	0	0	0	0	0	0	331	1853	232	0	0	0	**2416**
2009	0	0	0	0	0	0	649	844	555	959	431	0	**3438**
2010	0	0	0	0	0	0	0	1195	428	527	423	0	**2573**
2011	0	0	0	0	0	0	0	1617	831	916	835	111	**4310**
2012	0	0	0	0	0	0	791	0	0	0	0	0	**791**
2013	0	0	0	0	0	0	2	746	1187	151	0	0	**2086**
1994-2008 Average						**58**	**1048**	**870**	**401**	**274**	**80**	**48**	**2780**
2009-2013 Average							**289**	**880**	**600**	**511**	**338**	**22**	**2640**

Note:

1: All of the diversions from the Mountain Meadow Ditch irrigated fields are located in Missouri Heights, so no reduction was taken.

2: Sprink Park Reservoir Diversions equal Mountain Meadow Ditch diversions minus diversions from cattle creek, Equals direct flow plus releases.

RESOURCE ENGINEERING, INC.
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APPENDIX D: ACZ WATER QUALITY LAB RESULTS

Resource Engineering, Inc.
Project ID: 033-8.1.5
Sample ID: HART WELL

ACZ Sample ID: ***L73595-01***
Date Sampled: *12/17/08 15:30*
Date Received: *12/18/08*
Sample Matrix: *Ground Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	40.3			mg/L	0.2	1	12/22/08 20:01	ear
Magnesium, dissolved	M200.7 ICP	22.8			mg/L	0.2	1	12/26/08 15:17	ear
Potassium, dissolved	M200.7 ICP	0.9	B		mg/L	0.3	2	12/22/08 20:01	ear
Sodium, dissolved	M200.7 ICP	49.9			mg/L	0.3	2	12/22/08 20:01	ear

Wet Chemistry

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration								
Bicarbonate as CaCO3		237			mg/L	2	20	12/20/08 0:00	abm
Carbonate as CaCO3		7	B		mg/L	2	20	12/20/08 0:00	abm
Hydroxide as CaCO3			U		mg/L	2	20	12/20/08 0:00	abm
Total Alkalinity		244		*	mg/L	2	20	12/20/08 0:00	abm
Cation-Anion Balance	Calculation								
Cation-Anion Balance		0.8			%			12/30/08 0:00	calc
Sum of Anions		6.0			meq/L	0.1	0.5	12/30/08 0:00	calc
Sum of Cations		6.1			meq/L	0.1	0.5	12/30/08 0:00	calc
Chloride	SM4500Cl-E	11		*	mg/L	1	5	12/26/08 12:41	aml
Conductivity @25C	SM2510B	515			umhos/cm	1	10	12/20/08 3:01	abm
Hardness as CaCO3	SM2340B - Calculation	194			mg/L	1	7	12/30/08 0:00	calc
Lab Filtration	SM 3030 B			*				12/18/08 13:28	gkj
Lab Filtration & Acidification	SM 3030 B			*				12/18/08 14:22	kah
Nitrate as N, dissolved	Calculation: NO3NO2 minus NO2	0.42			mg/L	0.02	0.1	12/30/08 0:00	calc
Nitrate/Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	0.42			mg/L	0.02	0.1	12/18/08 18:40	pjb
Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction		U	*	mg/L	0.01	0.05	12/18/08 18:40	pjb
pH (lab)	SM4500H+ B								
pH		8.4	H		units	0.1	0.1	12/20/08 0:00	abm
pH measured at		23.0			C	0.1	0.1	12/20/08 0:00	abm
Residue, Filterable (TDS) @180C	SM2540C	360			mg/L	10	20	12/19/08 16:02	jlf
Sulfate	SM4500 SO4-D	40	B		mg/L	10	50	12/18/08 14:31	kah
TDS (calculated)	Calculation	316			mg/L	10	50	12/30/08 0:00	calc
TDS (ratio - measured/calculated)	Calculation	1.14						12/30/08 0:00	calc
Turbidity	M180.1 - Nephelometric	6.8		*	NTU	0.1	0.5	12/18/08 13:04	gkj

Resource Engineering, Inc.
Project ID: 033.8.1.5
Sample ID: PIETSCH WELL

ACZ Sample ID: ***L72807-02***
Date Sampled: *10/31/08 15:00*
Date Received: *11/03/08*
Sample Matrix: *Ground Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	0.4	B		mg/L	0.2	1	11/13/08 17:42	aeh
Magnesium, dissolved	M200.7 ICP	0.3	B		mg/L	0.2	1	11/13/08 17:42	aeh
Potassium, dissolved	M200.7 ICP	0.3	B		mg/L	0.3	2	11/13/08 17:42	aeh
Sodium, dissolved	M200.7 ICP	115			mg/L	0.3	2	11/13/08 17:42	aeh

Wet Chemistry

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration								
Bicarbonate as CaCO3		218			mg/L	2	20	11/06/08 0:00	abm
Carbonate as CaCO3		4	B		mg/L	2	20	11/06/08 0:00	abm
Hydroxide as CaCO3			U		mg/L	2	20	11/06/08 0:00	abm
Total Alkalinity		221			mg/L	2	20	11/06/08 0:00	abm
Cation-Anion Balance	Calculation								
Cation-Anion Balance		1.0			%			11/18/08 0:00	calc
Sum of Anions		5.0			meq/L	0.1	0.5	11/18/08 0:00	calc
Sum of Cations		5.1			meq/L	0.1	0.5	11/18/08 0:00	calc
Chloride	SM4500Cl-E	5			mg/L	1	5	11/11/08 13:14	jjg
Conductivity @25C	SM2510B	440			umhos/cm	1	10	11/06/08 20:42	abm
Hardness as CaCO3	SM2340B - Calculation	2	B		mg/L	1	7	11/18/08 0:00	calc
Lab Filtration	SM 3030 B			*				11/03/08 12:29	abm
Lab Filtration & Acidification	SM 3030 B			*				11/03/08 16:44	abm
Nitrate as N, dissolved	Calculation: NO3NO2 minus NO2	0.43			mg/L	0.02	0.1	11/18/08 0:00	calc
Nitrate/Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	0.43	H	*	mg/L	0.02	0.1	11/04/08 18:39	pjb
Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction		UH	*	mg/L	0.01	0.05	11/04/08 18:39	pjb
pH (lab)	SM4500H+ B								
pH		8.3	H		units	0.1	0.1	11/06/08 0:00	abm
pH measured at		22.0			C	0.1	0.1	11/06/08 0:00	abm
Residue, Filterable (TDS) @180C	SM2540C	300			mg/L	10	20	11/04/08 15:33	abm
Sulfate	SM4500 SO4-D	20	B		mg/L	10	50	11/10/08 12:31	abm
TDS (calculated)	Calculation	278			mg/L	10	50	11/18/08 0:00	calc
TDS (ratio - measured/calculated)	Calculation	1.08						11/18/08 0:00	calc
Turbidity	M180.1 - Nephelometric		UH	*	NTU	0.1	0.5	11/04/08 9:56	kah

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Resource Engineering, Inc.
Project ID: 033.8.1.5
Sample ID: ELMORE WELL

ACZ Sample ID: ***L72807-01***
Date Sampled: *10/31/08 13:45*
Date Received: *11/03/08*
Sample Matrix: *Ground Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	47.4			mg/L	0.2	1	11/13/08 17:39	aeh
Magnesium, dissolved	M200.7 ICP	29.9			mg/L	0.2	1	11/13/08 17:39	aeh
Potassium, dissolved	M200.7 ICP	2.2			mg/L	0.3	2	11/13/08 17:39	aeh
Sodium, dissolved	M200.7 ICP	21.9			mg/L	0.3	2	11/13/08 17:39	aeh

Wet Chemistry

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration								
Bicarbonate as CaCO3		250			mg/L	2	20	11/06/08 0:00	abm
Carbonate as CaCO3			U		mg/L	2	20	11/06/08 0:00	abm
Hydroxide as CaCO3			U		mg/L	2	20	11/06/08 0:00	abm
Total Alkalinity		252			mg/L	2	20	11/06/08 0:00	abm
Cation-Anion Balance	Calculation								
Cation-Anion Balance		-0.9			%			11/18/08 0:00	calc
Sum of Anions		5.9			meq/L	0.1	0.5	11/18/08 0:00	calc
Sum of Cations		5.8			meq/L	0.1	0.5	11/18/08 0:00	calc
Chloride	SM4500Cl-E	9			mg/L	1	5	11/11/08 13:13	jjg
Conductivity @25C	SM2510B	489			umhos/cm	1	10	11/06/08 20:34	abm
Hardness as CaCO3	SM2340B - Calculation	241			mg/L	1	7	11/18/08 0:00	calc
Lab Filtration	SM 3030 B			*				11/03/08 12:27	abm
Lab Filtration & Acidification	SM 3030 B			*				11/03/08 16:35	abm
Nitrate as N, dissolved	Calculation: NO3NO2 minus NO2	3.35			mg/L	0.06	0.3	11/18/08 0:00	calc
Nitrate/Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	3.35	H	*	mg/L	0.06	0.3	11/04/08 19:05	pjb
Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction		UH	*	mg/L	0.01	0.05	11/04/08 18:37	pjb
pH (lab)	SM4500H+ B								
pH		8.3	H		units	0.1	0.1	11/06/08 0:00	abm
pH measured at		22.0			C	0.1	0.1	11/06/08 0:00	abm
Residue, Filterable (TDS) @180C	SM2540C	310			mg/L	10	20	11/04/08 15:33	abm
Sulfate	SM4500 SO4-D	20	B		mg/L	10	50	11/10/08 12:28	abm
TDS (calculated)	Calculation	295			mg/L	10	50	11/18/08 0:00	calc
TDS (ratio - measured/calculated)	Calculation	1.05						11/18/08 0:00	calc
Turbidity	M180.1 - Nephelometric	0.3	BH	*	NTU	0.1	0.5	11/04/08 9:56	kah

** Please refer to Qualifier Reports for details.*

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Inorganic Analytical Results

Resource Engineering, Inc.
Project ID: 033-8.1.6
Sample ID: HART WELL

ACZ Sample ID: ***L15739-01***
Date Sampled: *11/22/13 10:30*
Date Received: *11/25/13*
Sample Matrix: *Ground Water*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	41			mg/L	0.2	1	12/03/13 13:58	aeb
Magnesium, dissolved	M200.7 ICP	1	21			mg/L	0.2	1	12/03/13 13:58	aeb
Potassium, dissolved	M200.7 ICP	1	1.4	B		mg/L	0.3	2	12/03/13 13:58	aeb
Sodium, dissolved	M200.7 ICP	1	48.7			mg/L	0.3	2	12/03/13 13:58	aeb

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	229			mg/L	2	20	12/04/13 0:00	khw
Carbonate as CaCO3		1	9	B		mg/L	2	20	12/04/13 0:00	khw
Hydroxide as CaCO3		1		U		mg/L	2	20	12/04/13 0:00	khw
Total Alkalinity		1	238			mg/L	2	20	12/04/13 0:00	khw
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.8			%			12/09/13 15:32	calc
Sum of Anions			5.9			meq/L	0.1	0.5	12/09/13 15:32	calc
Sum of Cations			6			meq/L	0.1	0.5	12/09/13 15:32	calc
Chloride	SM4500Cl-E	1	10		*	mg/L	1	5	12/05/13 15:46	mpb
Conductivity @25C	SM2510B	1	552			umhos/cm	1	10	12/04/13 20:15	khw
Hardness as CaCO3	SM2340B - Calculation		189			mg/L	1	7	12/09/13 15:32	calc
Lab Filtration (0.45um filter)	SOPWC050	1							12/04/13 10:48	abm
Lab Filtration (0.45um) & Acidification	M200.7/200.8	1							12/02/13 10:46	mfm
Nitrate as N, dissolved	Calculation: NO3NO2 minus NO2		0.42	H		mg/L	0.02	0.1	12/09/13 15:32	calc
Nitrate/Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	1	0.42	H	*	mg/L	0.02	0.1	11/26/13 22:49	pjb
Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	1		UH	*	mg/L	0.01	0.05	11/26/13 22:49	pjb
pH (lab)	SM4500H+ B									
pH		1	8.3	H		units	0.1	0.1	12/04/13 0:00	khw
pH measured at		1	22			C	0.1	0.1	12/04/13 0:00	khw
Residue, Filterable (TDS) @180C	SM2540C	1	340			mg/L	10	20	11/27/13 13:35	mss3
Sulfate	D516-02 - Turbidimetric	1	38.0		*	mg/L	1	5	12/05/13 18:12	mpb
TDS (calculated)	Calculation		305			mg/L	10	50	12/09/13 15:32	calc
TDS (ratio - measured/calculated)	Calculation		1.11						12/09/13 15:32	calc
Turbidity	M180.1 - Nephelometric	1	0.2	BH	*	NTU	0.1	0.5	12/02/13 14:21	dcw

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Resource Engineering, Inc.
Project ID: 033-8.1.6
Sample ID: PIETSCH WELL

ACZ Sample ID: ***L15739-02***
Date Sampled: *11/22/13 13:45*
Date Received: *11/25/13*
Sample Matrix: *Ground Water*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	35.7			mg/L	0.2	1	12/03/13 14:01	aeb
Magnesium, dissolved	M200.7 ICP	1	26.9			mg/L	0.2	1	12/03/13 14:01	aeb
Potassium, dissolved	M200.7 ICP	1	2.7			mg/L	0.3	2	12/03/13 14:01	aeb
Sodium, dissolved	M200.7 ICP	1	14.6			mg/L	0.3	2	12/03/13 14:01	aeb

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	192			mg/L	2	20	12/04/13 0:00	khw
Carbonate as CaCO3		1	7	B		mg/L	2	20	12/04/13 0:00	khw
Hydroxide as CaCO3		1		U		mg/L	2	20	12/04/13 0:00	khw
Total Alkalinity		1	200			mg/L	2	20	12/04/13 0:00	khw
Cation-Anion Balance	Calculation									
Cation-Anion Balance			1.1			%			12/09/13 15:32	calc
Sum of Anions			4.6			meq/L	0.1	0.5	12/09/13 15:32	calc
Sum of Cations			4.7			meq/L	0.1	0.5	12/09/13 15:32	calc
Chloride	SM4500Cl-E	1	6		*	mg/L	1	5	12/05/13 15:47	mpb
Conductivity @25C	SM2510B	1	434			umhos/cm	1	10	12/04/13 20:24	khw
Hardness as CaCO3	SM2340B - Calculation		200			mg/L	1	7	12/09/13 15:32	calc
Lab Filtration (0.45um filter)	SOPWC050	1							12/04/13 10:51	abm
Lab Filtration (0.45um) & Acidification	M200.7/200.8	1							12/02/13 10:46	mfm
Nitrate as N, dissolved	Calculation: NO3NO2 minus NO2		0.31	H		mg/L	0.02	0.1	12/09/13 15:32	calc
Nitrate/Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	1	0.31	H	*	mg/L	0.02	0.1	11/26/13 22:50	pjb
Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	1		UH	*	mg/L	0.01	0.05	11/26/13 22:50	pjb
pH (lab)	SM4500H+ B									
pH		1	8.4	H		units	0.1	0.1	12/04/13 0:00	khw
pH measured at		1	21			C	0.1	0.1	12/04/13 0:00	khw
Residue, Filterable (TDS) @180C	SM2540C	1	270			mg/L	10	20	11/27/13 13:36	mss3
Sulfate	D516-02 - Turbidimetric	1	20.4		*	mg/L	1	5	12/05/13 18:12	mpb
TDS (calculated)	Calculation		228			mg/L	10	50	12/09/13 15:32	calc
TDS (ratio - measured/calculated)	Calculation		1.18						12/09/13 15:32	calc
Turbidity	M180.1 - Nephelometric	1	0.2	BH	*	NTU	0.1	0.5	12/02/13 14:22	dcw

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Resource Engineering, Inc.
Project ID: 033-8.1.6
Sample ID: ELMORE WELL

ACZ Sample ID: ***L15739-03***
Date Sampled: *11/22/13 14:30*
Date Received: *11/25/13*
Sample Matrix: *Ground Water*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Calcium, dissolved	M200.7 ICP	1	46.8			mg/L	0.2	1	12/03/13 14:04	aeb
Magnesium, dissolved	M200.7 ICP	1	28.4			mg/L	0.2	1	12/03/13 14:04	aeb
Potassium, dissolved	M200.7 ICP	1	2.3			mg/L	0.3	2	12/03/13 14:04	aeb
Sodium, dissolved	M200.7 ICP	1	22.2			mg/L	0.3	2	12/03/13 14:04	aeb

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	226			mg/L	2	20	12/04/13 0:00	khw
Carbonate as CaCO3		1	6	B		mg/L	2	20	12/04/13 0:00	khw
Hydroxide as CaCO3		1		U		mg/L	2	20	12/04/13 0:00	khw
Total Alkalinity		1	232			mg/L	2	20	12/04/13 0:00	khw
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.9			%			12/09/13 15:32	calc
Sum of Anions			5.6			meq/L	0.1	0.5	12/09/13 15:32	calc
Sum of Cations			5.7			meq/L	0.1	0.5	12/09/13 15:32	calc
Chloride	SM4500Cl-E	1	11		*	mg/L	1	5	12/05/13 15:47	mpb
Conductivity @25C	SM2510B	1	527			umhos/cm	1	10	12/04/13 20:32	khw
Hardness as CaCO3	SM2340B - Calculation		234			mg/L	1	7	12/09/13 15:32	calc
Lab Filtration (0.45um filter)	SOPWC050	1							12/04/13 10:53	abm
Lab Filtration (0.45um) & Acidification	M200.7/200.8	1							12/02/13 10:47	mfm
Nitrate as N, dissolved	Calculation: NO3NO2 minus NO2		2.81	H		mg/L	0.06	0.3	12/09/13 15:32	calc
Nitrate/Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	3	2.81	H	*	mg/L	0.06	0.3	11/27/13 2:02	pjb
Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	1		UH	*	mg/L	0.01	0.05	11/26/13 22:51	pjb
pH (lab)	SM4500H+ B									
pH		1	8.3	H		units	0.1	0.1	12/04/13 0:00	khw
pH measured at		1	21			C	0.1	0.1	12/04/13 0:00	khw
Residue, Filterable (TDS) @180C	SM2540C	1	330			mg/L	10	20	11/27/13 13:38	mss3
Sulfate	D516-02 - Turbidimetric	1	23.1		*	mg/L	1	5	12/05/13 18:12	mpb
TDS (calculated)	Calculation		285			mg/L	10	50	12/09/13 15:32	calc
TDS (ratio - measured/calculated)	Calculation		1.16						12/09/13 15:32	calc
Turbidity	M180.1 - Nephelometric	1	0.1	BH	*	NTU	0.1	0.5	12/02/13 14:23	dcw

Arizona license number: AZ0102

** Please refer to Qualifier Reports for details.*

APPENDIX E: BLANEY-CRIDDLE CALCULATIONS

Title: Missouri Heights Groundwater Study

Crop Consumptive Use Estimate, Modified Blaney-Criddle methodology (S.C.S. Technical Release 21)
enter data in shaded cells
Crop = BLUEGRASS (utilizes Pochop Borelli & Burman's temperature and growth stage coefficients and elevation factors)

Climate Data source: BWCD Weather Station

	Month #	Day #	Date
Start of Growing Season =	4	27	117
End of Growing Season =	10	11	284
Season Length (inclusive) =	168	days	

Latitute (deg.min) = 39.43 39.72 Decimal Degrees

Depth of Application (in) = 1

Elevation (ft) = 6700
Elevation Factor = 1.07 (+2.865% per 1,000 ft above 4,429 ft)

Month	Temp (°F)	Precip. (in.)
Jan	21.9	1.2
Feb	24.2	1.2
Mar	35.0	1.1
Apr	41.2	2.0
May	50.5	1.4
Jun	61.4	0.8
Jul	65.5	1.6
Aug	63.5	0.9
Sep	56.0	1.2
Oct	43.2	1.4
Nov	32.9	0.9
Dec	22.9	1.5
Annual		15.14

Growing Period	Avg. Period Temp (°F)	% Daylight	(t*p)/100	Kt	Growth Stage Coefficient Kc	Consumptive Crop Demand (in.)	Period Precip. (in.)	Period Effective Precip. (in.)	Consumptive Irrigation Requirment (in.)	Consumptive Irrigation Requirment (ft.)
Jan										
Feb										
Mar										
Apr	45.2	1.24	0.56	0.80	0.97	0.46	0.27	0.10	0.36	0.03
May	50.5	10.01	5.06	0.82	1.00	4.39	1.43	0.83	3.57	0.30
Jun	61.4	10.02	6.15	0.85	1.10	6.14	0.81	0.52	5.61	0.47
Jul	65.5	10.19	6.68	0.87	1.06	6.52	1.55	1.00	5.52	0.46
Aug	63.5	9.56	6.07	0.86	0.98	5.44	0.90	0.56	4.88	0.41
Sep	56.0	8.37	4.69	0.83	0.97	4.04	1.19	0.68	3.36	0.28
Oct	47.4	2.83	1.34	0.81	0.89	1.03	0.48	0.22	0.80	0.07
Nov										
Dec										
Annual						28.02	6.64	3.92	24.10	2.0

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APPENDIX F: PRECIPITATION LAG RESULTS