Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A1-01	**Interpretation of Groundwater Age:** Inconclusive, may be a mix of shallow and deeper waters.
Watershed	Alum Gulch	
Monitoring Period	12/2016 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from zero to 34.2 gpm. No changes are predicted at this site.
Number of Visits	13	

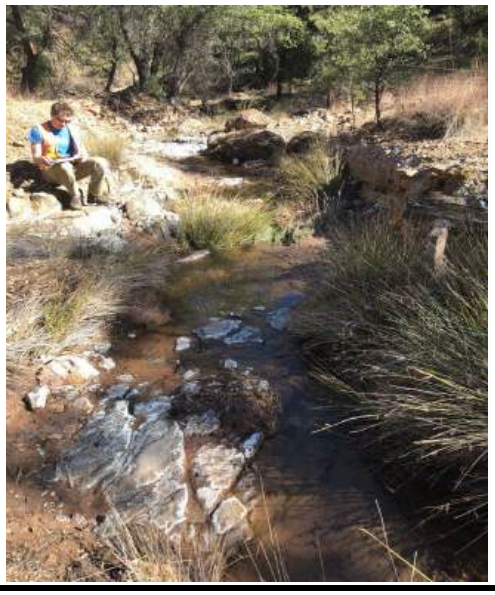
Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/24/2018	0.00	3.74	32.5	3051	12/29/2016	1.35	3.94	11.5	2923
5/28/2019	<0.25	3.95	21.8	2283	10/23/2017	<0.25	3.87	14.4	2495
6/12/2020	<0.25	3.75	29.1	2330	11/27/2018	0.00	4.10	12.5	1305
1/18/2021	Dry				12/3/2019	34.20	3.45	12.3	638
3/22/2021	0.00	4.10	15	3120	10/15/2020	0.00	4.18	17.6	2020
5/19/2021	Dry				8/24/2021	27.80	3.49	21.2	1342
					11/16/2021	0.02	4.03	11.1	2068

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/24/2018	Iron, lead, nickel, cadmium, copper, zinc, selenium, pH	12/29/2016	Lead, nickel, cadmium, copper zinc, pH
5/28/2019	Lead, cadmium, copper, zinc, selenium, pH	10/23/2017	Lead, nickel, cadmium, copper, zinc, selenium, pH
6/12/2020	Iron, lead, nickel, cadmium, copper, zinc, selenium, pH	11/27/2018	Lead, cadmium, copper, zinc, pH
1/18/2021	Site was dry	12/3/2019	Cyanide, lead, cadmium, copper, zinc, pH
5/19/2021	Site was dry	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
		11/16/2021	Lead, cadmium, copper, zinc, pH, DO

Aquatic and Vegetation Survey Findings: This site is located within a section of Alum Gulch with some exposed bedrock. Water is generally present pre-monsoon and during monsoon in shallow flowing runs. Riparian obligate rushes (*Juncus* spp.) occur along perimeter where soil is present. Overstory tree coverage is limited to oaks [*Quercus* spp.] with no riparian tree species present. Invasive plants observed include Lehmann lovegrass (*Eragrostis lehmanniana*) and weeping lovegrass (*Eragrostis curvula*). Aquatic invertebrates, including beetles, boatmen, and backswimmers, have been observed. No aquatic vertebrates have been observed.

Dry Season Photo (5/24/2018)	Wet Season Photo (11/27/2018)
	
Dry Season Photo (5/28/2019)	**Wet Season Photo (12/3/2019)**
	

Dry Season Photo (6/15/2020)	Wet Season Photo (10/15/2020)
	
Dry Season Photo (05/19/2021)	**Wet Season Photo (08/24/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A3-01	**Interpretation of Groundwater Age:** Inconclusive, may be a mix of shallow and deeper waters.
Watershed	Alum Gulch	
Monitoring Period	10/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 63.2 gpm. In the first 4 years, there may be up to 0.01 gpm decrease in flow.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					10/23/2017	<0.25	3.84	15.7	1883
5/24/2018	<0.25	3.71	20.4	2104	11/27/2018	1.50	4.60	12.9	1933
5/28/2019	1.00	3.74	20.0	1916	12/3/2019	63.20	4.73	11.4	551
6/12/2020	<0.25	3.56	27.8	1741	10/15/2020	<0.25	3.38	19.2	2001
1/18/2021	0.00	3.78	3.8	2269	8/24/2021	25.00	4.11	22.8	1461
3/22/2021	0.13	4.04	19.6	2576	11/26/2021	0.51	4.01	14.9	1849
5/19/2021	<0.01	3.78	30.9	2600					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		10/23/2017	Cyanide, iron, lead, cadmium, copper, zinc, selenium, pH
5/24/2018	Iron, lead, nickel, cadmium, copper, zinc, pH	11/27/2018	Cyanide, lead, mercury, cadmium, copper, zinc, pH
5/28/2019	Lead, cadmium, copper, zinc, pH	12/3/2019	Cyanide, lead, cadmium, copper, zinc, selenium, pH
6/12/2020	Iron, lead, nickel, cadmium, copper, zinc, selenium, pH	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/18/2021	Lead, cadmium, copper, zinc, pH, DO	11/26/2021	Lead, cadmium, copper, zinc, iron, pH, DO
5/19/2021	Lead, cyanide, cadmium, copper, nickel, zinc, iron, pH, DO		

Aquatic and Vegetation Survey Findings: Site is located in sandy, gravelly section of Alum Gulch lined with a thick cover of riparian obligate plants including rushes (*Juncus* spp.) as well as deergrass (*Muhlenbergia rigens*) and Johnsongrass (*Sorghum halepense*). Overstory tree coverage is limited to upland tree species (oak [*Quercus* sp.] and juniper [*Juniperus* sp.]) within the drainage. Drainage and hillside vegetation dominated by oak woodland and grasses. Water present pre-monsoon and during monsoon in shallow flowing runs. Aquatic invertebrates including beetles, boatmen, and backswimmers have been observed. No aquatic vertebrates have been observed. Deer tracks near the site have been noted. Invasive plant species observed are Lehmann lovegrass (*Eragrostis lehmanniana*) and Bermudagrass (*Cynodon dactylon*).

Dry Season Photo (5/24/2018)	Wet Season Photo (11/27/2018)
	
Dry Season Photo (5/28/2019)	**Wet Season Photo (12/3/2019)**
	

Dry Season Photo (6/12/2020)	Wet Season Photo (10/15/2020)
	
Dry Season Photo (05/19/2021)	**Wet Season Photo (08/24/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A3-02	**Interpretation of Groundwater Age:** Evaporative, modern during the dry season. Deeper groundwater dominant, modern during the wet season. Source is both surface water and groundwater during the dry season with a greater contribution from groundwater during the wet season.
Watershed	Alum Gulch	
Monitoring Period	04/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 gpm to 24.5 gpm. In the first 4 years, there may be up to 0.04 gpm decrease in flow.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
4/28/2017	0.00	3.86	12.3	3484					
5/23/2018	0.00	3.70	29.9	5897	11/27/2018	1.50	4.10	11.7	1447
5/28/2019	0.70	3.98	21.4	2050	12/3/2019	Not Measured[1]	4.85	11.3	544
6/12/2020	<0.25	3.72	31.5	1641	10/15/2020	0.00	4.31	20.1	3650
1/18/2021	0.18	4.01	2.4	2412	8/24/2021	24.50	4.12	26.3	1367
3/22/2021	0.28	3.95	17.3	2829	11/16/2021	0.41	4.03	17.3	1941
5/19/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
4/28/2017	Nickel, cadmium, copper, zinc, pH		
5/23/2018	Iron, lead, manganese, nickel, cadmium, copper, zinc, selenium, pH	11/27/2018	Lead, cadmium, copper, zinc, pH
5/28/2019	Lead, cadmium, copper, zinc, selenium, pH	12/3/2019	Iron, lead, cadmium, copper, zinc, selenium, pH
6/12/2020	Lead, nickel, cadmium, copper, zinc, selenium, pH	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/18/2021	Cadmium, copper, lead, zinc, pH, DO	11/16/2021	Cadmium, copper, lead, zinc, pH, DO
5/19/2021	Dry		

Aquatic and Vegetation Survey Findings: Bedrock portion of Alum Gulch. No riparian overstory tree species present at the site. Some riparian obligate rushes (*Juncus* spp.) present along perimeter where soil is present. Typically dry during pre-monsoon visits (May and June). When water is present, it is available in pools and runs of shallow surface flow. Aquatic beetles and boatmen have been observed. No aquatic vertebrates have been observed. Drainage and hillside vegetation dominated by oak woodland. Invasive plant species observed are Lehmann lovegrass (*Eragrostis lehmanniana*) and Bermudagrass (*Cynodon dactylon*).

Dry Season Photo (5/23/2018)	Wet Season Photo (11/27/2018)
	

Notes [1]=Flows too high to measure with conventional methods

Dry Season Photo (5/28/2019)	Wet Season Photo (12/3/2019)
	

Dry Season Photo (6/12/2020)	Wet Season Photo (10/15/2020)
	
Dry Season Photo (05/19/2021)	**Wet Season Photo (08/24/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A3-03	**Interpretation of Groundwater Age:** Modern and evaporative during the dry season; deeper, modern source during the wet season. The source is primarily surface water during the dry season and groundwater during the wet season.
Watershed	Alum Gulch	
Monitoring Period	10/2017 - 12/2022	**Potential Impacts/Effects:** Flows observed at this site have ranged from near 0 to 34.5 gpm. In the first 4 years, there may be up to 0.04 gpm decrease in flow.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					10/24/2017	<0.25	3.84	10.5	2281
5/24/2018	<0.25	3.82	23.1	2727	11/27/2018	2.00	4.20	7.2	1452
5/28/2019	0.40	3.96	22.6	2033	12/3/2019	Not Measured[1]	4.52	11.3	549
6/12/2020	<0.25	3.85	23.5	1780	10/15/2020	<0.25	4.27	14.9	2080
1/18/2021	0.35	3.99	3.7	2018	8/23/2021	34.5	4.26	26.2	1364
3/22/2021	0.15	4.12	14.4	2018	11/18/2021	0.34	3.94	6.7	2091
5/19/2021	<0.01	3.84	20.4	4438					

Water Quality Exceedances

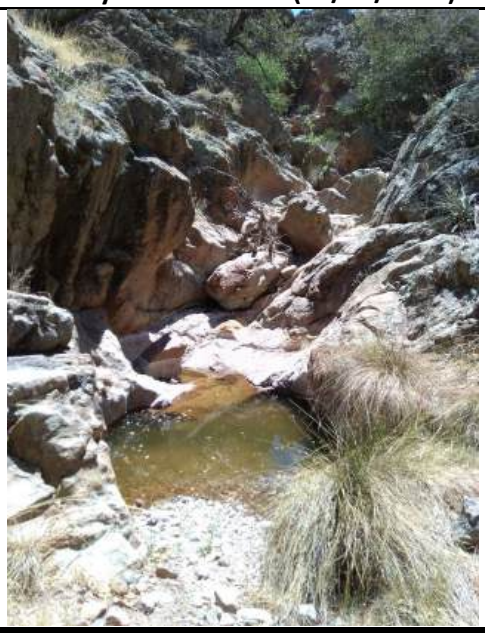
Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		10/24/2017	Lead, nickel, cadmium, copper, zinc, selenium, pH
5/24/2018	Iron, lead, nickel, cadmium, copper, zinc, selenium, pH	11/27/2018	Lead, cadmium, copper, zinc, pH
5/28/2019	Lead, cadmium, copper, zinc, selenium, pH	12/3/2019	Lead, cadmium, copper, zinc, selenium, pH
6/12/2020	Lead, cadmium, copper, zinc, selenium, pH	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/18/2021	Cadmium, copper, lead, zinc, pH, DO	11/18/2021	Cadmium, copper, lead, zinc, pH, DO
5/19/2021	Beryllium, cadmium, copper, lead, nickel, zinc, pH, DO		

Aquatic and Vegetation Survey Findings: Site is located in cobbly and rocky section of Alum Gulch with exposed bedrock. Water is present in pools. Aquatic beetles have been observed. No aquatic vertebrates have been observed along drainage. Overstory tree coverage is limited to upland tree species (oak [*Quercus* sp.] and juniper [*Juniperus* sp.]) within the drainage. Drainage and hillside vegetation dominated by oak woodland and grasses. Some riparian obligate rushes (*Juncus* spp.) present along perimeter of drainage channel.

Dry Season Photo (5/24/2018)	Wet Season Photo (11/27/2018)
	

Notes [1]=Flows too high to measure with conventional methods

Dry Season Photo (5/28/2019)	Wet Season Photo (12/3/2019)
	

Dry Season Photo (6/12/2020)	Wet Season Photo (10/15/2020)
	
Dry Season Photo (05/19/2021)	**Wet Season Photo (08/23/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A5-01
Watershed	Alum Gulch
Monitoring Period	12/2016 - 12/2021
Number of Visits	13

Interpretation of Groundwater Age: Source is modern but primarily deeper groundwater.

Potential Impacts/Effects: Flows observed at this site have ranged from 0 gpm to 19.1 gpm. In the first 4 years, there may be up to 0.01 gpm decrease in flow.

Flows and Field Parameters (pH, Temp, SC)

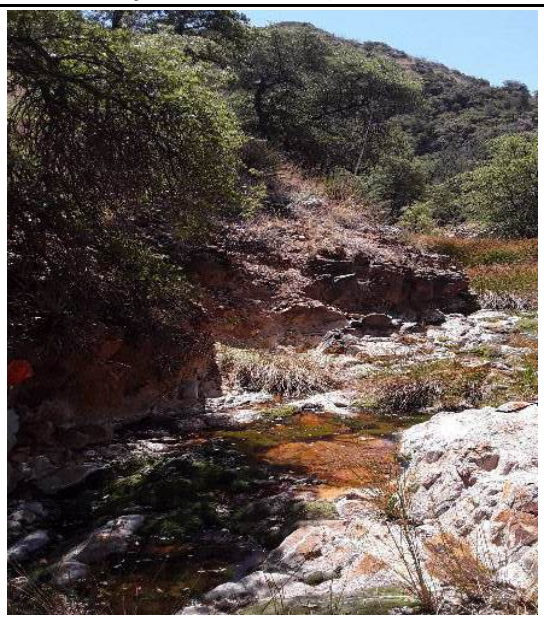
Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					12/29/2016	4.48	3.66	10.6	3680
					10/24/2017	0.00	3.57	16.9	3474
5/24/2018	0.00	3.57	25.3	3381	11/27/2018	1.50	3.00	13.2	1909
5/29/2019	1.00	3.67	26.4	2867	12/3/2019	Not Measured[1]	4.17	11.8	682
6/12/2020	0.04	8.42	22.8	2730	10/15/2020	0.03	3.55	16.5	2510
1/18/2021	0.36	3.49	8.5	4228	8/23/2021	19.1	3.76	25.6	1552
3/22/2021	0.5	3.63	17.2	3739	11/18/2021	0.10	3.69	7.7	2824
5/19/2021	<0.01	3.22	15.4	4228					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		12/29/2016	Iron, lead, manganese, mercury, nickel, silver, beryllium, cadmium, chromium, copper, zinc, pH
		10/24/2017	Iron, lead, manganese, nickel, beryllium, cadmium, copper, zinc, selenium, pH
5/24/2018	Iron, lead, manganese, nickel, beryllium, cadmium, copper, zinc, selenium, pH	11/27/2018	Lead, nickel, beryllium, cadmium, copper, zinc, pH
5/29/2019	Iron, lead, manganese, nickel, beryllium, cadmium, copper, zinc, selenium, pH	12/3/2019	Lead, cadmium, copper, zinc, selenium, pH
6/12/2020	Iron, lead, manganese, nickel, beryllium, cadmium, copper, zinc, selenium	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/18/2021	Beryllium, cadmium, copper, iron, lead, manganese, nickel, zinc, pH, DO	11/18/2021	Beryllium, cadmium, copper, iron, lead, nickel, zinc, pH, DO
5/19/2021	Beryllium, cadmium, copper, iron, lead, manganese, nickel, zinc, pH, DO		

Aquatic and Vegetation Survey Findings: Site is located in cobbly and rocky section of Alum Gulch with exposed bedrock. Generally, water is present in shallow pools and runs. Aquatic beetles and boatmen have been observed. No aquatic vertebrates have been observed. Overstory tree coverage is sparse within the drainage dominated by oak (*Quercus* spp.). Perimeter vegetation is dominated by riparian obligate rushes (*Juncus* spp.). Hillsides of drainage dominated by oak (*Quercus* spp.).

Dry Season Photo (5/24/2018)	Wet Season Photo (11/27/2018)
	
Notes [1]=Flows too high to measure with conventional methods	
Dry Season Photo (5/29/2019)	**Wet Season Photo (12/3/2019)**
	

Dry Season Photo (6/12/2020)	Wet Season Photo (10/15/2020)
	
Dry Season Photo (05/19/2021)	**Wet Season Photo (08/23/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A6-02
Watershed	Alum Gulch
Monitoring Period	04/2017 - 12/2021
Number of Visits	12

Interpretation of Groundwater Age: Evaporative and modern, source is surface water.

Potential Impacts/Effects: Flows observed at this site have ranged from 0 gpm to 30 gpm. In the first 4 years, there may be up to 0.01 gpm decrease in flow.

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
4/27/2017	0.00	6.60	24.0	2705	10/24/2017	0.00	3.46	21.8	2241
5/25/2018	0.00	3.65	16.8	2811	11/28/2018	5.10	4.00	7.5	1816
5/29/2019	0.24	3.83	25.2	2405	12/4/2019	Not Measured[1]	3.87	10.9	840
6/18/2020	<0.25	3.55	20.7	2780	10/14/2020	0.00	4.83	19.5	2020
1/19/2021	Dry				8/25/2021	30	3.69	28.3	1488
3/22/2021	0.11	3.79	20.2	4171	11/17/2021	0	3.87	15.5	2160

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
4/27/2017	Beryllium, zinc	10/24/2017	Iron, lead, nickel, beryllium, cadmium, copper, zinc, selenium, pH
5/25/2018	Iron, lead, nickel, beryllium, cadmium, copper, zinc, selenium, pH	11/28/2018	Lead, beryllium, cadmium, copper, zinc, selenium, pH
5/29/2019	Iron, lead, nickel, beryllium, cadmium, copper, zinc, selenium, pH	12/4/2019	Lead, cadmium, copper, zinc, selenium, pH
6/18/2020	Iron, lead, nickel, beryllium, cadmium, copper, zinc, selenium, pH	10/14/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/19/2021	Dry	11/17/2021	Beryllium, cadmium, copper, iron, lead, zinc, pH, DO

Aquatic and Vegetation Survey Findings: Site is located in exposed bedrock section of Alum Gulch. Generally, water is present in shallow pools. Aquatic beetles and boatmen have been observed. No aquatic vertebrates have been observed. Deer tracks have been noted at this site. No overstory tree coverage is present and perimeter vegetation is dominated by *Juncus balticus* . Hillsides of drainage dominated by oak (*Quercus* spp.). Invasive plant species observed are Lehmann lovegrass (*Eragrostis lehmanniana*) and Bermudagrass (*Cynodon dactylon*).

Dry Season Photo (5/25/2018)	Wet Season Photo (11/28/2018)
	
Notes [1]=Flows too high to measure with conventional methods	
Dry Season Photo (5/29/2019)	**Wet Season Photo (12/4/2019)**
	

Dry Season Photo (6/18/2020)	Wet Season Photo (10/14/2020)
	
Wet Season Photo (03/22/2021)	**Wet Season Photo (08/25/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A6-02T
Watershed	Alum Gulch
Monitoring Period	05/2018 - 12/2021
Number of Visits	11

Interpretation of Groundwater Age: Fairly consistent, modern, and lightly evaporative. Source is primarily surface water, may have a groundwater contribution during the dry season.

Potential Impacts/Effects: Flows observed at this site have ranged from 0 gpm to 9.4 gpm. In the first 4 years, there may be up to 0.01 gpm decrease in flow.

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/25/2018	0.00	6.46	18.7	2581	11/28/2018	5.10	4.60	8.9	1714
5/29/2019	0.28	4.20	28.5	2383	12/4/2019	Not Measured[1]	4.45	10.7	797
6/18/2020	<0.25	5.99	20.3	2290	10/14/2020	<0.25	6.52	18.6	2210
1/19/2021	0.00	5.70	6.9	2362	8/25/2021	9.40	6.70	26.5	820
3/22/2021	0.30	3.95	11.9	3822	11/17/2021	Dry			
5/18/2021	<0.01	6.40	23.8	2766					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/25/2018	Iron, lead, beryllium, zinc, pH	11/28/2018	Lead, beryllium, cadmium, copper, zinc, selenium, pH
5/29/2019	Iron, lead, nickel, beryllium, cadmium, copper, zinc, selenium, pH	12/4/2019	Lead, cadmium, copper, zinc, pH
6/18/2020	Iron, lead, beryllium, zinc, pH	10/14/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/19/2021	Unable to sample	11/17/2021	Dry
5/18/2021	Beryllium, iron, lead, zinc, pH, DO		

Aquatic and Vegetation Survey Findings: Site is located in exposed bedrock section of Alum Gulch. Generally, water is present in shallow pools. Aquatic beetles and boatmen have been observed. No aquatic vertebrates have been observed. Deer tracks and bear scat have been noted at this site. Overstory tree coverage is dominated by an individual Fremont cottonwood (*Populus fremontii*) and also includes oak (*Quercus* spp.) and mesquite (*Prosopis velutina*). Perimeter vegetation is dominated by riparian obligate rushes (*Juncus* spp.), deergrass (*Muhlenbergia rigens*), and cane bluestem (*Bothriochloa barbinodis*). Hillsides of drainage dominated by oak (*Quercus* spp.). Invasive plant species observed are Lehmann lovegrass (*Eragrostis lehmanniana*) and Bermudagrass (*Cynodon dactylon*).

Dry Season Photo (5/25/2018)	Wet Season Photo (11/28/2018)
	
Notes [1]=Flows too high to measure with conventional methods	
Dry Season Photo (5/29/2019)	**Wet Season Photo (12/4/2019)**
	

Dry Season Photo (6/18/2020)	Wet Season Photo (10/14/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/25/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A6-AD-01	**Interpretation of Groundwater Age:** Mix of modern and submodern water, consistent deep groundwater source through all seasons.
Watershed	Alum Gulch	
Monitoring Period	5/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 0.15 gpm. No changes are predicted at this site.
Number of Visits	13	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/2/2017	<0.25	7.41	10.7	1106	10/24/2017	0.08	6.50	14.0	1082
5/28/2018	<0.25	7.09	15.1	1075	11/27/2018	0.00	6.70	10.0	439
5/29/2019	<0.25	7.64	12.8	1039	12/4/2019	0.00	7.39	12.4	900
6/12/2020	<0.25	7.29	17.0	819	10/15/2020	<0.25	7.96	14.5	1203
1/18/2021	<0.01	6.98	7.6	1045	8/23/2021	0.15	7.98	18.4	1008
3/22/2021	<0.01	7.65	8.1	1077	11/18/2021	<0.01	6.74	10.7	1072
5/19/2021	<0.01	7.79	12.1	1072					

Water Quality Exceedances

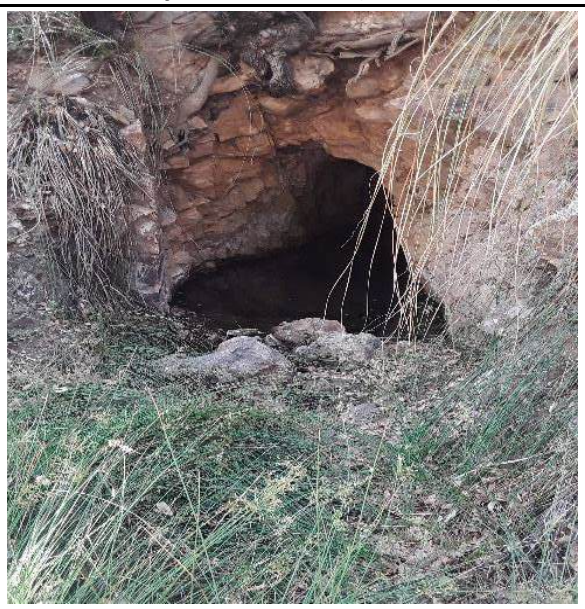
Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/2/2017	No Exceedances	10/24/2017	No Exceedances
5/28/2018	Iron, lead, arsenic, selenium	11/27/2018	No Exceedances
5/29/2019	Mercury	12/4/2019	Selenium
6/12/2020	Lead, cadmium, copper	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/18/2021	DO	11/18/2021	DO
5/19/2021	DO		

Aquatic and Vegetation Survey Findings: This site is located at an adit with a concrete spring box that retains water at the adit entrance within Alum Gulch. Rushes (*Juncus* spp.), a riparian obligate genus, and deergrass (*Muhlenbergia rigens*) are present at the adit opening. Overstory cover dominated by oak (*Quercus* spp.) with individual Fremont cottonwood (*Populus fremontii*), and Mexican pinyon (*Pinus cembroides*) present. Invasive plants observed include Bermudagrass (*Cynodon dactylon*) and horehound (*Marrubium vulgare*). Aquatic beetles have been observed. No aquatic vertebrates have been observed.

MONTGOMERY & ASSOCIATES

Dry Season Photo (5/28/2018)	Wet Season Photo (11/27/2018)
	
Dry Season Photo (5/29/2019)	**Wet Season Photo (12/4/2019)**
	

MONTGOMERY & ASSOCIATES

Dry Season Photo (6/12/2020)	Wet Season Photo (10/15/2020)
	
Dry Season Photo (05/19/2021)	**Wet Season Photo (08/23/2021)**
	

MONTGOMERY & ASSOCIATES

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A12-01	**Interpretation of Groundwater Age:** Lightly evaporative and modern. The source is surface and groundwater, with a more significant dry season groundwater contribution.
Watershed	Alum Gulch	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from trace to 40 gpm. In the first 4 years, there may be up to 0.01 gpm decrease in flow.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/2/2017	0.45	3.29	21.6	2271
5/29/2018	0.45	3.05	28.1	2601	11/28/2018	1.80	3.70	15.3	1544
5/30/2019	0.70	3.15	29.4	2323	12/7/2019	Not Measured[1]	3.86	14.5	959
6/18/2020	<0.25	2.93	30.8	2400	10/14/2020	<0.25	3.45	25.4	2270
1/19/2021	0.27	3.17	11.1	2344	8/25/2021	40.00	3.73	29.9	1374
3/18/2021	0.81	3.08	23.2	2707	11/17/2021	0.01	3.48	15.3	1935
5/18/2021	0.02	3.01	26.6	2755					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/2/2017	Lead, cadmium, copper, zinc, pH
5/29/2018	Lead, cadmium, copper, zinc, pH	11/28/2018	Lead, cadmium, copper, zinc, pH
5/30/2019	Lead, copper, zinc, pH	12/7/2019	Lead, cadmium, copper, zinc, pH
6/18/2020	Lead, cadmium, copper, zinc, pH	10/14/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/19/2021	Lead, cadmium, copper, zinc, pH	11/17/2021	Lead, cadmium, copper, zinc, pH
5/18/2021	Lead, cadmium, copper, zinc, pH		

Aquatic and Vegetation Survey Findings: Site is located in exposed bedrock section of Alum Gulch. Generally, water is present in shallow pools. No overstory tree coverage is present within the drainage at this site. Perimeter vegetation is dominated by riparian obligate *Juncus balticus* . Hillsides of drainage dominated by oaks (*Quercus* spp.). Invasive plant species observed are Lehmann lovegrass (*Eragrostis lehmanniana*).

Dry Season Photo (5/29/2018)	Wet Season Photo (11/28/2018)
	
Notes [1]=Flows too high to measure with conventional methods	
Dry Season Photo (5/30/2019)	**Wet Season Photo (12/7/2019)**
	

Dry Season Photo (6/18/2020)	Wet Season Photo (10/14/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/25/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A12-02	**Interpretation of Groundwater Age:** Mix of modern water with a deep groundwater contribution. Deep groundwater source dominates during the dry season.
Watershed	Alum Gulch	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 0.07. In the first 4 years, there may be up to 0.01 gpm decrease in flow.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/2/2017	<0.25	2.62	25.0	3414
5/29/2018	Dry				11/28/2018	Dry			
5/30/2019	Dry				12/7/2019	<0.25	2.49	19.3	2773
6/18/2020	<0.25	2.57	29.3	2570	10/14/2020	0.00	5.38	22.7	1607
1/19/2021	0.00	5.03	15.8	1725	8/25/2021	0.07	4.21	22.3	2507
3/18/2021	<0.01	5.33	17.4	1744	11/17/2021	0.00	5.08	19.5	1834
5/18/2021	0.00	5.48	19.6	1770					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/2/2017	Lead, arsenic, copper, zinc, pH
5/29/2018	Dry	11/28/2018	Dry
5/30/2019	Dry	12/7/2019	Lead, copper, zinc, pH
6/18/2020	Lead, arsenic, copper, zinc, pH	10/14/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/19/2021	copper, pH	11/17/2021	copper, pH
5/18/2021	pH		

Aquatic and Vegetation Survey Findings: Site is a seep located in exposed bedrock section of a tributary to Alum Gulch. When water is present, it is typically available in shallow pools. Moss is present within the drainage bottom. Emory oak (*Quercus emoryi*) and Toumey oak (*Quercus toumeyi*) provide limited overstory tree coverage. Generally, aquatic beetles, boatmen, and backswimmers are present within the Alum Gulch drainage. No aquatic vertebrates have been observed at this site.

Dry Season Photo (5/29/2018)	Wet Season Photo (11/28/2018)
	
Dry Season Photo (5/30/2019)	**Wet Season Photo (12/7/2019)**
No photo taken	

Dry Season Photo (6/18/2020)	Wet Season Photo (10/14/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/25/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A14-AD-01	**Interpretation of Groundwater Age:** Consistent deep groundwater source.
Watershed	Alum Gulch	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site are always near 0.1 gpm. No changes are predicted at this site.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/2/2017	<0.25	2.41	11.7	3787
5/29/2018		2.34	28.5	3375	11/28/2018	<0.25	2.30	11.9	3300
5/30/2019	<0.25	2.47	17.1	2552	12/7/2019	<0.25	2.25	12.7	2550
6/18/2020	<0.25	2.41	22.9	2300	10/14/2020	<0.25	2.93	19.2	2105
1/19/2021	0.08	2.56	9.7	2788	8/25/2021	0.26	2.33	19.5	3374
3/18/2021	0.12	2.57	13	3129	11/17/2021	0.00	2.4	11.8	3093
5/18/2021	0.04	2.33	15.7	2799					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/2/2017	Cadmium, copper, zinc, pH
5/29/2018	Lead, copper, zinc, pH	11/28/2018	Copper, zinc, pH
5/30/2019	Copper, zinc, pH	12/7/2019	Copper, zinc, pH
6/18/2020	Copper, zinc, pH	10/14/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/19/2021	Copper, zinc, pH	11/17/2021	Copper, zinc, pH
5/18/2021	Copper, lead, zinc, pH		

Aquatic and Vegetation Survey Findings: This site is located at an adit within a rocky section of Alum Gulch. Water is present in the adit and discharges into the drainage. A large moss mat and some riparian obligate rushes (*Juncus* spp.) are present at the adit entrance. Although there is no overstory canopy at the site, overstory tree species along the drainage are dominated by oak (*Quercus* spp.) and Chihuahuan pine (*Pinus leiophylla*). Aquatic invertebrates observed include damselflies, beetles, boatmen, and backswimmers. No aquatic vertebrates have been observed.

Dry Season Photo (5/29/2018)	Wet Season Photo (11/28/2018)
	
Dry Season Photo (5/30/2019)	**Wet Season Photo (12/7/2019)**
	

Dry Season Photo (6/18/2020)	Wet Season Photo (10/14/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/25/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	A15-01	**Interpretation of Groundwater Age:** Modern evaporative water, deeper source not evident.
Watershed	Alum Gulch	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0.04 to 50 gpm. No changes are predicted at this site.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/2/2017	0.90	3.10	12.2	2667
5/29/2018	<0.25	3.16	25.7	2976	11/28/2018	4.40	3.40	7.9	1762
5/30/2019	0.90	3.27	25.1	2142	12/7/2019	Not Measured[1]	3.55	11.3	1079
6/18/2020	<0.25	7.94	23.4	2990	10/14/2020	<0.25	4.21	19.9	2350
1/19/2021	0.46	3.21	7.2	1944	8/25/2021	50	3.39	24.4	1514
3/18/2021	0.83	3.22	11.8	2242	11/17/2021	0.33	3.18	9.3	1990
5/18/2021	0.04	3.08	20.6	352					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/2/2017	Lead, cadmium, copper, zinc, pH
5/29/2018	Lead, cadmium, copper, zinc, pH	11/28/2018	Cadmium, copper, zinc, pH
5/30/2019	Lead, cadmium, copper, zinc, pH	12/7/2019	Cadmium, copper, zinc, pH
6/18/2020	Lead, cadmium, copper, zinc	10/14/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/19/2021	Cadmium, copper, zinc, pH	11/17/2021	Cadmium, copper, zinc, pH
5/18/2021	Cadmium, copper, lead, selenium, manganese, zinc, pH		

Aquatic and Vegetation Survey Findings: This site is located in a bedrock section near downstream extent of Alum Gulch. Water is present in series of pools and runs. The site supports very little vegetation, but where pockets of soil exist in the bedrock, Baltic rush (*Juncus balticus*), a riparian obligate species, beargrass (*Nolina macrocarpa*), and moss occur sparingly. Although there is no overstory canopy at the site, overstory trees along the drainage are dominated by oak (*Quercus* spp.). Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) and invasive Lehmann lovegrass (*Eragrostis lehmanniana*) have been observed. Aquatic invertebrates observed within the Alum Gulch drainage include beetles, boatmen, and backswimmers. No aquatic vertebrates have been observed.

Dry Season Photo (5/29/2018)	Wet Season Photo (11/28/2018)
	
Notes [1]=Flows too high to measure with conventional methods	
Dry Season Photo (5/30/2019)	**Wet Season Photo (12/7/2019)**
	

Dry Season Photo (6/18/2020)	Wet Season Photo (10/14/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/25/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	AC1-01	**Interpretation of Groundwater Age:** Modern precipitation water influenced by deep groundwater.
Watershed	Adams Canyon	
Monitoring Period	5/2019-12/2021	**Potential Impacts/Effects:** No changes are predicted at this site.
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/22/2019	0.00	8.30	19.2	95.0	12/6/2019	0.00	6.33	12.3	37
7/2/2020	0.00	7.87	26.7	108	10/2/2020	0.00	7.87	24.5	97
1/20/2021	0.00	7.65	10.7	116	3/19/2021	0.00	7.71	13.4	128
5/17/2021	0.00	6.70	25.8	161	8/24/2021	0.00	6.70	31.5	146
11/17/2021	0.00	7.31	9.2	92.5					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/22/2019	Iron, lead, copper	12/6/2019	Iron, lead, copper, zinc, pH
7/2/2020	Iron, lead	10/2/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	No exceedances	11/17/2021	No exceedances
5/17/2021	Lead		

Aquatic and Vegetation Survey Findings: This site is a large earthen stock tank located within Adams Canyon drainage. Two willow trees (*Salix* sp.) occur as emergent and canopy vegetation for the tank. Perimeter vegetation is dominated by non-native barnyard grass (*Echinochloa crus-galli*) and riparian obligate spikerush (*Eleocharis* sp.). The upland overstory vegetation is dominated by Emory oak (*Quercus emoryi*). Invasive Bermudagrass (*Cynodon dactylon*) and American bullfrogs (*Lithobathes catesbeianus*) have been observed at this site.

Dry Season Photo (5/22/2019)	Wet Season Photo (12/6/2019)
	

Note [1]=Flows too high to measure with conventional methods

Dry Season Photo (7/2/2020)	Wet Season Photo (10/2/2020)
	

Dry Season Photo (05/17/2021)	Wet Season Photo (08/24/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	AC2-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Adams Canyon	
Monitoring Period	12/2019 - 12/2021	**Potential Impacts/Effects:** Site is consistently dry, however, when water was present, flow was 13 gpm.
Number of Visits	8	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					12/6/2019	13	6.6	12.6	92
7/2/2020	Dry				10/2/2020	Dry			
1/20/2021	Dry				8/24/2021	Dry			
3/19/2021	Dry				11/17/2021	Dry			
5/17/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		12/6/2019	Iron, lead copper
7/2/2020	Dry	10/2/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	Dry	11/17/2021	Dry
5/17/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located in a rocky, gravelly section of Adams Canyon drainage. This site was dry during one visit in 2019 and another in 2020. The overstory is dominated by oak (*Quercus* spp.) with some alligator juniper (*Juniperus deppeana*) and Arizona walnut (*Juglans major*) present. Dominant understory vegetation includes poison ivy (*Toxicodendron radicans*), grasses (*Aristida* sp.), pinyon ricegrass (*Piptochaetium fimbriatum*), and bullgrass (*Muhlenbergia emersleyi*). Invasive weeping lovegrass (*Eragrostis curvula*) has been observed. No aquatic invertebrates or vertebrates have been observed. Heavy grazing occurs at this site.

Dry Season Photo	Wet Season Photo (12/6/2019)
No photo taken	
Dry Season Photo (7/2/2020)	**Wet Season Photo (10/2/2020)**
	

Dry Season Photo (05/17/2021)	Wet Season Photo (08/24/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	BE1-02	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Blue Eagle	
Monitoring Period	5/2019-12/2021	**Potential Impacts/Effects:** Flows observed at this site during site visits have ranged from 0 to 0.65 gpm. No changes are predicted at this site.
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

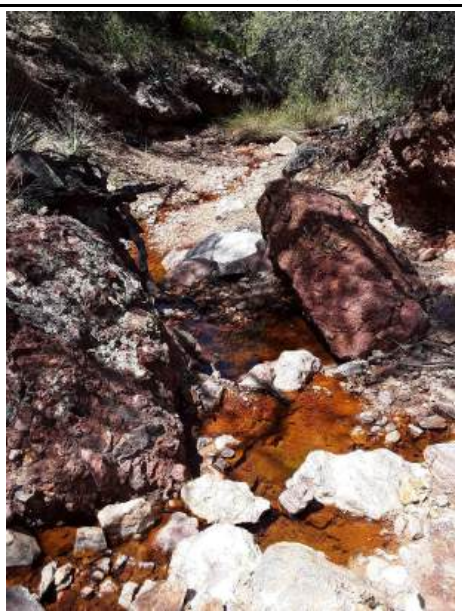
Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/27/2019	0.00	3.35	19.1	1264	12/11/2019	<0.25	3.11	11.5	1104
6/22/2020	<0.25	7.41	29.2	1352	10/21/2020	<0.25	2.80	21.6	1081
2/4/2021	0.12	3.18	10.4	1444	8/26/2021	0.65	3.26	24.7	960
3/24/2021	0.04	3.07	10.7	1487	11/23/2021	0.03	3.33	15.3	1296
5/25/2021	<0.01	3.15	27.3	1502					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/27/2019	Lead, copper, zinc, pH	12/11/2019	Lead, copper, zinc, pH
6/22/2020	Lead, copper, zinc	10/21/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/4/2021	Copper, lead, zinc, pH	11/23/2021	Copper, lead, zinc, pH
5/25/2021	Unable to sample		

Aquatic and Vegetation Survey Findings: This feature is a seep located within a section of exposed bedrock in Blue Eagle Canyon. Water is present in small pools. Herbaceous ground cover is dominated by riparian obligate Baltic rush (*Juncus balticus*). Also present is rockloving spikemoss (*Selaginella rupincola*) and sotol (*Dasylirion wheeleri*). Overstory vegetation is dominated by oaks (*Quercus* spp.). Aquatic invertebrates observed include backswimmers. No aquatic vertebrates have been observed.

Dry Season Photo (5/27/2019)	Wet Season Photo (12/11/2019)
	
Dry Season Photo (6/22/2020)	**Wet Season Photo (10/21/2020)**
	

Dry Season Photo (05/25/2021)	Wet Season Photo (08/26/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	BE1-AD-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Blue Eagle	
Monitoring Period	5/2019-12/2021	**Potential Impacts/Effects:** No flow has been measured at this site. No changes are predicted at this site.
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/27/2019	0.00	3.24	15.8	2582	12/11/2019	0.00	2.80	8.9	1143
6/22/2020	0.00	8.23	24.2	2390	10/21/2020	0.00	2.66	19.8	2290
2/4/2021	0.00	2.92	8.3	2710	8/26/2021	0.00	2.66	20.8	2064
3/24/2021	0.00	2.85	8.3	2858	11/23/2021	0.00	2.94	14.3	2862
5/25/2021	0.00	2.95	16.6	3038					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/27/2019	Lead, copper, zinc, pH	12/11/2019	Lead, copper, zinc, pH
6/22/2020	Lead, copper, zinc	10/21/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/4/2021	Copper, lead, zinc, pH	11/23/2021	Copper, zinc, pH
5/25/2021	Lead, zinc, pH		

Aquatic and Vegetation Survey Findings: This site is located at an adit within Blue Eagle Canyon with a rocky berm that dams water at the adit entrance. The site does not support emergent or perimeter vegetation. Oaks (*Quercus* spp.) dominate the overstory within the adjacent drainage. Rockloving spikemoss (*Selaginella rupincola*), hopbush (*Dodonaea viscosa*), and bullgrass (*Muhlenbergia emersleyi*) were also noted near the site. Aquatic invertebrates observed include beetles, boatmen, and backswimmers. No aquatic vertebrates have been observed.

Dry Season Photo (5/27/2019)	Wet Season Photo (12/11/2019)
	
Dry Season Photo (6/22/2020)	**Wet Season Photo (10/21/2020)**
	

Dry Season Photo (05/25/2021)	Wet Season Photo (08/26/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	Bog Hole	**Interpretation of Groundwater Age:** Isotope data was collected during the September 2021 event. Results will be assessed for determination of groundwater age after additional data is collected during the 2022 sampling events.
Watershed	San Rafael Valley	
Monitoring Period	5/2021 - 12/2021	**Potential Impacts/Effects:** Flows has not been observed at this site. Predictions will be made after additional data is obtained.
Number of Visits	3	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/27/2021	Dry				9/10/2021	0.00	6.78	27.39	162.2
					12/2/2021	0.00	7.21	11	264.8

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/27/2021	Dry	9/10/2021	Only Isotopes Collected
		12/2/2021	No exceedance

Aquatic and Vegetation Survey Findings: Ponded water fills massive Cienega in dammed drainage. When water is present, water ponds in the area about 500 feet long and 700 feet wide. Adjacent vegetation is semidesert grassland with scattered Fremont cottonwoods (*Populus fremontii*). During the 05/27/21 visit, a dead Sonoran mud turtle (*Kinosternon sonoriense*) and a monarch butterfly (*Danaus plexippus*) were observed.

Dry Season Photo (05/27/2021)

Wet Season Photo (09/10/2021)

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	C1-02	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Corral Canyon	
Monitoring Period	12/2018 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 0.01. This site has been dry during all dry season surveys suggesting the site is not in connection with a perennial groundwater source. No changes are predicted at this site.
Number of Visits	10	

Flows and Field Parameters (pH, Temp, SC)

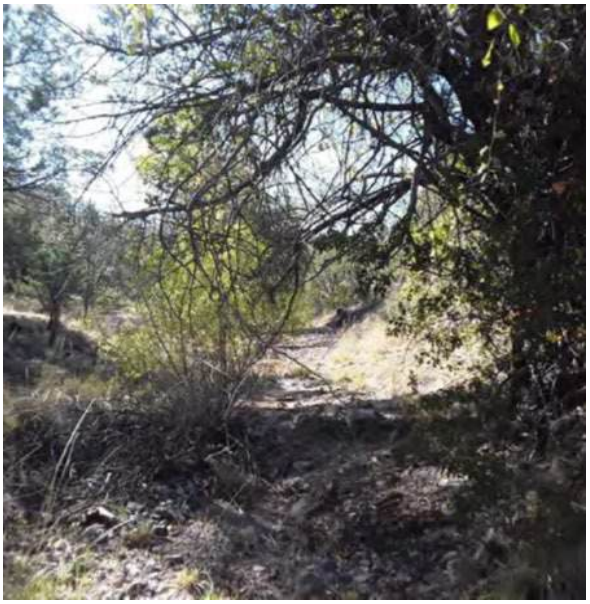
Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					12/2/2018	<0.25	8.30	7.20	507
5/23/2019	Dry				12/4/2019	0.00	8.15	11.3	261
6/16/2020	Dry				9/30/2020	Dry			
1/11/2021	Dry				8/26/2021	0.01	7.78	25.9	657
3/8/2021	Dry				11/15/2021	Dry			
5/17/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		12/2/2018	No Exceedances
5/23/2019	Dry	12/4/2019	No Exceedances
6/16/2020	Dry	9/30/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/11/2021	Dry	11/15/2021	Dry
5/17/2021	Dry		

Aquatic and Vegetation Survey Findings: This site occurs in a section of exposed bedrock within the Corral Canyon drainage. The site was dry during pre-monsoon visits in 2019, 2020, and 2021. The site is dominated by deergrass (*Muhlenbergia rigens*), alderleaf mountain mahogany (*Cercocarpus montanus*), Wright's silktassel (*Garrya wrightii*), and bulb panicgrass (*Panicum bulbosum*). Although no overstory tree cover exists at the site, Arizona white oak (*Quercus arizonica*) occurs along the drainage. Trace amounts of cupgrass (*Eriochloa* sp.) and seep monkeyflower (*Mimulus guttatus*), a wetland associated plant, were noted. Non-native beardless rabbitsfoot grass (*Polypogon viridis*) has been noted. No aquatic invertebrates or vertebrates have been observed.

Dry Season Photo	Wet Season Photo (12/2/2018)
No photo taken	
Dry Season Photo (5/23/2019)	**Wet Season Photo (12/4/2019)**
	

Dry Season Photo (6/16/2020)	Wet Season Photo (9/30/2020)
	
Dry Season Photo (05/17/2021)	**Wet Season Photo (08/26/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	C1-WELL-WM-01	**Interpretation of Groundwater Age:** Modern water during wet season, deep groundwater signature during dry season.
Watershed	Corral Canyon	
Monitoring Period	5/2017 - 12/2021	**Potential Impacts/Effects:** This site is not a seep or spring, site is fed by a well. Flows rarely observed at this site, however, have ranged from 0 to <0.25 gpm. No changes are predicted at this site.
Number of Visits	13	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Pumpung Rate (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Pumping Rate (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/7/2017		7.32	23.9	657	10/25/2017	0.00	6.93	29.9	611
5/17/2018		6.84	19.2	598	12/2/2018	<0.25	8.40	9.9	422
5/23/2019	0.00	8.36	25.4	468	12/4/2019	0.00	9.79	14.7	136
6/16/2020	0.00	8.74	30.0	300	9/30/2020	0.00	8.37	26.4	318
1/11/2021	0.02	7.25	2.6	518	8/26/2021	0.00	8.59	29.4	282
3/8/2021	0.00	6.88	21.4	659	11/15/2021	0.00	8.03	18.1	446
5/17/2021	0.01	7.16	21.6	635					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/3/2017	No Exceedances	10/25/2017	No Exceedances
5/17/2018	No Exceedances	12/2/2018	No Exceedances
5/23/2019	No Exceedances	12/4/2019	pH
6/16/2020	No Exceedances	9/30/2020	Wet season 2021 samples were not collected due to Covid-19 restrictions
1/11/2021	No Exceedances	11/15/2021	No Exceedances
5/17/2021	Copper		

Aquatic and Vegetation Survey Findings: This site is an above ground, metal, rectangular stock drinker (approx. 3m x 1m) fed by an adjacent windmill and well system in Corral Canyon. Submerged algae and *Chara* sp. have been observed within the drinker. The site supports no emergent vegetation and only limited perimeter vegetation in the form of cane bluestem (*Bothriochloa barbinodis*) and some Rocky Mountain rush (*Juncus saximontanus*). Upland vegetation surrounding the site is dominated by alligator juniper (*Juniperus deppeana*) and catclaw mimosa (*Mimosa aculeaticarpa* var. *biuncifera*). Aquatic beetles, water boatmen, backswimmers, snails, water striders, and dragonfly larvae have been observed. Invasive American bullfrog (*Lithobathes catesbeianus*) and black-necked gartersnake (*Thamnophis cyrtopsis*) have been observed at this drinker.

Dry Season Photo (5/17/2018)	Wet Season Photo (12/2/2018)
No Photo Taken	
Dry Season Photo (5/23/2019)	**Wet Season Photo (12/4/2019)**
	

Dry Season Photo (6/16/2020)	Wet Season Photo (9/30/2020)
	
Dry Season Photo (05/17/2021)	**Wet Season Photo (08/26/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	C5-WELL-ST-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Corral Canyon	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** This site is not a seep or spring, site is fed by a well. Flows rarely observed at this site, however, when there is flow, it ranges from 0 to 5.00. No changes are predicted at this site.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Pumping Rate (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Pumping Rate (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/6/2017	0.00	7.31	18.0	593
					12/2/2018	0.00	8.50	8.6	377
5/21/2019	0.00	8.17	17.8	359	12/4/2019	0.00	8.84	14.3	317
6/16/2020	0.00	7.07	22.0	466	10/5/2020	0.00	7.95	22.0	555
1/11/2021	5.00	7.16	16.8	537	8/26/2021	0.00	7.01	28.2	580
3/8/2021	0.00	7.47	15.9	574	11/15/2021	0.00	7.28	17.6	572
5/17/2021	1.00	7.31	24.1	560					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/6/2017	No Exceedances
		12/2/2018	No Exceedances
5/21/2019	No Exceedances	12/4/2019	No Exceedances
6/16/2020	No Exceedances	10/5/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/11/2021	No Exceedances	11/15/2021	No Exceedances
5/17/2021	Copper, Zinc		

Aquatic and Vegetation Survey Findings: This site is a metal, rectangular stock drinker (approx. 3.8m x 1m) sunk at ground-level, located in Corral Canyon. Submerged algae and *Chara* sp. have been observed within the drinker. Vegetation at the site is predominated by invasive Bermudagrass (*Cynodon dactylon*) and southwestern prickly poppy (*Argemone pleiacantha*). Cows have been noted at the site. Aquatic invertebrates observed include backswimmers, beetles, boatmen, dragonflies, and leeches. Invasive American bullfrogs (*Lithobathes catesbeianus*) have been observed in recent years at this site.

Dry Season Photo	Wet Season Photo (12/02/2018)
No photo taken.	
Dry Season Photo (5/21/2019)	**Wet Season Photo (12/4/2019)**
	

Dry Season Photo (6/16/2020)	Wet Season Photo (10/5/2020)
	
Dry Season Photo (05/17/2021)	**Wet Season Photo (08/26/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	CD1-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Chino Draw	
Monitoring Period	5/2019 - 12/2021	**Potential Impacts/Effects:** No flow has been measured at this site. No changes are predicted at this site.
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/22/2019	0.00	7.94	19.0	125	12/6/2019	0.00	5.96	12.6	44
7/6/2020	Dry				10/16/2020	Dry			
1/20/2021	Dry				8/25/2021	0.00	6.83	20.7	329
3/19/2021	Dry				11/17/2021	Dry			
5/17/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/22/2019	Iron, lead, copper	12/6/2019	Iron, lead, copper, pH
7/6/2020	Dry	10/16/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	Dry	11/17/2021	Dry
5/17/2021	Dry		

Aquatic and Vegetation Survey Findings: This site occurs in a gravelly/rocky channel of Chino Draw. The overstory vegetation is dominated by Emory oak (*Quercus emoryi*) and alligator juniper (*Juniperus deppeana*). Understory vegetation is dominated by skunkbush sumac (*Rhus trilobata*), pinyon ricegrass (*piptochaetium fimbriatum*), and other grama grasses (*Bouteloua* spp.), and invasive vegetation observed includes Lehmann lovegrass (*Eragrostis lehmanniana*). No aquatic invertebrates or vertebrates have been observed at this site.

Dry Season Photo (5/22/2019)	Wet Season Photo (12/6/2019)
	
Dry Season Photo (7/6/2020)	**Wet Season Photo (10/16/2020)**
	

Dry Season Photo (05/17/2021)	Wet Season Photo (08/25/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	CD2-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Chino Draw	
Monitoring Period	12/2019-12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 15.2 gpm. No changes are predicted at this site.
Number of Visits	8	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					12/6/2019	15.2	6.08	13.5	43
7/6/2020	0.00	7.90	29.6	448	10/16/2020	<0.25	8.80	29.1	432
1/20/2021	0.00	8.07	6.8	310	8/24/2021	0.00	7.81	28.1	343
3/19/2021	0.00	8.69	12.6	249	11/17/2021	0.00	8.52	9.7	251
5/17/2021	0.00	9.78	22.3	300					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		12/6/2019	Iron, copper, pH
7/6/2020	Iron	10/16/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	No Exceedances	11/17/2021	No Exceedances
5/17/2021	pH		

Aquatic and Vegetation Survey Findings: This site is a metal open-topped cistern, fed from an adjacent solar well in Chino Draw. This cistern has two attached side drinkers. Water is present within the cistern and the side drinkers as well as an adjacent wetted area as spillover. The overstory vegetation is dominated by Emory oak (*Quercus emoryi*). Understory vegetation is dominated by grasses (*Bouteloua* sp. and *Aristida* sp.), weakleaf bur ragweed (*Ambrosia confertiflora*), and riparian obligate spikerush (*Elocharis* sp.). Invasive vegetation observed includes Bermudagrass (*Cynodon dactylon*). Aquatic invertebrates observed include beetles and boatmen. No aquatic vertebrates have been observed.

Dry Season Photo	Wet Season Photo (12/6/2019)
No photo taken	
Dry Season Photo (7/6/2020)	**Wet Season Photo (10/16/2020)**
	

Dry Season Photo (05/17/2021)	Wet Season Photo (08/24/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	CG1-01
Watershed	Cox Gulch
Monitoring Period	6/2021 - 12/2021
Number of Visits	3

Interpretation of Groundwater Age: Isotope data was collected during the June and September 2021 events. Results will be assessed for determination of groundwater age after additional data is collected during the 2022 sampling events.

Potential Impacts/Effects: Flows have varied from 0.32 to 3.97 gpm. Predictions will be made once additional data is obtained.

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
6/1/2021	3.97	2.62	15.6	3538	9/13/2021	1.30	2.86	16.5	2883
					11/30/2021	0.32	2.65	10.6	3515

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/1/2021	Arsenic, beryllium, cadmium, copper, iron, nickel, zinc, pH	11/30/2021	Arsenic, beryllium, cadmium, copper, iron, nickel, thallium, zinc, pH

Aquatic and Vegetation Survey Findings: Water flows from an adit on the eastern side of the canyon in upper Cox Gulch, staining the ground surface yellow-orange at the adit entrance. The adit entrance is mostly bare of vegetation; however, water present at entrance supports algae. The overstory cover is dominated by Emory oak (*Quercus emoryi*) in the immediate surrounding area. Aquatic beetles have been present at the adit entrance, but no aquatic vertebrates have been observed. Vertebrate wildlife or sign observed included Mearn's quail (*Cyrtonyx montezumae*) and deer.

Dry Season Photo (06/01/2021)

Wet Season Photo (09/13/2021)

MONTGOMERY & ASSOCIATES

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	CG2-01	**Interpretation of Groundwater Age:** Isotope data was collected during the June and September 2021 events. Results will be assessed for the determination of groundwater age after additional data is collected during the 2022 sampling events.
Watershed	Cox Gulch	
Monitoring Period	6/2021 - 12/2021	**Potential Impacts/Effects:** Flows have varied from 0.02 to 4.60 gpm. Predictions will be made once additional data is obtained.
Number of Visits	3	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
6/1/2021	0.02	2.86	19.83	2598	9/13/2021	4.60	3.16	24.7	2181
					11/30/2021	0.54	3.14	8.8	2469

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/1/2021	Beryllium, cadmium, copper, iron, zinc, pH, DO	11/30/2021	Cadmium, copper, iron, zinc, pH, DO

Aquatic and Vegetation Survey Findings: Water seeps from granite joints and flows atop bedrock outcrop in Cox Gulch. Steep and terraced channel with several tinajas. Vegetation is predominantly rushes (*Juncus balticus*) and mosses, with an overstory of Emory oak (*Quercus emoyi*). Invasive Lehmann lovegrass occurs (*Eragrostis lehmanniana*). Aquatic beetles and backswimmers have been present. During the site visit on 06/01/2021, Mexican jays (*Aphelocoma wollweberi*) and Dusky-capped flycatchers (*Myiarchus tuberculifer*) were observed in the vicinity.

Dry Season Photo (06/01/2021)

Wet Season Photo (09/13/2021)

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	CG3-WELL-01
Watershed	Cox Gulch
Monitoring Period	6/2021 - 12/2021
Number of Visits	3

Interpretation of Groundwater Age: Isotope data was collected during the June and September 2021 events. Results will be assessed for determination of groundwater age after additional data is collected during the 2022 sampling events.

Potential Impacts/Effects: Flows has varied from 0.02 to 0.04 gpm. Predictions will be made once additional data is obtained.

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
6/1/2021	0.02	7.53	24.9	1704	9/13/2021	0.04	7.58	26.3	1672
					11/30/2021	0.04	6.89	22.5	1614

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/1/2021	Arsenic, Cyanide, DO	11/30/2021	Arsenic, Iron, DO

Aquatic and Vegetation Survey Findings: Water flowing into a bathtub fed by an artesian well. During visits, overflow from the bathtub results in wetted stretch of soil typically extending approximately 6 feet. No aquatic invertebrates or herpetofauna have been observed; evidence of cattle, deer, and coyotes have been observed.

Dry Season Photo (06/01/2021)

Wet Season Photo (09/13/2021)

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	F2-01	**Interpretation of Groundwater Age:** Consistent deep groundwater source.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 5 gpm. No changes are predicted at this site.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/7/2017	0.12	3.14	16.1	1214
5/30/2018	0.00	3.09	20.6	1338	11/29/2018	<0.25	3.90	10.8	1071
5/27/2019	0.00	3.40	13.0	1057	12/7/2019	5.00	3.21	15.1	1028
6/11/2020	<0.25	3.31	24.4	1174	10/21/2020	<0.25	3.06	20.6	1277
1/13/2021	0.02	3.72	9.6	1205	9/2/2021	1.41	3.25	20.6	1401
3/11/2021	<0.01	3.42	11.6	1268	11/23/2021	0.34	3.23	12.7	1415
5/24/2021	0.01	2.92	31.1	1257					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/9/2017	Cadmium, copper, zinc, pH
5/30/2018	Lead, cadmium, copper, zinc, pH	11/29/2018	Lead, cadmium, copper, zinc, pH
5/27/2019	Lead, cadmium, copper, zinc, pH	12/7/2019	Lead, cadmium, copper, zinc, pH
6/11/2020	Lead, cadmium, copper, zinc, pH	10/21/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/13/2021	Cadmium, copper, lead, zinc, pH	11/23/2021	Cadmium, copper, zinc, pH
5/24/2021	Cadmium, copper, lead, zinc, pH		

Aquatic and Vegetation Survey Findings: This site is located in rocky and cobbly section of upper Flux Canyon with exposed bedrock. Generally, water is present in shallow pools. Moss is present in the drainage bottom on exposed bedrock. Little to no understory or herbaceous cover exists. Limited overstory tree coverage is dominated by oak (*Quercus* spp.) and Mexican pinyon (*Pinus cembroides*). Aquatic invertebrates previously noted within the Flux Canyon drainage including beetles, boatmen, backswimmers, dragonflies, and damselflies. No aquatic vertebrates have been observed.

Dry Season Photo (5/20/2018)	Wet Season Photo (11/29/2018)
	
Dry Season Photo (5/27/2019)	**Wet Season Photo (12/7/2019)**
	

Dry Season Photo (6/11/2020)	Wet Season Photo (10/21/2020)
	
Dry Season Photo (05/24/2021)	**Wet Season Photo (09/02/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	F4-01	**Interpretation of Groundwater Age:** Mix of deep groundwater and modern water.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 7.31 gpm. Two dry site visits during the dry season suggest that the site may not be connected with a perennial groundwater source. No changes are predicted at this site.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/9/2017	0.00	4.01	18.1	1543
5/30/2018	Dry				11/29/2018	<0.25	4.50	8.6	585
5/27/2019	0.00	4.05	21.0	1264	12/7/2019	<0.25	4.15	14.9	603
6/11/2020	<0.25	4.55	30.7	1290	10/21/2020	Dry			
1/13/2021	0.02	5.81	4.7	2196	9/2/2021	7.31	4.03	23.8	908
3/11/2021	<0.01	6.20	9.2	1958	11/23/2021	<0.01	5.72	9.4	1678
5/24/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/9/2017	Lead, cadmium, copper, zinc, pH
5/30/2018	Dry	11/29/2018	Cadmium, copper, zinc, pH
5/27/2019	Lead, cadmium, copper, zinc, pH	12/7/2019	Copper, zinc, pH
6/11/2020	Lead, cadmium, copper, pH	10/21/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/13/2021	Copper, pH	11/23/2021	Copper, zinc, pH
5/24/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located in cobbly and gravelly section of Flux Canyon with some exposed bedrock. Generally, water is present in shallow, isolated pools near bedrock. Rocky Mountain rush (*Juncus saximontanus*), a riparian obligate species, plains lovegrass (*Eragrostis intermedia*), and bullgrass (*Muhlenbergia emersleyi*) are dominate perimeter vegetation along the drainage bottom. Seep monkeyflower (*Mimulus guttatus*), a wetland associated plant, was noted at this site. Green sprangletop (*Leptochloa dubia*) and other grasses dominate the adjacent hillsides. Arizona white oak (*Quercus arizonica*) provides the limited amount of overstory tree coverage at this site. Invasive plant species observed includes Lehmann lovegrass (*Eragrostis lehmanniana*). Aquatic invertebrates previously noted within the Flux Canyon drainage including beetles, boatmen, backswimmers, dragonflies, and damselflies. No aquatic vertebrates have been observed.

Dry Season Photo (5/30/2018)	Wet Season Photo (11/29/2018)
	
Dry Season Photo (5/27/2019)	**Wet Season Photo (12/7/2019)**
	

Dry Season Photo (6/11/2020)	Wet Season Photo (10/8/2020)
	
Dry Season Photo (05/24/2021)	**Wet Season Photo (09/02/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	F6-01	**Interpretation of Groundwater Age:** Mixed source of modern water and deep groundwater.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 13.85 gpm. No changes are predicted at this site.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/9/2017	0.12	6.33	13.1	2717
5/30/2018	0	6.48	26.6	2848	11/29/2018	<0.25	6.70	9.7	1122
5/27/2019	1.10	6.59	20.2	2535	12/7/2019	4.41	5.75	13.4	918
6/10/2020	0.12	6.72	31.1	2610	10/8/2020	<0.25	4.09	20.8	4140
1/12/2021	0.43	6.70	4.1	2737	9/2/2021	13.85	5.76	25.9	1388
3/17/2021	0.22	7.88	15.3	3069	11/22/2021	0.33	6.78	12.8	2930
5/25/2021	<0.01	6.81	24.1	3167					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/9/2017	Lead, zinc, pH
5/30/2018	Lead, zinc, pH	11/29/2018	Lead, cadmium, zinc
5/27/2019	Lead, cadmium, zinc	12/7/2019	Lead, Cadmium, copper, zinc, pH
6/10/2020	Lead, cadmium, zinc	10/8/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/12/2021	Zinc	11/22/2021	Lead, zinc
5/25/2021	Lead, zinc		

Aquatic and Vegetation Survey Findings: This site is located in rocky and cobbly section of Flux Canyon with exposed bedrock. Generally, water is present in shallow pools. Bullgrass (*Muhlenbergia emersleyi*) and riparian obligate rushes (*Juncus* spp.) are dominate perimeter vegetation along the drainage bottom. Hopbush (*Dodonaea viscosa*) and Texas bluestem (*Schizachyrium cirratum*) occur on the adjacent hillsides. Although there is no overstory canopy at the site, overstory trees along the drainage are dominated by Emory oak (*Quercus emoryi*). Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) and invasive plants, Lehmann lovegrass (*Eragrostis lehmanniana*) and Johnson grass (*Sorghum halepense*) have been observed. Aquatic invertebrates previously noted within the Flux Canyon drainage including beetles, boatmen, backswimmers, dragonflies, and damselflies. No aquatic vertebrates have been observed.

Dry Season Photo (5/30/2018)	Wet Season Photo (11/29/2018)
	
Dry Season Photo (5/27/2019)	**Wet Season Photo (12/7/2019)**
	

Dry Season Photo (6/10/2020)	Wet Season Photo (10/8/2020)
	
Dry Season Photo (05/25/2021)	**Wet Season Photo (09/02/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	F6-02	**Interpretation of Groundwater Age:** Lightly evaporative and modern. Source is both surface water and groundwater with a greater dry season contribution from groundwater.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from near 0 to 35.7 gpm. In the first 4 years, there may be up to 0.001 gpm decrease in flow**.**
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/14/2017	0.40	4.20	11.9	2668
5/31/2018	<0.25	4.10	22.5	3041	11/29/2018	1.50	4.70	11.8	995
5/27/2019	1.40	4.09	20.1	2673	12/7/2019	Not Measured[1]	4.21	13.1	1272
6/10/2020	<0.25	3.77	27.2	3160	10/8/2020	<0.25	4.09	20.8	4140
1/12/2021	0.55	3.78	6.4	3632	9/1/2021	35.7	4.38	21.8	1869
3/17/2021	0.64	3.95	11.5	3718	11/22/2021	<0.01	3.92	12.7	3277
5/25/2021	<0.01	3.97	20.3	3763					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/14/2017	Lead, cadmium, copper, zinc, pH
5/31/2018	Lead, cadmium, copper, zinc, pH	11/29/2018	Lead, cadmium, copper, zinc, pH
5/27/2019	Lead, cadmium, copper, zinc, pH	12/7/2019	Lead, cadmium, copper, zinc, pH
6/10/2020	Lead, cadmium, copper, zinc, pH	10/8/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/12/2021	Cadmium, copper, lead, manganese, zinc, pH	11/22/2021	Cadmium, copper, lead, zinc, pH
5/25/2021	Cadmium, copper, lead, zinc, pH		

Aquatic and Vegetation Survey Findings: Site is located in rocky and cobbly section of Flux Canyon with exposed bedrock. Generally, water is present in shallow pools. Aquatic invertebrates including beetles, boatmen, and damselflies observed. No aquatic vertebrates have been observed. Livestock (scat) and deer (tracks) sign present. Little to no overstory tree coverage is present within the drainage. Emergent and perimeter vegetation is dominated by riparian obligate rushes (*Juncus* spp.), Bermudagrass (*Cynodon dactylon*), and bullgrass (*Muhlenbergia emersleyi*). Drainage lacks riparian vegetation. North-facing slopes are dominated by upland tree and shrub species (oaks [*Quercus* spp.], junipers [*Juniperus* spp.], and hopbush [*Dodonaea viscosa*]), while south-facing slopes are dominated by grasses with sotol (*Dasylirion wheeleri*) and Palmer agave (*Agave palmeri*) present. Invasive plant species observed are Bermudagrass (*Cynodon dactylon*).

Dry Season Photo (5/30/2018)	Wet Season Photo (11/29/2018)
	
Notes [1]=Flows too high to measure with conventional methods	
Dry Season Photo (5/27/2019)	**Wet Season Photo (12/7/2019)**
	

Dry Season Photo (6/10/2020)	Wet Season Photo (10/8/2020)
	
Dry Season Photo (05/25/2021)	**Wet Season Photo (09/01/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	F8-01
Watershed	Flux Canyon
Monitoring Period	11/2017 - 12/2021
Number of Visits	12

Interpretation of Groundwater Age: Fairly consistent, lightly evaporative modern with a deeper source. Source is both surface and groundwater.

Potential Impacts/Effects: Flows observed at this site have ranged from near 0 to 42.2 gpm. In the first 4 years, there may be up to 0.001 gpm decrease in flow.

Flows and Field Parameters (pH, Temp, SC)

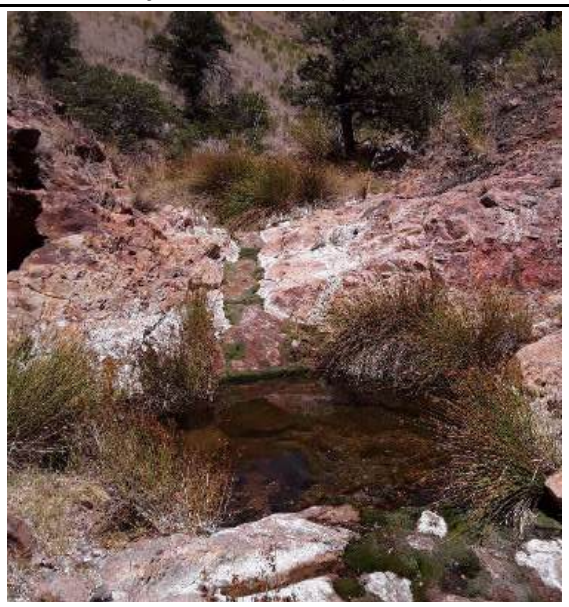
Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/14/2017	<0.25	3.76	12.8	1881
5/31/2018	<0.25	3.66	22.1	2038	11/29/2018	1.60	4.50	11.4	1405
5/27/2019	0.90	4.16	21.3	2494	12/11/2019	Not Measured[1]	4.13	10.2	1203
6/10/2020	<0.25	3.81	27.6	1973	10/8/2020	<0.25	3.72	23.0	2690
1/12/2021	0.54	3.75	3.3	2871	9/1/2021	42.2	4.14	21.8	1769
3/17/2021	0.74	3.81	15.0	3464	11/22/2021	0.22	3.71	12.2	2456
5/25/2021	<0.01	3.60	28.6	3590					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/24/2017	Lead, cadmium, copper, zinc, pH
5/31/2018	Lead, cadmium, copper, zinc, pH	11/29/2018	Lead, cadmium, copper, zinc, pH
5/27/2019	Lead, cadmium, copper, zinc, pH	12/11/2019	Lead, cadmium, copper, zinc, pH
6/10/2020	Lead, cadmium, copper, zinc, pH	10/8/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/12/2021	Cadmium, copper, lead, manganese, zinc, pH	11/22/2021	Cadmium, copper, lead, zinc, pH
5/25/2021	Cadmium, copper, lead, zinc, pH		

Aquatic and Vegetation Survey Findings: Site is located in bedrock bottom section of Flux Canyon. Generally, water is present in shallow pools. Aquatic beetles and boatmen have been observed. No aquatic vertebrates observed have been observed. Deer tracks have been noted at this site. No overstory tree coverage is present at this site in the drainage. Emergent and perimeter vegetation is dominated by riparian obligate *Juncus* spp., Bermudagrass (*Cynodon dactylon*), and bullgrass (*Muhlenbergia emersleyi*). Drainage lacks riparian tree vegetation. North-facing slopes are dominated by Emory oak (*Quercus emoryii*) and hopbush (*Dodonaea viscosa*), while south-facing slopes are dominated by grasses with sotol (*Dasylirion wheeleri*) and Palmer agave (*Agave palmeri*) present. Invasive plant species observed includes Bermudagrass (*Cynodon dactylon*).

Dry Season Photo (5/31/2018)	Wet Season Photo (11/29/2018)
	
Notes [1]=Flows too high to measure with conventional methods	
Dry Season Photo (5/27/2019)	**Wet Season Photo (12/11/2019)**
	

Dry Season Photo (6/10/2020)	Wet Season Photo (10/8/2020)
	
Dry Season Photo (05/25/2021)	**Wet Season Photo (09/01/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	F9-01	**Interpretation of Groundwater Age:** Source is inconclusive (mixed deeper and lightly evaporative), submodern.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site, during site visits, have ranged from near 0 to 86 gpm. In the first 4 years, there is no predicted change to flow.
Number of Visits	12	

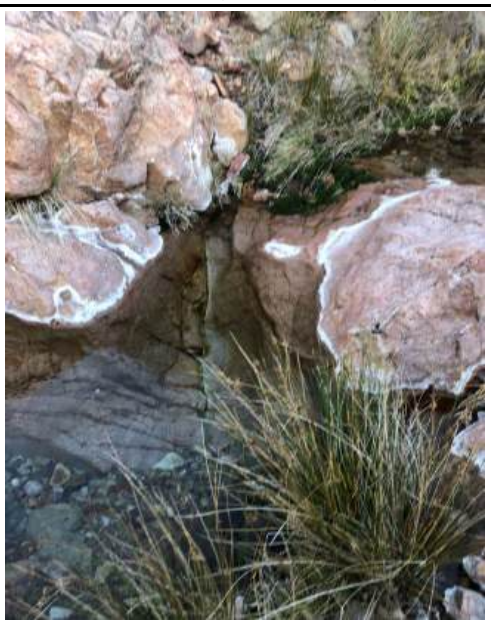
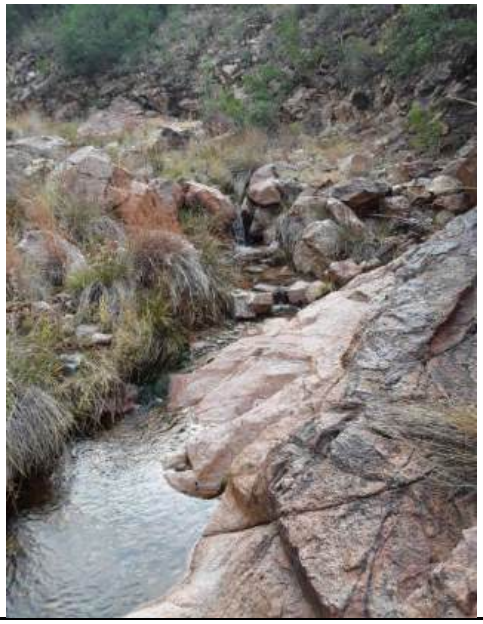
Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/14/2017	0.90	3.76	12.8	1130
5/31/2018	<0.25	3.80	27.4	1860	11/29/2018	4.20	4.50	11.4	560
5/27/2019	1.60	4.16	24.0	1186	12/11/2019	28.0	4.13	10.2	1002
6/10/2020	<0.25	3.88	22.2	1406	10/8/2020	<0.25	4.12	22.2	1415
1/12/2021	2.18	4.01	3.2	1088	9/1/2021	86.02	4.00	21.9	1034
3/17/2021	2.7	4.01	11.6	1047	11/22/2021	0.57	3.81	10.3	1295
5/25/2021	<0.01	4.00	17.2	1462					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/14/2017	Lead, copper, zinc, pH
5/31/2018	Lead, cadmium, copper, zinc, pH	11/29/2018	Lead, cadmium, copper, zinc, pH
5/27/2019	Lead, cadmium, copper, zinc, pH	12/11/2019	Lead, cadmium, copper, zinc, pH
6/10/2020	Lead, cadmium, copper, zinc, pH	10/8/2020	Covid-19 restrictions
1/12/2021	Cadmium, copper, lead, zinc, pH	11/22/2021	Cadmium, copper, lead, zinc, pH
5/25/2021	Cadmium, copper, lead, zinc, pH		

Aquatic and Vegetation Survey Findings: Site is located in rocky and bouldery section of lower Flux Canyon. Generally, water is present in shallow pools. Aquatic beetles and boatmen have been observed. No aquatic vertebrates observed have been observed. Deer tracks have been noted at this site. No overstory tree coverage is present at this site within the drainage. Emergent and perimeter vegetation is dominated by riparian obligate *Juncus* spp., Bermudagrass (*Cynodon dactylon*), bullgrass (*Muhlenbergia emersleyi*), and deergrass (*Muhlenbergia rigens*). Drainage lacks riparian tree vegetation. North-facing slopes are dominated by Emory oak (*Quercus emoryi*) and hopbush (*Dodonaea viscosa*), while south-facing slopes are dominated by grasses. Invasive plant species observed are Lehmann lovegrass (*Eragrostis lehmanniana*) and Bermudagrass (*Cynodon dactylon*).

Dry Season Photo (5/31/2018)	Wet Season Photo (11/29/2018)
	
Dry Season Photo (5/27/2019)	**Wet Season Photo (12/11/2019)**
	

Dry Season Photo (6/10/2020)	Wet Season Photo (10/8/2020)
	
Dry Season Photo (05/25/2021)	**Wet Season Photo (09/01/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	G1-01	**Interpretation of Groundwater Age:** Modern water.
Watershed	Goldbaum Canyon	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from zero to trace flow. Three dry site visits during the dry season suggest that this site may not be connected with a perennial groundwater source. No changes are predicted at this site.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/16/2017	<0.25	7.53	7.4	451
					12/2/2018	0.00	9.40	10.9	102
5/23/2019	0.00	9.96	25.9	116	12/5/2019	<0.25	7.38	10.3	70
6/25/2020	Dry				10/6/2020	Dry			
2/1/2021	<0.01	8.08	4.6	72	9/2/2021	<0.01	9.11	26.4	63
3/23/2021	<0.01	9.01	13.1	94.98	11/22/2021	Dry			
6/1/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/16/2017	No Exceedances
		12/2/2018	pH
5/23/2019	pH	12/5/2019	No Exceedances
6/25/2020	Dry	10/6/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/1/2021	No Exceedances	11/22/2021	Dry
6/1/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located within exposed bedrock in Goldblaum Canyon. Water is present in series of small tinajas. This site does not support any emergent or perimeter vegetation. No overstory tree species occur at this site. Trace vegetation noted nearby include Ipomopsis *(Ipomopsis* sp.) and deergrass (*Muhlenbergia rigens*). Canyon treefrog (*Hyla arenicolor*) have been observed at this site.

Dry Season Photo (May 2018)	Wet Season Photo (12/2/2018)
	
Dry Season Photo (5/23/2019)	**Wet Season Photo (12/5/2019)**
	

Dry Season Photo (7/14/2020)	Wet Season Photo (10/6/2020)
	
Dry Season Photo (06/01/2021)	**Wet Season Photo (09/02/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	G3-WELL-WM-01	**Interpretation of Groundwater Age:** Deep groundwater signature during dry season, modern signature during wet season.
Watershed	Goldbaum Canyon	
Monitoring Period	11/2017-12/2021	**Potential Impacts/Effects:** This site is not a seep or spring, site it is fed by a well. No changes are predicted at this site.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Pumping Rate (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Pumping Rate (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/16/2017	0.00	7.39	21.5	582
5/18/2018	0.00	6.91	17.4	541	12/2/2018	0.00	9.10	10.1	244
5/23/2019	0.00	9.27	22.5	289	12/5/2019	0.00	9.04	10.6	171
6/25/2020	0.00	7.96	24.8	338	10/6/2020	0.00	7.75	26.8	553
2/1/2021	0.00	7.40	9.4	519	9/2/2021	0.00	7.82	21.28	427
3/23/2021	0.00	7.60	10.7	534	11/22/2021	0.00	7.37	14.0	530
6/1/2021	0.00	7.36	22.1	540					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/16/2017	No Exceedances
5/18/2018	No Exceedances	12/2/2018	pH
5/23/2019	pH	12/5/2019	pH
6/25/2020	No Exceedances	10/6/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/1/2021	No Exceedances	11/22/2021	No Exceedances
6/1/2021	No Exceedances		

Aquatic and Vegetation Survey Findings: This site consists of a metal, circular stock drinker (approx. 1.8m in diameter) located in Goldbaum Canyon. The drinker is fed by an adjacent windmill and well. There is some accumulated silt along the bottom of the drinker. Submerged algae (*Chara* sp.) is typically present in this drinker. No overstory vegetation is present. Invasive Bermudagrass (*Cynodon dactylon*) occurs around the base of the drinker. Aquatic invertebrates observed include beetles, backswimmers, boatmen, dragonflies, water scorpion, leeches, and snails. No aquatic vertebrates or herpetofauna have been observed. Livestock has been observed around the stock tank and the site is heavily grazed.

Dry Season Photo (5/18/2018)	Wet Season Photo (12/2/2018)
Photo Not Taken	
Dry Season Photo (5/23/2019)	**Wet Season Photo (12/5/2019)**
	

Dry Season Photo (6/25/2020)	Wet Season Photo (10/6/2020)
	
Dry Season Photo (03/23/2021)	**Wet Season Photo (09/02/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	H6-01	**Interpretation of Groundwater Age:** Fairly consistent, modern with some influence from a deeper source. Source is both surface and groundwater.
Watershed	Harshaw Creek	
Monitoring Period	10/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from near 0 to 30.8 gpm. In the first 4 years, there may be up to 0.02 gpm decrease in flow.
Number of Visits	12	

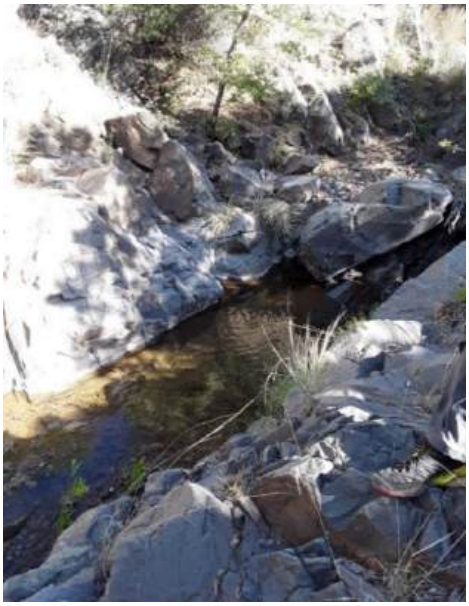
Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					10/19/2017	3.14	6.68	18.0	1356
5/16/2018	<0.25	7.47	16.5	1826	12/1/2018	0.70	7.10	11.1	1267
5/26/2019	30.80	7.74	17.0	1296	12/8/2019	29.20	7.45	12.7	948
6/29/2020	4.98	8.16	20.2	1536	10/9/2020	0.90	6.94	21.4	1774
2/2/2021	0.23	7.11	9.2	1694	9/10/2021	3.18	6.40	19.6	1322
3/23/2021	<0.01	7.11	17.0	1813	12/1/2021	<0.01	7.48	10.1	1747
6/3/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		10/19/2017	No Exceedances
5/16/2018	Lead	12/1/2018	No Exceedances
5/26/2019	No Exceedances	12/8/2019	No Exceedances
6/29/2020	No Exceedances	10/9/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/2/2021	Lead	12/1/2021	No Exceedances
6/3/2021	Dry		

Aquatic and Vegetation Survey Findings: Feature consists of a relic dam that has silted in along Harshaw Creek. A pipe driven into the bottom of the dam allows for the passage of water within the alluvium behind the dam to the downstream drainage. During monsoons, flowing water is consistently present below the dam. Aquatic invertebrates but no aquatic vertebrates have been observed. Drainage substrate is mix of bedrock, boulders, gravel, and sand. Arizona white oak (*Quercus arizonica*), alligator juniper (*Juniperus deppeana*), and Fremont cottonwood (*Populus fremontii*) dominate the overstory. Understory vegetation includes deergrass (*Muhlenbergia rigens*), silktassel (*Garrya wrightii*), Arizona grape (*Vitis arizonica*), seepwillow (*Baccharis salicifolia*), and skunkbush sumac (*Rhus trilobata*).

Dry Season Photo (5/16/2018)	Wet Season Photo (12/1/2018)
	
Dry Season Photo (5/26/2019)	**Wet Season Photo (12/08/2019)**
	

Dry Season Photo (6/29/2020)	Wet Season Photo (10/9/2020)
	
Dry Season Photo (06/03/2021)	**Wet Season Photo (09/10/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	H8-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Harshaw Creek	
Monitoring Period	10/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 23 gpm. Once discharge of treated water begins in Harshaw, this spring will be augmented by surface water discharge on the order of 3300 gpm.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					10/19/2017	5.84	8.00	21.6	1343
					12/1/2018	<0.25	7.40	9.4	1303
5/24/2019	4.41	8.33	26.3	1549	12/8/2019	23.00	7.69	14.8	1107
6/25/2020	<0.25	7.02	29.3	1288	10/22/2020	Dry			
1/20/2021	Dry				9/9/2021	8.88	7.06	22.8	1822
3/23/2021	Dry				11/29/2021	Dry			
5/26/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		10/19/2017	No Exceedances
		12/1/2018	No Exceedances
5/24/2019	Lead	12/8/2019	No Exceedances
6/25/2020	No Exceedances	10/22/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	Dry	11/29/2021	Dry
5/26/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located in a section of Harshaw Creek with gravely, sandy substrate and bedrock constrictions. When water is present, it is typically available in shallow pools. Limited herbaceous vegetation cover is dominated by deergrass (*Muhlenbergia rigens*) and other perennial grasses *(Poaceae* family). Riparian overstory tree cover is dominated by Fremont cottonwood (*Populus fremontii*) and Arizona sycamore (*Platanus wrightii*). Velvet mesquite (*Prosopis velutina*) and alligator juniper (*Juniperus deppeana*) are also present in the midstory. Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) has been observed. Aquatic invertebrates along this section of the drainage generally include boatmen, damselflies, beetles and water striders. No aquatic vertebrates have been observed.

Dry Season Photo (May 2018)	Wet Season Photo (12/01/2018)
	
Dry Season Photo (5/24/2019)	**Wet Season Photo (12/8/2019)**
	

Dry Season Photo (6/25/2020)	Wet Season Photo (10/22/2020)
	
Dry Season Photo (05/26/2021)	**Wet Season Photo (09/09/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	H10-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Harshaw Creek	
Monitoring Period	10/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from nearly 0 to 183 gpm. Once discharge of treated water begins in Harshaw, this spring will be augmented by surface water discharge on the order of 3300 gpm.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					10/19/2017	5.84	6.93	19.1	1077
					12/3/2018	<0.25	7.10	13.4	615
5/24/2019	2.25	7.62	25	1451	12/8/2019	183	7.62	15.2	846
6/25/2020	Dry				10/22/2020	Dry			
1/20/2021	Dry				9/9/2021	59	7.83	22.9	1025
3/23/2021	Dry				11/15/2021	Dry			
5/26/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		10/19/2017	No Exceedances
		12/3/2018	No Exceedances
5/24/2019	Lead	12/8/2019	Lead
6/25/2020	Dry	10/22/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	Dry	11/15/2021	Dry
5/26/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located in a rocky, gravelly, and sandy section of Harshaw Creek with some bedrock constrictions. Riparian tree species including Fremont cottonwood (*Populus fremontii*) and Arizona sycamore (*Platanus wrightii*) dominate the overstory vegetation. Bonpland willow (*Salix bonplandiana*) is also present. Understory vegetation includes deergrass (*Muhlenbergia rigens*), Arizona grape (*Vitis arizonica*), and narrowleaf willow (*Salix exigua*). Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) and beardless rabbitsfoot grass (*Polypogon viridis*) have been observed along with invasive Bermudagrass (*Cynodon dactylon*). No aquatic invertebrates or vertebrates have been observed.

Dry Season Photo	Wet Season Photo (12/3/2018)
No photo taken.	
Dry Season Photo (5/24/2019)	**Wet Season Photo (12/8/2019)**
	

Dry Season Photo (6/25/2020)	Wet Season Photo (10/22/2020)
	
Dry Season Photo (05/26/2021)	**Wet Season Photo (09/09/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	H10-02	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Harshaw Creek	
Monitoring Period	10/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from nearly 0 to 183 gpm. Once discharge of treated water begins in Harshaw, this spring will be augmented by surface water discharge on the order of 3300 gpm.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					10/19/2017	0.00	7.17	18.0	1059
					12/3/2018	Dry			
5/31/2019	0.00	8.30	27.6	1574	12/8/2019	183	7.98	15.2	851
6/25/2020	Dry				10/22/2020	Dry			
1/20/2021	Dry				9/9/2021	24.50	7.68	26.9	1017
3/23/2021	Dry				11/15/2021	Dry			
5/26/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		10/19/2017	Lead
		12/3/2018	Dry
5/31/2019	Lead	12/8/2019	Lead
6/25/2020	Dry	10/22/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	Dry	11/15/2021	Dry
5/26/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located in a rocky, gravelly, and sandy section of Harshaw Creek. This site was dry during both pre-monsoon and monsoon visits in 2020. Arizona sycamore (*Platanus wrightii*), a preferential riparian tree species, dominates the overstory tree canopy with alligator juniper (*Juniperus deppeana*) also present. Understory vegetation is limited and includes Arizona grape (*Vitis arizonica*) and seepwillow (*Baccharis salicifolia*). Invasive plant species observed include Bermudagrass (*Cynodon dactylon*) and common mullein (*Verbascum thapsus*). No aquatic vertebrates have been observed.

Dry Season Photo	Wet Season Photo (12/3/2018)
No photo taken.	
Dry Season Photo (5/31/2019)	**Wet Season Photo (12/8/2019)**
	

Dry Season Photo (6/25/2020)	Wet Season Photo (10/22/2020)
	
Dry Season Photo (05/26/2021)	**Wet Season Photo (09/09/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	H16-01	**Interpretation of Groundwater Age:** Modern, no evidence of deeper source.
Watershed	Harshaw Creek	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** This site has been dry during all site visits except for 1 visit where flow was measured at 90.22 gpm. Once discharge of treated water begins in Harshaw, this spring will be augmented by surface water discharge on the order of 3300 gpm.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/7/2017	90.22	7.95	18.0	667
					12/3/2018	Dry			
5/23/2019	Dry				12/4/2019	Dry			
6/9/2020	Dry				10/20/2020	Dry			
1/21/2021	Dry				9/9/2021	Dry			
3/10/2021	Dry				12/2/2021	Dry			
5/19/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/7/2017	No Exceedances
		12/3/2018	Dry
5/23/2019	Dry	12/4/2019	Dry
6/9/2020	Dry	10/20/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/21/2021	Dry	12/2/2021	Dry
5/19/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located in a wide, sandy and gravelly section of Harshaw Creek. The overstory tree canopy is dominated by riparian trees including Fremont cottonwood (*Populus fremontii*) and Goodding's willow (*Salix gooddingii*). Seepwillow (*Baccharis salicifolia*) occurs sparingly at the channel edges. Seep monkeyflower (*Mimulus guttatus*), a wetland associated plant, was noted at this site. Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) and invasive plants, common mullein (*Verbascum thapsus*), Johnson grass (*Sorghum halepense*), and Lehmann lovegrass (*Eragrostis lehmanniana*), have been observed.

Dry Season Photo (5/23/2019)	Wet Season Photo (12/3/18)
	
Dry Season Photo (6/9/2020)	**Wet Season Photo (10/20/2020)**
	

Dry Season Photo (05/19/2021)	Wet Season Photo (09/09/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	H16-02	**Interpretation of Groundwater Age:** — Lightly evaporative and modern. Source is likely both surface and groundwater.
Watershed	Harshaw Creek	
Monitoring Period	05/2018 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site, have ranged from 0.01 to 65.6 gpm. Once discharge of treated water begins in Harshaw, this stream is augmented by surface water discharge on the order of 3,300 gpm.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/16/2018	74.96	7.23	19.4	793	12/3/2018	5.80	7.40	16.6	712
5/23/2019	37.90	7.65	16.4	825	12/4/2019	65.60	7.59	17.0	650
6/9/2020	8.19	7.65	18.7	849	10/20/2020	<0.25	7.41	18.4	881
1/21/2021	Dry				9/9/2021	0.01	7.05	21.9	910
3/10/2021	Dry				12/2/2021	6.51	6.81	16.9	956
5/19/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/16/2018	No Exceedances	12/3/2018	No Exceedances
5/23/2019	No Exceedances	12/4/2019	No Exceedances
6/9/2020	No Exceedances	10/20/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/21/2021	Dry	12/2/2021	No Exceedances
5/19/2021	Dry		

Aquatic and Vegetation Survey Findings: Located in wetted section of Harshaw Creek. Willows (*Salix* spp.) and Arizona sycamore (*Platanus wrightii*) are dominant riparian overstory tree species while seepwillow (*Baccharis salicifolia*), spikerush (*Eleocharis* sp.), southwestern annual saltmarsh aster (*Symphyotrichum expansum*), Johnsongrass (*Sorghum halepense*), deergrass (*Muhlenbergia rigens)*, and dock (*Rumex* sp.) are dominant emergent vegetation. Upland vegetation is characterized as oak (*Qurecus* spp.) and juniper (*Juniperus* spp.) woodlands.

Water is present during pre-monsoon and monsoon surveys. Longfin dace (*Agosia chrysogaster*), canyon tree frog (*Hyla arenicolor*) tadpoles, and black-necked gartersnakes (*Thamnophis cyrtopsis*) have been observed along this wetted stretch of Harshaw. Aquatic beetles, boatmen, backswimmers, dragonflies, damselflies, mayflies, waterscorpions, belostomatids, and snails have been observed. Invasive plants noted include Johnsongrass (*Sorghum halepense*), common mullein (*Verbascum thapsus*), Bermudagrass (*Cynodon dactylon*), gummy lovegrass (*Eragrostis curtipedicellata*), Lehmann lovegrass (*Eragrostis lehmanniana*), cockspur grass (*Echinochloa* spp.), yellow bluestem (*Bothriochloa ischaemum*), Sahara mustard (*Brassica tournefortii*), and saltcedar (*Tamarisk* spp.).

Dry Season Photo (5/16/2018)	Wet Season Photo (12/3/2018)
	
Dry Season Photo (5/23/2019)	**Wet Season Photo (12/4/2019)**
	

Dry Season Photo (6/8/2020)	Wet Season Photo (10/20/2020)
	
Dry Season Photo (05/19/2021)	**Wet Season Photo (09/09/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	H16-03	**Interpretation of Groundwater Age:** Consistently lightly evaporative and modern, no deep groundwater source.
Watershed	Harshaw Creek	
Monitoring Period	11/2017-12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from near 0 to 180 gpm. Once discharge of treated water begins in Harshaw, this spring is augmented by surface water discharge on the order of 3300 gpm.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/7/2017	179.98	7.88	17.2	672
5/16/2018	<0.25	7.41	20.0	788	12/3/2018	17.60	7.70	13.8	734
5/24/2019	60.80	7.94	18.5	841	12/4/2019	23.00	7.90	16.5	643
6/9/2020	5.98	7.57	19.6	847	10/20/2020	11.30	7.56	19.2	1411
1/21/2021	8.60	7.58	11.6	979	9/9/2021	8.30	7.35	24.5	964
5/19/2021	0.45	7.15	21.9	989	12/2/2021	70.00	7.55	16.9	951
3/10/2021	8.12	7.73	14.6	956					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/7/2017	No Exceedances
5/16/2018	No Exceedances	12/3/2018	No Exceedances
5/24/2019	No Exceedances	12/4/2019	No Exceedances
6/9/2020	No Exceedances	10/20/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/21/2021	No Exceedances	12/2/2021	No Exceedances
5/19/2021	No Exceedances		

Aquatic and Vegetation Survey Findings: This site is located in a wetted section of Harshaw Creek with gravelly and sandy substrate. Water is available in shallow riffles and runs. Goodding's willow (*Salix gooddingii*) and Fremont cottonwood (*Populus fremontii*) are the dominant riparian overstory tree species while seepwillow (*Baccharis salicifolia*) and riparian obligate spikerush (*Eleocharis* sp.) are dominant emergent vegetation. Wetland associated plants, cattail (*Typha* sp.) and monkeyflower (*Mimulus* sp.), have been observed. Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) and invasive plants, Johnsongrass (*Sorghum halepense*) and saltcedar (*Tamarix ramossisima*), have been noted. Canyon treefrog (*Hyla arenicolor*), black-necked gartersnake (*Thamnophis cyrtopsis*), and longfin dace (*Agosia chrysogaster*) have been observed in this portion of Harshaw Creek. Aquatic beetles, boatmen, backswimmers, dragonflies, damselflies, mayflies, water scorpions, belostomatids, and snails have been observed.

Dry Season Photo (5/16/2018)	Wet Season Photo (12/3/2018)
No Photo Taken	
Dry Season Photo (5/24/2019)	**Wet Season Photo (12/4/2019)**
	

Dry Season Photo (6/8/2020)	Wet Season Photo (10/8/2020)
	
Dry Season Photo (05/19/2021)	**Wet Season Photo (09/09/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	HB1-01	**Interpretation of Groundwater Age:** Consistent deep groundwater source.
Watershed	Humboldt Canyon	
Monitoring Period	4/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 29.2 gpm. No changes to flow are predicted at this site.
Number of Visits	13	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
4/24/2017	0.00	3.54	16.7	312	10/20/2017	1.80	3.51	18.3	302
5/23/2018	0.16	3.51	17.7	305	11/28/2018	0.40	3.90	10.7	290
5/28/2019	0.00	3.61	15.3	326	12/3/2019	29.20	3.51	7.7	161
6/19/2020	0.40	3.7	19.6	311	10/15/2020	0.30	3.99	16.4	605
1/13/2021	0.70	3.69	1.11	297	8/24/2021	Dry			
3/11/2021	1.73	3.57	12.2	299.4	11/16/2021	0.00	4.05	13.6	498
5/24/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
4/24/2017	Copper, zinc, pH	10/20/2017	Copper, zinc, pH
5/23/2018	Copper, zinc, pH	11/28/2018	Copper, zinc, pH
5/28/2019	Copper, zinc, pH	12/3/2019	Copper, pH
6/19/2020	Lead, silver, copper, zinc, pH	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/13/2021	Cadmium, copper, lead, nickel, zinc, pH, DO	11/16/2021	Too little water to sample
5/24/2021	Dry		

Aquatic and Vegetation Survey Findings: This feature is located at a well-head in Humboldt Canyon where seepage results in a shallow surface water in the road and discharges to adjacent drainage. Riparian obligate Baltic rush (*Juncus balticus*), submerged algae, and moss are the predominate vegetation cover at the site. Silverleaf oak (*Quercus hypoleucoides*) and Chihuahua pine (*Pinus leiophylla*) provide overstory cover. Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) has been noted. Aquatic beetles and dragonfly larvae have been observed. No aquatic vertebrates have been observed.

Dry Season Photo (5/23/2018)	Wet Season Photo (11/28/2018)
	
Dry Season Photo (5/28/2019)	**Wet Season Photo (12/3/2019)**
	

Dry Season Photo (6/19/2020)	Wet Season Photo (10/15/2020)
	
Dry Season Photo (05/24/2021)	**Wet Season Photo (08/24/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	HB3-01	**Interpretation of Groundwater Age:** Consistent deep groundwater source.
Watershed	Humboldt Canyon	
Monitoring Period	4/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 29.2 gpm. No changes to flow are predicted at this site.
Number of Visits	13	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
4/27/2017	0.00	3.07	18.6	1271	10/20/2017	0.16	2.91	17.4	1187
5/23/2018	<0.25	3.01	16.8	1204	11/28/2018	1.20	2.90	11.8	817
5/28/2019	0.50	3.16	26.2	947	12/3/2019	29.20	3.24	10.6	169
6/19/2020	<0.25	6.89	23.4	1316	10/15/2020	<0.25	3.07	17.2	1675
1/13/2021	0.22	3.06	0	1142	8/24/2021	1.77	2.46	20.2	932
3/11/2021	1.24	2.83	11.3	948.7	11/16/2021	0.01	3.06	11.2	1276
5/24/2021	0.02	2.73	17.4	1366					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
4/27/2017	Cadmium, copper, zinc, pH	10/20/2017	Copper, zinc, pH
5/23/2018	Copper, zinc, pH	11/28/2018	Copper, zinc, pH
5/28/2019	Copper, zinc, pH	12/3/2019	Copper, zinc, pH
6/19/2020	Cadmium, copper, zinc	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/13/2021	Cadmium, copper, iron, lead, nickel, zinc, pH	11/16/2021	Cadmium, copper, iron, lead, nickel, thallium, zinc, pH, DO
5/24/2021	Cadmium, copper, iron, lead, nickel, silver, zinc, pH, DO		

Aquatic and Vegetation Survey Findings: This shallow seep is located in a section of exposed bedrock in Humboldt Canyon. Riparian obligate Baltic rush (*Juncus balticus*), algae, and moss are the predominate vegetation cover at the site. Silverleaf oak (*Quercus hypoleucoides*) provides overstory cover at the site. Aquatic invertebrates observed include boatmen and beetles. No aquatic vertebrates have been observed.

Dry Season Photo (5/23/2018)	Wet Season Photo (11/28/2018)
	
Dry Season Photo (5/28/2019)	**Wet Season Photo (12/3/2019)**
	

Dry Season Photo (6/19/2020)	Wet Season Photo (10/15/2020)
	
Dry Season Photo (05/24/2021)	**Wet Season Photo (08/24/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	HB5-01	**Interpretation of Groundwater Age:** Consistent deep groundwater source.
Watershed	Humboldt Canyon	
Monitoring Period	12/2016 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 34 gpm. No changes to flow are predicted at this site.
Number of Visits	14	

Flows and Field Parameters (pH, Temp, SC)

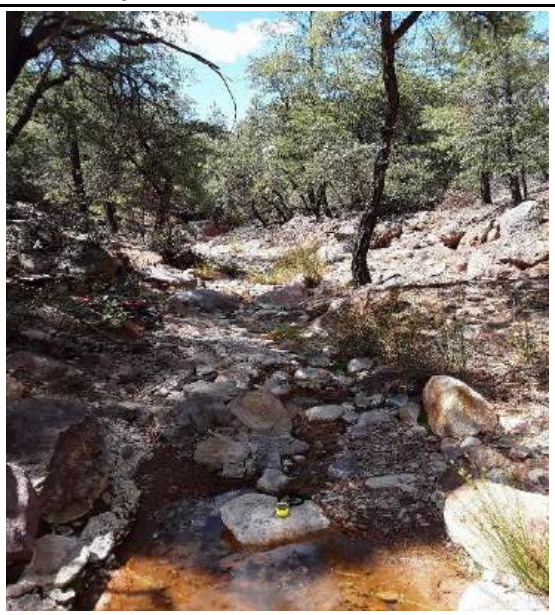
Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					12/29/2016	1.80	3.17	10.5	940
4/27/2017	0.00	3.11	20.8	1021	10/23/2017	0.00	3.10	13.2	835
5/23/2018	0.00	3.06	20.1	1002	11/28/2018	0.70	3.10	12.2	720
5/28/2019	<0.25	3.24	22.8	922	12/3/2019	34.20	3.29	10.9	388
6/15/2020	<0.25	3.08	32.7	834	10/15/2020	<0.25	2.86	19.1	1545
1/13/2021	Dry				8/24/2021	9.10	2.67	26.2	696
3/11/2021	1.10	3.01	14.1	997	11/16/2021	0.10	3.17	10.1	898
5/24/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		12/29/2016	Copper, zinc, pH
4/27/2017	Copper, zinc, pH	10/23/2017	Copper, zinc, pH
5/23/2018	Copper, zinc, pH	11/28/2018	Copper, zinc, pH
5/28/2019	Copper, zinc, pH	12/3/2019	Copper, zinc, pH
6/15/2020	Copper, zinc, pH	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/13/2021	Dry	11/16/2021	Cadmium, copper, iron, nickel, thallium, zinc, pH,DO
5/24/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located within a rocky and bouldery section of Humboldt Canyon. Water is typically present in shallow runs with small pools in the drainage. Riparian obligate Baltic rush (*Juncus balticus*), algae, and moss are the predominate herbaceous cover at the site. Silverleaf oak (*Quercus hypoleucoides*) and Chihuahua pine (*Pinus leiophylla*) provide overstory cover. Aquatic beetles and backswimmers have been observed along this drainage. No aquatic vertebrates were observed.

Dry Season Photo (5/23/2018)	Wet Season Photo (11/28/2018)
	
Dry Season Photo (5/28/2019)	**Wet Season Photo (12/3/2019)**
	

Dry Season Photo (6/15/2020)	Wet Season Photo (10/15/2020)
	
Dry Season Photo (05/24/2021)	**Wet Season Photo (08/24/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	HE4-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	E. Fork of Harshaw Creek	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** This site has been dry during site visits except for 2 visits where flow ranged from 2.24 to 7.29 gpm. In the first 4 years, there may be up to 0.005 gpm decrease in flow.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/7/2017	2.24	7.22	17.3	569
					12/2/2018	Dry			
5/23/2019	Dry				12/4/2019	7.29	7.53	17.7	479
7/6/2020	Dry				10/27/2020	Dry			
1/21/2021	Dry				8/31/2021	Dry			
3/10/2021	Dry				11/15/2021	Dry			
5/19/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/7/2017	No Exceedances
		12/2/2018	Dry
5/23/2019	Dry	12/4/2019	No Exceedances
7/6/2020	Dry	10/27/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/21/2021	Dry	11/15/2021	Dry
5/19/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located within a silty/sandy section of the East Fork of Harshaw Creek. Understory vegetation at the site is dominated by seep willow (*Baccharis salicifolia*), sideoats grama (*Bouteloua curtipendula*), and deergrass (*Muhlenbergia rigens*). Overstory vegetation is dominated by Fremont cottonwood (*Populus fremontii*), a preferential riparian species, with velvet mesquite (*Prosopis velutina*), desert willow (*Chilopsis linearis*), and Bonpland willow (*Salix bonplandiana*) also present. No aquatic vertebrates have been observed. No aquatic invertebrates or vertebrates have been observed.

Dry Season Photo	Wet Season Photo (12/2/2018)
No photo taken.	
Dry Season Photo (5/23/2019)	**Wet Season Photo (12/4/2019)**
	

Dry Season Photo (7/6/2020)	Wet Season Photo (10/27/2020)
	
Dry Season Photo (05/19/2021)	**Wet Season Photo (08/31/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	HE7-WELL-ST-01	**Interpretation of Groundwater Age:** Evaporative and modern, no deep source.
Watershed	E. Fork of Harshaw Creek	
Monitoring Period	11/2017-12/2021	**Potential Impacts/Effects:** This site is not a seep or spring, site it is fed by a well. No changes are predicted at this site.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Pumping Rate (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Pumping Rate (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/6/2017	0.00	8.18	17.6	668
5/16/2018	0.00	7.68	21.4	562	12/2/2018	0.00	9.80	10.1	311
5/23/2019	0.00	9.64	20.5	656	12/4/2019	0.00	9.20	12.1	393
7/6/2020	0.00	8.02	29.7	555	10/27/2020	0.00	8.53	15.3	1049
1/21/2021	0.00	7.46	17.9	688	8/31/2021	0.00	8.14	24.1	546
3/10/2021	0.00	8.04	13.5	662	11/15/2021	0.00	8.25	12.5	597
5/19/2021	0.00	7.82	22.1	714					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/6/2017	No Exceedances
5/16/2018	No Exceedances	12/2/2018	pH
5/23/2019	pH	12/4/2019	pH
7/6/2020	No Exceedances	10/27/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/21/2021	No Exceedances	11/15/2021	No Exceedances
5/19/2021	No Exceedances		

Aquatic and Vegetation Survey Findings: This site is a metal stock drinker associated with an adjacent solar well and closed cistern, located within the East Fork of Harshaw Creek. Invasive Bermudagrass (*Cynodon dactylon*) dominates the site with alkali sacaton (*Sporobolus airoides*) also present. No overstory canopy cover occurs at the site. Aquatic invertebrates observed in this drinker include backswimmers, boatmen, beetles, and dragonflies. No aquatic vertebrates have been observed. Cattle and grazing are present on adjacent land.

Dry Season Photo (5/16/2018)	Wet Season Photo (12/02/2018)
No Photo Taken	
Dry Season Photo (5/23/2019)	**Wet Season Photo (12/4/2019)**
	

Dry Season Photo (7/6/2020)	Wet Season Photo (10/27/2020)
	
Dry Season Photo (05/19/2021)	**Wet Season Photo (08/31/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	HM7-AD-01	**Interpretation of Groundwater Age:** Deep groundwater source.
Watershed	Hermosa Canyon	
Monitoring Period	4/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 0.45 gpm. This site has been dry during several surveys during the dry season suggesting the site may not be in connection with a perennial groundwater source. No changes are predicted at this site.
Number of Visits	13	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
4/28/2017	<0.25	7.62	16.2	412	10/18/2017	0.45	6.72	18.3	413
5/22/2018	0.00	7.49	14.1	412	12/1/2018	Dry			
5/26/2019	Dry				12/10/2019	Dry			
6/26/2020	Dry				10/27/2020	Dry			
2/1/2021	Dry				9/1/2021	0.00	7.41	21.2	413
3/23/2021	Dry				11/22/2021	Dry			
6/1/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
4/28/2017	No Exceedances	10/18/2017	No Exceedances
5/22/2018	No Exceedances	12/1/2018	Dry
5/26/2019	Dry	12/10/2019	Dry
6/26/2020	Dry	10/27/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/1/2021	Dry	11/22/2021	Dry
6/1/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located at an adit along the eastern wall of Hermosa Canyon with a built-in spring box. This site was dry during site visits in 2019 and 2020. The moss mat at the adit entrance is desiccated. Bullgrass (*Muhlenbergia emersleyi*), canyon grape (*Vitis arizonica*), and California buckthorn (*Frangula californica*) dominate the limited herbaceous cover within the drainage bottom. Overstory tree cover is dominated by Arizona sycamore (*Platanus wrightii*), a preferential riparian tree species, and netleaf hackberry (*Celtis reticulata*). No aquatic invertebrates, or vertebrates have been observed in recent years.

Dry Season Photo (5/22/2018)	Wet Season Photo (12/01/2018)
	
Dry Season Photo (5/26/2019)	**Wet Season Photo (12/10/2019)**
	

Dry Season Photo (6/26/2020)	Wet Season Photo (10/27/2020)
	
Dry Season Photo (06/01/2021)	**Wet Season Photo (09/01/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	HM8-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Hermosa Canyon	
Monitoring Period	5/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to trace flow. This site has been dry during most dry season surveys suggesting the site may not be in connection with a perennial groundwater source. In the first 4 years, there may be up to 0.07 gpm decrease in flow.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/3/2017	<0.25	7.38	22.8	449	10/18/2017	Dry			
					12/1/2018	Dry			
5/26/2019	Dry				12/10/2019	0.00	7.09	14.9	377
6/26/2020	Dry				10/27/2020	Dry			
2/1/2021	Dry				9/1/2021	Dry			
3/23/2021	Dry				11/22/2021	Dry			
6/1/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/3/2017	No exceedances	10/18/2017	Dry
		12/1/2018	Dry
5/26/2019	Dry	12/10/2019	No exceedances
6/26/2020	Dry	10/27/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/1/2021	Dry	11/22/2021	Dry
6/1/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located within a silty and cobbly portion of Hermosa Canyon. The site contains little herbaceous cover, limited to perennial grasses (*Poaceae* family). Overstory vegetation is dominated by riparian trees including Arizona sycamore (*Platanus wrightii*), Fremont cottonwood (*Populus fremontii*), and coyote willow (*Salix exigua*). Invasive tree-of-heaven (*Ailanthus altissima*) has been observed. No aquatic invertebrates or vertebrates have been observed at this site.

Dry Season Photo	Wet Season Photo (12/01/2018)
No photo taken	
Dry Season Photo (5/26/2019)	**Wet Season Photo (12/10/2019)**
No photo taken	

Dry Season Photo (6/26/2020)	Wet Season Photo (10/27/2020)
	
Dry Season Photo (06/01/2021)	**Wet Season Photo (09/01/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	HM8-02	**Interpretation of Groundwater Age:** Consistently submodern with a deep groundwater source.
Watershed	Hermosa Canyon	
Monitoring Period	01/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 15 gpm.
Number of Visits	13	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					10/18/2017	0.00	7.15	19.7	517
1/12/2017	13.47	7.18	13.9	458	12/1/2018	0.00	7.20	18.7	211
5/22/2018	0.00	7.04	16.9	489	12/8/2019	15.00	7.69	13.9	350
5/24/2019	Dry				10/27/2020	Dry			
6/26/2020	Dry				9/1/2021	Dry			
2/1/2021	Dry				11/22/2021	Dry			
3/23/2021	Dry								
6/1/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		1/12/2017	Selenium
		10/18/2017	No Exceedandes
5/22/2018	Lead	12/1/2018	No Exceedandes
5/24/2019	Dry	12/8/2019	No Exceedandes
6/26/2020	Dry	10/27/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/1/2021	Dry	11/22/2021	Dry
6/1/2021	Dry		

Aquatic and Vegetation Survey Findings: Site located at downstream end of Hermosa Canyon. Overstory riparian tree cover includes Arizona sycamore (*Platanus wrightii*), Arizona walnut (*Juglans major*), Arizona ash (*Fraxinus velutina*), and coyote willow (*Salix exigua*). Netleaf hackberry (*Celtis reticulata*) and alligator juniper (*Juniperus deppeana*) are also present overstory tree species.

Dry Season Photo (5/22/2018)	Wet Season Photo (12/1/2018)
	
Dry Season Photo (5/24/2019)	**Wet Season Photo (12/08/2019)**
	

Dry Season Photo (6/26/2020)	Wet Season Photo (10/27/2020)
	
Dry Season Photo (06/01/2021)	**Wet Season Photo (09/01/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	MW1-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Mowry Wash	
Monitoring Period	12/2019 - 12/2021	**Potential Impacts/Effects:** This site has been dry during all site visits except for 1 visit where flow was recorded at 4.75 gpm, suggesting the site may not be in connection with a perennial groundwater source. No changes are predicted at this site.
Number of Visits	8	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					12/5/2019	4.75	7.80	15.1	379
7/1/2020	Dry				10/23/2020	Dry			
1/28/2021	Dry				8/31/2021	Dry			
3/25/2021	Dry				11/29/2021	Dry			
6/2/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		12/5/2019	No Exceedances
7/1/2020	Dry	10/23/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/28/2021	Dry	11/29/2021	Dry
6/2/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located within a cobbly and silty section of north Mowry Wash. The site contains little herbaceous cover with dominate species being Texas bluestem (*Schizachyrium cirratum*), ticktrefoil (*Desmodium* sp.), and lovegrass (*Eragrostis* sp.). Overstory vegetation is dominated by Emory oak (*Quercus emoryi*). No aquatic invertebrates or vertebrates have been observed at this site.

Dry Season Photo	Wet Season Photo (12/5/2019)
No photo taken	
Dry Season Photo (7/1/2020)	**Wet Season Photo (10/23/2020)**
	

Dry Season Photo (06/02/2021)	Wet Season Photo (08/31/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	MWS1-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Mowry Wash South	
Monitoring Period	5/2019 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 84 gpm.
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/30/2019	0.00	7.29	14.8	399	12/5/2019	83.80	6.91	11.8	132
6/30/2020	Dry				10/23/2020	Dry			
1/28/2021	Dry				9/10/2021	13.50	6.81	21.9	171
3/25/2021	Dry				11/29/2021	Dry			
5/26/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/30/2019	No Exceedances	12/5/2019	Iron, copper, zinc
6/30/2020	Dry	10/23/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/28/2021	Dry	11/29/2021	Dry
5/26/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located within rocky/gravelly section of south Mowry Wash. Deergrass (*Muhlenbergia rigens*) is the dominate perimeter vegetation at this site with pinyon ricegrass (*piptochaetium fimbriatum*), and riparian obligates, spikerush (*Eleocharis* sp.), rushes (*Juncus* spp.), and seep monkeyflower (*Mimulus guttatus*), are also present. Other understory shrub vegetation noted include skunkbush (*Rhus trilobata*) and Wright's silktassel (*Garrya wrightii*). Overstory vegetation is dominated by alligator juniper (*Juniperus deppeana*), Emory oak (*Quercus emoryi*), and Mexican pinyon (*Pinus cembroides*). Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) and invasive weeping lovegrass *(Eragrostis curvula*) have been observed. Aquatic invertebrates observed along this drainage include beetles and backswimmers. No aquatic vertebrates have been observed at this site.

Dry Season Photo (5/20/2019)	Wet Season Photo (12/5/2019)
	
Dry Season Photo (6/30/2020)	**Wet Season Photo (10/23/2020)**
	

Dry Season Photo (05/26/2021)	Wet Season Photo (09/10/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	MWS1-02	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Mowry Wash South	
Monitoring Period	05/2019 - 12/2021	**Potential Impacts/Effects:** No surface flow has been observed at this site during site visits, rather it exists as a still pond. In the first 4 years, there may be up to 0.0006 gpm decrease in flow.
Number of Visits	9	

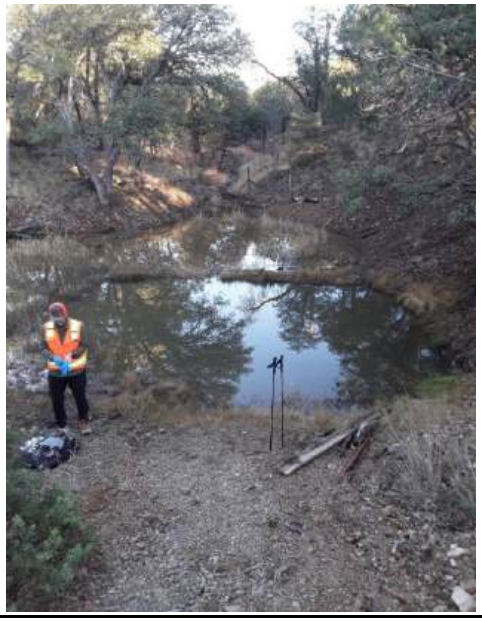
Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/21/2019	0.00	10.20	23.9	219	12/5/2019	0.00	6.58	9.5	135
6/30/2020	0.00	8.48	27.5	200	10/23/2020	0.00	7.27	15.4	944
1/28/2021	0.00	6.78	-0.8	252	9/10/2021	0.00	7.20	22.0	86
3/25/2021	0.00	7.29	9.3	292	11/29/2021	0.00	6.05	2.5	264
5/26/2021	0.00	7.14	18.8	338					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/21/2019	Iron, pH	12/5/2019	Iron, copper, zinc
6/30/2020	Iron, arsenic	10/23/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/28/2021	Copper, iron, selenium	11/29/2021	pH
5/26/2021	No exceedances		

Aquatic and Vegetation Survey Findings: Tank dug out against hillside, potentially fed by groundwater. Water present year-round with riparian obligate plant species including rushes (*Juncus* spp.) and aquatic vegetation including non-native Brazilian waterweed (*Egeria densa*). Nonnative fish and bullfrogs (*Lithobates catesbeianus*) have been observed. Aquatic invertebrates including beetles, boatmen, backswimmers, damselflies, and leeches, as well as snails, have been observed. Invasive plants, water milfoil (*Myriophyllum* sp.) and Johnsongrass (*Sorghum halepense*), have been observed.

Dry Season Photo (5/21/2019)	Wet Season Photo (12/5/2019)
	
Dry Season Photo (6/30/2020)	**Wet Season Photo (10/23/2020)**
	

Dry Season Photo (05/26/2021)	Wet Season Photo (09/10/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	MWS1-03	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Mowry Wash South	
Monitoring Period	03/2021 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 11.9 gpm. Predictions will be made once additional data is obtained.
Number of Visits	4	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
3/25/2021	0.12	7.03	5.33	403.8	9/10/2021	11.90	7.02	21.06	89.2
5/26/2021	Dry				11/29/2021	Dry			

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
3/25/2021	No Exceedances	9/10/2021	Isotopes samples collected
5/26/2021	Dry	11/29/2021	Dry

Aquatic and Vegetation Survey Findings: Water seeps from alluvium behind the concrete dam and flows atop volcanic bedrock/alluvium channel. This is a surface water section of Mowry Wash. Aquatic beetles have been observed. The dominant vegetation is Madrean oak woodland, dominated by alligator juniper (*Juniperus deppeana*) and Mexican pinyon (*Pinus cembroides*). No invasive plant species were noted, but one USFS sensitive species, Sonoran nose burn (*Tragia laciniata*), has been observed. Deer tracks and livestock sign has been noted.

Dry Season Photo (05/26/2021)

Wet Season Photo (09/10/2021)

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	MWS2-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Mowry Wash South	
Monitoring Period	5/2019 - 12/2021	**Potential Impacts/Effects:** Site has been dry for all site visits except for 2 visits, where flow ranged from 32.6 to 128 gpm.
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

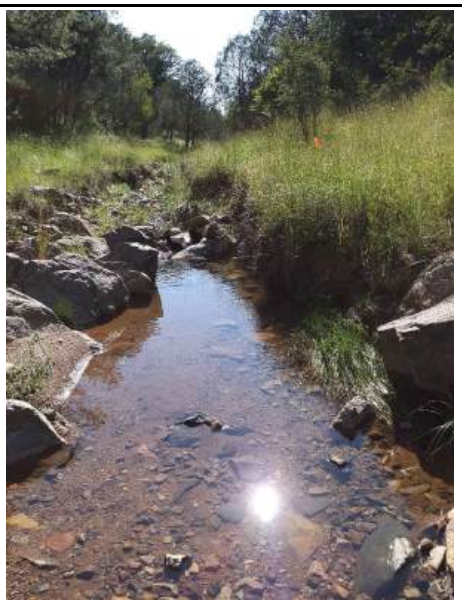
Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/21/2019	0.00	7.00	18.4	785	12/5/2019	128	7.05	11.4	227
6/30/2020	Dry				10/23/2020	Dry			
1/28/2021	Dry				9/15/2021	32.6	6.98	26.2	422
3/25/2021	Dry				11/29/2021	Dry			
5/26/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/21/2019	Lead	12/5/2019	Cyanide, zinc, selenium
6/30/2020	Dry	10/23/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/28/2021	Dry	11/29/2021	Dry
5/26/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located within rocky/gravelly section of south Mowry Wash with some bedrock outcrop constrictions. Threeawn (*Aristida* sp.) is the dominate perimeter vegetation at this site with deergrass (*Muhlenbergia rigens*), pointleaf manzanita (*Arctostaphylos pungens*), and panicgrass (*Panicum* sp.). Riparian obligates, Mexican rush (*Juncus mexicana*) and spikerush (*Eleocharis* sp.), and seepwillow (*Baccharis salicifolia*) were also noted at the site. This site lacks tree canopy cover, however, overstory vegetation adjacent to the site is dominated by Emory oak (*Quercus emoryi*). Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) and invasive plants, Lehmann lovegrass (*Eragrostis lehmanniana*) and weeping lovegrass (*Eragrostis curvula*) have been observed. Aquatic invertebrates observed along this drainage include beetles and backswimmers. No aquatic vertebrates have been observed at this site.

Dry Season Photo (5/21/2019)	Wet Season Photo (12/5/2019)
	
Dry Season Photo (6/30/2020)	**Wet Season Photo (10/23/2020)**
	

Dry Season Photo (05/26/2021)	Wet Season Photo (09/15/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	PC-SP-01	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Providencia Canyon	
Monitoring Period	06/2021 - 12/2021	**Potential Impacts/Effects:** No flow has been observed at this site.
Number of Visits	3	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
6/2/2021	Wet				9/16/2021	0.00	7.86	22.3	1769
					12/2/2021	0.00	7.26	18.2	1774

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/2/2021	Unable to sample	9/16/2021	Isotope samples collected
		12/2/2021	No exceedances

Aquatic and Vegetation Survey Findings: Also called Shannon Spring, water pools in the shaft on the southern side of Providencia canyon. A functioning submersible solar pump with polyline tubing in all directions resides at the site. Pumped water runs up the canyon side to a cistern about 500 ft up the hillside. The tubing then runs back down and across the canyon to the cattle drinker. The predominant vegetation is consistent with the Madrean oak woodland, with poison ivy (*Toxicodendron radicans*) and velvet ash (*Fraxinus velutina*) surrounding the cistern. Invasive Bermudagrass (*Cynodon dactylon*) is present. Aquatic beetles have been observed, but no aquatic herpetofauna has been observed.

Dry Season Photo (06/2/2021)

Wet Season Photo (09/16/2021)

MONTGOMERY & ASSOCIATES

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	PV1-01	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Paja Verde Wash	
Monitoring Period	06/2021 - 12/2021	**Potential Impacts/Effects:** No flow has been observed at this site.
Number of Visits	3	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
6/1/2021	Dry				9/16/2021	Dry			
					11/30/2021	Dry			

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/1/2021	Dry	9/16/2021	Dry
		11/30/2021	Dry

Aquatic and Vegetation Survey Findings: Dry wash with a masonry dam with a dry valve at the base. No signs of recent water. Stomped mud at site hardened dry. Surrounding vegetation is sparse, dominated by kidneywood (*Eysenhardtia orthocarpa*) and mimosa (*Mimosa dysocarpa*). Invasive cocklebur (*Xanthium strumarium*) occurs. No aquatic herpetofauna or invertebrates have been observed.

Dry Season Photo (06/1/2021)

Wet Season Photo (09/16/2021)

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	RM-SP-01	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Red Mountain Tributary	
Monitoring Period	06/2021 - 12/2021	**Potential Impacts/Effects: F**lows measured at this site have ranged from 0 to 0.01 gpm.
Number of Visits	3	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/19/2021	<0.01	7.14	20.5	2612	9/10/2021	0.01	6.32	18.9	2237
					11/30/2021	0.00	7.96	10.2	2466

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/19/2021	No exceedances	9/10/2021	Isotope samples collected
		11/30/2021	No exceedances

Aquatic and Vegetation Survey Findings: Water seeping from bedrock ledges in trachyandesite cascades over shelves into a lower muddy pool. Vegetation is Madrean evergreen woodland with an overstory dominated by Toumey oak (*Quercus toumeyi*). No aquatic herpetofauna or invertebrates have been observed. Cattle scat has been observed below the spring. Javelina tracks have been observed.

Dry Season Photo (05/19/2021)

Wet Season Photo (09/10/2021)

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	RT-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Ridge Tank	
Monitoring Period	5/2019 - 12/2021	**Potential Impacts/Effects:** No flow has been measured at this site. This site sits atop a ridge and is a dirt tank (excavated depression) that holds precipitation and some surface runoff. Groundwater does not contribute to this site. No changes are predicted at this site.
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/22/2019	0.00	7.74	18.3	87	12/6/2019	0.00	6.88	14.7	27
7/2/2020	0.00	6.83	27.1	115	10/2/2020	0.00	8.12	21.1	89
1/20/2021	0.00	8.31	5.4	114	8/24/2021	0.00	6.70	33.3	54
3/19/2021	0.00	7.54	12.9	108	11/17/2021	0.00	7.64	10.5	80
5/17/2021	0.00	6.66	14.4	145					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/22/2019	Iron, lead, copper	12/6/2019	Iron, copper
7/2/2020	Iron, lead, copper	10/2/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	No exceedances	11/17/2021	Lead, copper
5/17/2021	Lead		

Aquatic and Vegetation Survey Findings: Ridge Tank, a large earthen tank, is located on the ridgetop divide between Adams Canyon and Chino Draw. California bulrush (*Schoenoplectus californicus*), a wetland associated species, is present as emergent vegetation. Hairy waterclover (*Marsilea vestita*), a wetland associated species is present as floating vegetation and algae as submerged vegetation. Riparian obligates, spikerush (*Eleocharis* sp.) and Baltic rush (*Juncus balticus*), dominate the perimeter of the tank. Upland overstory vegetation surrounding the tank is dominated by juniper (*Juniperus* spp.) and pointleaf manzanita (*Arctostaphylos pungens*). Invasive plants observed at this site include Lehmann lovegrass (*Eragrostis lehmanniana*), giant reed (*Arundo donax*), and Bermudagrass (*Cynodon dactylon*). Aquatic invertebrates including beetles, damselflies, dragonflies, water scorpions, backswimmers, and snails have been observed. Aquatic vertebrates observed include the black-necked gartersnake (*Thamnophis cyrtopsis*). Non-native sunfish (*Centrarchidae family*) and the invasive American bullfrog (*Lithobates catesbeianus*) have also been noted at this site.

Dry Season Photo (5/22/2019)	Wet Season Photo (12/6/2019)
	
Dry Season Photo (7/2/2020)	**Wet Season Photo (10/2/2020)**
	

Dry Season Photo (05/17/2021)	Wet Season Photo (08/24/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	SB1-01	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Soldier Basin	
Monitoring Period	06/2021 - 12/2021	**Potential Impacts/Effects:** Flow has been observed at this site during the wet season. Predictions will be made once additional data is obtained.
Number of Visits	3	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
6/2/2021	Dry				9/15/2021	0.77	6.70	22.4	646
11/30/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/2/2021	Dry	9/15/2021	Isotope samples collected
		11/30/2021	Dry

Aquatic and Vegetation Survey Findings: Colluvial dam, followed by series of terraces with alluvial deposition. A cobble and concrete container was built into the eastern hillside. Vegetation is Madrean evergreen woodland with a riparian overstory dominated by Fremont cottonwood (*Populus fremontii*). Invasive Lehmann lovegrass (*Eragrostis lehmanniana*) was present. Aquatic beetles were observed. No aquatic herpetofauna have been observed.

Dry Season Photo (06/2/2021)

Wet Season Photo (09/15/2021)

MONTGOMERY & ASSOCIATES

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	SB1-02	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Soldier Basin	
Monitoring Period	06/2021 - 12/2021	**Potential Impacts/Effects:** Flow has been observed at this site during the wet season. Predictions will be made once additional data is obtained.
Number of Visits	3	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
6/2/2021	Dry				9/15/2021	0.01	6.87	21.9	1571
					11/30/2021	Dry			

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/2/2021	Dry	9/15/2021	Isotope samples collected
		11/30/2021	Dry

Aquatic and Vegetation Survey Findings: Granitic bedrock outcrop in channel near road crossing with seeping trace flow atop outcrop. Vegetation is Madrean evergreen woodland with woody vegetation dominated by beargrass (*Nolina microcarpa*), coyote willow (*Salix exigua*), and mimosa (*Mimosa aculeaticarpa var. biuncifera*). Invasive Bermudagrass (*Cynodon dactylon*) and Lehmann lovegrass (*Eragrostis lehmanniana*) are present. Aquatic beetles and one red-spotted toad tadpole (*Anaxyrus punctatus*) were observed. Deer tracks were noted.

Dry Season Photo (06/2/2021)

Wet Season Photo (09/15/2021)

MONTGOMERY & ASSOCIATES

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	SC-SP-01	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Sycamore Canyon	
Monitoring Period	6/2021 - 12/2021	**Potential Impacts/Effects:** Little flow has been observed at the site during the dry season. Predictions will be made once additional data is obtained.
Number of Visits	3	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
6/2/2021	0.00	7.60	16.3	1033	9/16/2021	0.01	7.42	17.7	1069
11/30/2021	0.00	7.13	10.3	1033					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/2/2021	No exceedances	11/30/2021	No exceedances

Aquatic and Vegetation Survey Findings: Old qanat dug 20 feet back into granodiorite bedrock wall with trace flow. Vegetation is Madrean evergreen woodland with a tree overstory dominated by velvet ash (*Fraxinus velutina*) and Arizona white oak (*Quercus arizonica*). No aquatic invertebrates or herpetofauna were observed. Unknown mammal tracks were present in the mud.

Dry Season Photo (06/2/2021)

Wet Season Photo (09/16/2021)

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	SNTA-01	**Interpretation of Groundwater Age:** Consistent deep groundwater source.
Watershed	Sonoita Creek	
Monitoring Period	6/2018-12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 545 to 4,620 gpm (1.2 to 10 cfs). In the first 4 years, flows in Sonoita Creek increased slightly due to discharge water in Harshaw Creek recharging the groundwater system.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
6/4/2018	2244.16	8.08	22.1	829	11/30/2018	1346.50	8.30	16.8	787
5/29/2019	1122.10	7.89	18.8	786	12/9/2019	Not Measured[1]	7.96	15.7	739
6/24/2020	545.00	7.93	18.7	1156	10/20/2020	4620.00	8.69	22.5	1133
2/4/2021	1346.00	8.12	15.6	817	9/14/2021	1950.00	7.95	24.1	811
3/24/2021	1450.00	8.12	15.6	847	12/1/2021	2216.70	8.00	17.3	864
5/27/2021	1798.00	8.10	21.1	850					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/4/2018	No Exceedances	11/30/2018	No Exceedances
5/29/2019	No Exceedances	12/9/2019	No Exceedances
6/24/2020	No Exceedances	10/20/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/4/2021	DO	12/1/2021	DO
5/27/2021	DO		

Aquatic and Vegetation Survey Findings: This site located along a section of Sonoita Creek upstream of the Alum Gulch confluence. Water is present in shallow riffles and runs. Riparian tree species present include Bonpland willow (*Salix bonplandiana*) and Fremont cottonwood (*Populus fremontii*). Emergent and perimeter vegetation is dominated by invasive plants including Bermudagrass (*Cynodon dactylon*), yellow sweet clover (*Melilotus officinalis*), and Johnson grass (*Sorghum halepense*). Fish have been observed at this site and include speckled dace (*Rhinichthys osculus*) and longfin dace (*Agosia chrysogaster*). Invasive crayfish have been observed. Aquatic invertebrates observed include belostomatids and damselfly.

Dry Season Photo (6/4/2018)	Wet Season Photo (11/30/2018)
	
Note [1]=Flows too high to measure with flume	
Dry Season Photo (5/29/2019)	**Wet Season Photo (12/9/2019)**
	

Dry Season Photo (6/24/2020)	Wet Season Photo (10/20/2020)
	
Dry Season Photo (05/27/2021)	**Wet Season Photo (09/14/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	SNTA-02	**Interpretation of Groundwater Age:** Consistent deep groundwater source.
Watershed	Sonoita Creek	
Monitoring Period	6/2018-12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 549 to 4,620 gpm (1.2 to 10 cfs). In the first 4 years, flows in Sonoita Creek increased slightly due to discharge water in Harshaw Creek recharging the groundwater system.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
6/4/2018	2244.16	8.09	22.6	827	11/30/2018	1346.50	8.20	18.2	776
5/29/2019	1122.10	7.88	19.6	789	12/9/2019	Not Measured[1]	7.97	15.6	739
6/24/2020	549.00	8.03	19.0	1137	10/20/2020	4620.00	8.20	22.9	693
2/4/2021	1346.00	8.12	15.6	818	9/14/2021	2103.00	7.89	24.2	816
3/24/2021	1450.00	8.10	15.8	847	12/1/2021	2325.50	7.92	18.4	862
5/27/2021	1798.00	8.17	22.0	848					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/4/2018	No Exceedances	11/30/2018	No Exceedances
5/29/2019	No Exceedances	12/9/2019	Zinc
6/24/2020	No Exceedances	10/20/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/4/2021	DO	12/1/2021	DO
5/27/2021	DO		

Aquatic and Vegetation Survey Findings: This site located along a section of Sonoita Creek downstream of the Alum Gulch confluence. Water is present in shallow riffles and runs. Riparian tree species present include Bonpland willow (*Salix bonplandiana*), narrowleaf willow (*Salix exguia*), Fremont cottonwood (*Populus fremontii*), and velvet ash (*Fraxinus velutina*). Emergent and perimeter vegetation is dominated by invasive yellow sweet clover (*Melilotus officinalis*) and native seepwillow (*Baccharis salicifolia*). Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) and other invasive plants, water cress (*Nasturtium officinale*) and Johnson grass (*Sorghum halepense*) have been observed. Fish have been observed at this site and include speckled dace (*Rhinichthys osculus*) and longfin dace (*Agosia chrysogaster*). Invasive crayfish have been observed. Aquatic invertebrates observed include belostomatids, boatmen, beetles, water scorpions, and snails.

Dry Season Photo (6/4/2018)	Wet Season Photo (11/30/2018)
	
Note [1]=Flows too high to measure with flume	
Dry Season Photo (5/29/2019)	**Wet Season Photo (12/9/2019)**
	

Dry Season Photo (6/24/2020)	Wet Season Photo (10/20/2020)
	
Dry Season Photo (05/27/2021)	**Wet Season Photo (09/14/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	SNTA-TNC-01	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Sonoita Creek	
Monitoring Period	2/2021 - 5/2021	**Potential Impacts/Effects:** Flows range from 884 to 1548.50 gpm. **Predictions will be made once additional data is obtained.**
Number of Visits	3	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
2/4/2021	1548.50	7.85	14.6	845					
3/24/2021	1382.00	7.59	15.6	867					
5/27/2021	884.00	7.52	18.0	874					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
2/4/2021	DO		
5/27/2021	DO		

Aquatic and Vegetation Survey Findings: Water flowing through the channel. Sandy soil banks on both sides. Sandy gravelly bottom. Vegetation is riparian forest and scrub dominated by Goodding's willow (*Salix exigua*) and coyote willow (*Salix exigua*), with a dense ground cover of watercress (*Nasturtium officinale*) in places. Native speckled dace (*Rhinichthys osculus*), longfin dace (*Agosia chrysogaster*), and Sonoran desert sucker (*Catostomus insignis*) were found in the creek, along with non-native crayfish. Invasive Bermudagrass (*Cynodon dactylon*), Johnsongrass (*Sorghum halepense*), and cocklebur (*Xanthium strumarium*) were observed. Aquatic invertebrates observed include beetles, belostomatids, and dragonflies. White-tailed deer (*Odocoileus virginianus*), javelina (*Tayassu tajacu*), and grey squirrels (*Sciurus carolinensis*) were present. Bird species observed include ravens (*Corvus corax*), painted redstarts (*Myioborus pictus*), vermilion flycatchers (*Pyrocephalus obscurus*), and a flicker (*Colaptes auratus*).

Dry Season Photo (05/27/2021)	Wet Season Photo
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	SNTA-TNC-01R	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Sonoita Creek	
Monitoring Period	9/2021 - 12/2021	**Potential Impacts/Effects:** Flows range from 760.5 to 1361 gpm. Predictions will be made once additional data is obtained.
Number of Visits	2	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					9/14/2021	760.50	7.35	22.9	935
					12/1/2021	1361.60	7.84	16.4	917

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		9/14/2021	Isotope samples collected
		12/1/2021	DO

Aquatic and Vegetation Survey Findings: Water flows in a meandering stream channel. Alluvial sediment with sandy, gravelly substrate and cobbles. Vegetation is riparian scrub dominated by coyote willow (*Salix exigua*). Invasive Johnsongrass (*Sorghum halepense*) was observed.

Dry Season Photo (05/27/2021)	Wet Season Photo (09/14/2021)
See SNTA-TNC-01	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TC2-01	**Interpretation of Groundwater Age:** Modern source.
Watershed	Trib. To Corral Canyon	
Monitoring Period	10/2017 - 12/2021	**Potential Impacts/Effects:** No surface flow has been observed at this site during site visits. This site is a dirt tank (excavated depression) that holds precipitation and surface runoff. Conditions suggest that groundwater does not contribute to this site. No changes are predicted at this site.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					10/27/2017	0.00	7.46	19.7	102
5/17/2018	0.00	8.51	26.4	162	12/2/2018	0.00	8.20	11.1	1466
5/26/2019	0.00	8.67	24.4	302	12/5/2019	0.00	7.50	11.1	46
6/16/2020	0.00	8.48	31.5	148	9/30/2020	0.00	9.21	28.1	79
1/11/2021	Dry				11/15/2021	0.00	7.51	18.6	135
3/8/2021	Dry								
5/17/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		10/27/2017	No Exceedances
5/17/2018	No Exceedances	12/2/2018	No Exceedances
5/26/2019	Lead	12/5/2019	Silver, copper
6/16/2020	No Exceedances	9/30/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/11/2021	Dry	11/15/2021	No Exceedances
5/17/2021	Dry		

Aquatic and Vegetation Survey Findings: Site is an earthen stock tank located within a tributary to Corral Canyon. The tank typically supports some floating vegetation, Chihuahuan waterclover (*Marsilea mollis*), as well as perimeter vegetation dominated by non-native jungle rice (*Echinochloa colona*). Invasive plants observed include Bermudagrass (*Cynodon dactylon*) and Lehmann lovegrass (*Eragrostis lehmanniana*). Aquatic invertebrates observed include beetles, belostomatid, backswimmers, boatmen, dragonfly, leeches, water scorpions, and snails. Invasive mosquitofish (*Gambusia affinis*) and American bullfrogs (*Lithobathes catesbeianus*) have been observed.

Dry Season Photo (6/1/2018)	Wet Season Photo (12/2/2018)
	
Dry Season Photo (5/26/2019)	**Wet Season Photo (12/5/2019)**
	

Dry Season Photo (6/16/2020)	Wet Season Photo (9/30/2020)
	
Dry Season Photo (05/17/2021)	**Wet Season Photo (11/15/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TEH1-01	**Interpretation of Groundwater Age:** Isotope data was collected during the September 2021 event. Results will be assessed for determination of groundwater age after additional data is collected during the 2022 sampling events.
Watershed	Tributary to E Fork of Harshaw Creek	
Monitoring Period	2/2021 - 8/2021	**Potential Impacts/Effects:** No flow has been observed at this site. Predictions will be made once additional data is obtained.
Number of Visits	4	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
2/1/2021	0.00	9.79	9.2	70	8/25/2021	0.00	7.48	29.6	206
3/10/2021	Dry								
6/3/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/3/2021	Dry		

Aquatic and Vegetation Survey Findings: Plunge pool at the base of bedrock outcrop. Surrounding vegetation is Madrean evergreen woodland. Aquatic backswimmers, boatmen, dragonflies, fairy shrimp, and red-spotted toads (*Anaxyrus punctatus*) have been observed.

Dry Season Photo (06/03/2021)

Wet Season Photo (08/25/2021)

MONTGOMERY & ASSOCIATES

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TEH2-01	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Tributary to E Fork of Harshaw Creek	
Monitoring Period	2/2021 - 12/2021	**Potential Impacts/Effects:** Little to no flow has been observed at this site. Predictions will be made once additional data is obtained.
Number of Visits	4	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
2/1/2021	0.02	9.15	12.1	118	8/26/2021	0.00	7.29	21.6	339
3/10/2021	0.00	8.72	16.8	375					
6/3/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
6/3/2021	Dry		

Aquatic and Vegetation Survey Findings: Ponded water is located in a bedrock notch within the tributary channel. Surrounding vegetation is Madrean evergreen woodland. Aquatic beetles, backswimmers, dragonflies, boatmen, and fairy shrimp have been observed.

Dry Season Photo (06/03/2021)

Wet Season Photo (08/26/2021)

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TH5-01	**Interpretation of Groundwater Age:** Evaporative and modern.
Watershed	Tributary to Harshaw Creek	
Monitoring Period	12/2018 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from <0.25 to 15 gpm. This site has been dry during all dry season surveys except for 1, where flow was 7.65 gpm, suggesting the site is not in connection with a perennial groundwater source. No changes are predicted at this site.
Number of Visits	10	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					12/3/2018	<0.25	7.70	5.1	155
5/31/2019	Dry				12/10/2019	15.00	6.83	8.0	67
6/29/2020	Dry				10/7/2020	Dry			
2/2/2021	0.37	7.65	8.8	136	9/8/2021	3.78	7.50	23.9	99
3/23/2021	Dry				12/1/2021	Dry			
6/3/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		12/3/2018	No Exceedances
5/31/2019	Dry	12/10/2019	No Exceedances
6/29/2020	Dry	10/7/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/2/2021	No Exceedances	12/1/2021	Dry
6/3/2021	Dry		

Aquatic and Vegetation Survey Findings: This site located within a bedrock section of a tributary to Harshaw Creek. Understory vegetation at the site is limited to upland species predominated by perennial grasses (*Poaceae* family), rockloving spikemoss (*Selaginella rupincola*), and sugar sumac (*Rhus ovata*). Overstory vegetation is dominated by Arizona white oak (*Quercus arizonica*) and alligator juniper (*Juniperus deppeana*). No aquatic invertebrates and no aquatic vertebrates have been observed.

Dry Season Photo	Wet Season Photo (12/3/2018)
No photo taken	
Dry Season Photo (5/31/2019)	**Wet Season Photo (12/10/2019)**
	

Dry Season Photo (6/29/2020)	Wet Season Photo (10/7/2020)
	
Dry Season Photo (06/03/2021)	**Wet Season Photo (09/08/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TH9-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	12/2019 - 12/2021	**Potential Impacts/Effects:** This site was dry during all site visits except for 1 where flow was measured at 3.24 gpm. In the first 4 years, there may be up to 0.023 gpm decrease in flow.
Number of Visits	8	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					12/8/2019	3.24	8.21	12.5	288
6/29/2020	Dry				10/22/2020	Dry			
1/28/2021	Dry				9/9/2021	Dry			
3/24/2021	Dry				11/29/2021	Dry			
5/24/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		12/9/2019	Lead
6/29/2020	Dry	10/22/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/28/2021	Dry	11/29/2021	Dry
5/24/2021	Dry		

Aquatic and Vegetation Survey Findings: This site located within a gravely and cobbly section of a tributary to Harshaw Creek. This portion of the creek has little vegetation cover within the drainage. Understory vegetation lining the channel includes grasses and seepwillow (*Baccharis salicifolia*). Overstory cover is dominated by Arizona walnut (*Juglans major*), oak (*Quercus* spp.), and velvet mesquite (*Prosopis velutina*). Invasive plant species observed include common mullein (*Verbascum thapsus*). No aquatic invertebrates or vertebrates have been observed.

Dry Season Photo	Wet Season Photo (12/8/2019)
No photo taken	

Dry Season Photo (7/14/2020)	Wet Season Photo (10/22/2020)
	
Dry Season Photo (05/24/2021)	**Wet Season Photo (09/09/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TH11-ST-01	**Interpretation of Groundwater Age:** Inconsistent. Deep groundwater source during dry season, evaporative during wet season.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	5/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have remained below 0.25. No changes are predicted at this site.
Number of Visits	13	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/3/2017	0.00	7.36	20.3	652	10/26/2017	0.00	6.78	13.3	641
6/1/2018	0.00	7.08	26.0	711	11/30/2018	<0.25	8.50	9.8	529
5/30/2019	<0.25	8.07	23.3	421	12/9/2019	<0.25	7.27	9.9	564
6/23/2020	<0.25	7.61	30.7	766	10/13/2020	0.00	8.09	20.4	665
1/14/2021	<0.01	6.82	5.1	646	8/31/2021	0.00	7.50	21.9	816
5/18/2021	<0.01	7.09	24.6	730	11/16/2021	0.00	7.64	8.3	652
3/9/2021	0.00	7.50	11.3	640					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/3/2017	No Exceedances	10/26/2017	No Exceedances
6/1/2018	No Exceedances	11/30/2018	No Exceedances
5/30/2019	Lead	12/9/2019	No Exceedances
6/23/2020	Lead	10/13/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/14/2021	No Exceedances	11/16/2021	No Exceedances
5/18/2021	Lead		

Aquatic and Vegetation Survey Findings: This concrete drinker is located in the upstream extent of an unnamed tributary to Harshaw Creek. Understory vegetation is dominated by sumac (*Rhus* spp.), Wright's silktassel (*Garrya wrightii*), pinyon ricegrass (*Piptochaetium fimbriatum*), and bull grass (*Muhlenbergia emersley*). Overstory vegetation is dominated by Arizona white oak (*Quercus arizonica*) and alligator juniper (*Juniperus deppeana*). Invasive plant species observed include Lehmann lovegrass (*Eragrostis lehmanniana*) and Bermudagrass (*Cynodon dactylon*). Aquatic beetles have been observed.

Dry Season Photo (6/1/2018)	Wet Season Photo (11/30/2018)
	
Dry Season Photo (5/30/2019)	**Wet Season Photo (12/9/2019)**
	

Dry Season Photo (6/23/2020)	Wet Season Photo (10/13/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/31/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TH14-01	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Trib. To Harshaw Creek	
Monitoring Period	5/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 9.20 gpm. No changes are predicted at this site.
Number of Visits	13	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/3/2017	<0.25	7.64	23.3	748	10/26/2017	<0.25	7.77	15.3	693
6/1/2018	0.00	7.96	22.0	670	11/30/2018	0.60	8.40	12.1	621
5/30/2019	0.00	8.12	2.37	518	12/9/2019	Not Measured[1]	7.86	13.8	500
6/23/2020	<0.25	8.99	28.8	561	10/13/2020	<0.25	7.92	24.3	735
1/14/2021	0.09	7.09	12.1	723	8/31/2021	9.20	8.06	22.2	612
3/9/2021	0.04	7.70	9.2	761	11/16/2021	0.05	7.58	8.8	719
5/18/2021	0.00	7.82	22.2	981					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/3/2017	No Exceedances	10/26/2017	No Exceedances
6/1/2018	No Exceedances	11/30/2018	No Exceedances
5/30/2019	No Exceedances	12/9/2019	No Exceedances
6/23/2020	No Exceedances	10/13/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/14/2021	No Exceedances	11/16/2021	No Exceedances
5/18/2021	No Exceedances		

Aquatic and Vegetation Survey Findings: This seep is located in section of unnamed tributary to Harshaw Creek with exposed bedrock. Generally, water is present in shallow pools. The site supports a number of herbaceous riparian obligate or wetland associated species including seep monkeyflower (*Mimulus guttatus*) and Mexican rush (*Juncus mexicanus*) as well as a variety of other herbaceous and shrub cover including bullgrass (*Muhlenbergia emersley*), catclaw mimosa (*Mimosa aculeaticarpa* var. *biuncifera*), sotol (*Dasylirion wheeleri*), green sprangletop (*Leptochloa dubia*), and Gentry yucca (*Yucca madrensis*). Non-native rabbitsfoot grass (*Polypogon* spp.) and invasive Lehmann lovegrass (*Eragrostis lehmanniana*) have been observed. Aquatic beetles, backswimmers, and dragonflies have been observed along this portion of the drainage. No aquatic vertebrates have been observed along this portion of the drainage.

Dry Season Photo (6/1/2018)	Wet Season Photo (11/30/2018)
	
Note [1]=Flows too high to measure with conventional methods	
Dry Season Photo (5/30/2019)	**Wet Season Photo (12/9/2019)**
	

Dry Season Photo (6/23/2020)	Wet Season Photo (10/13/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/31/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TH15-01	**Interpretation of Groundwater Age:** Modern water.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	11/2018 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 8.2 gpm. No changes are predicted at this site.
Number of Visits	10	

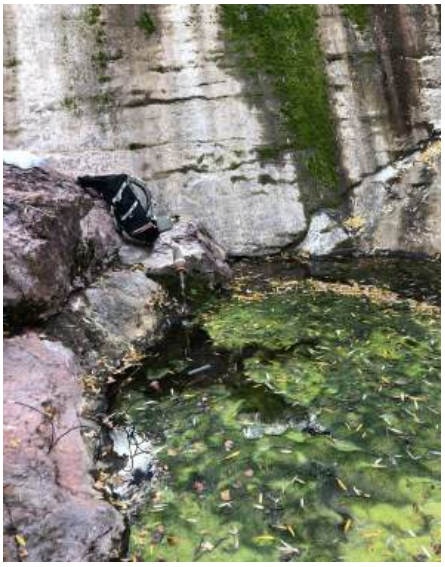
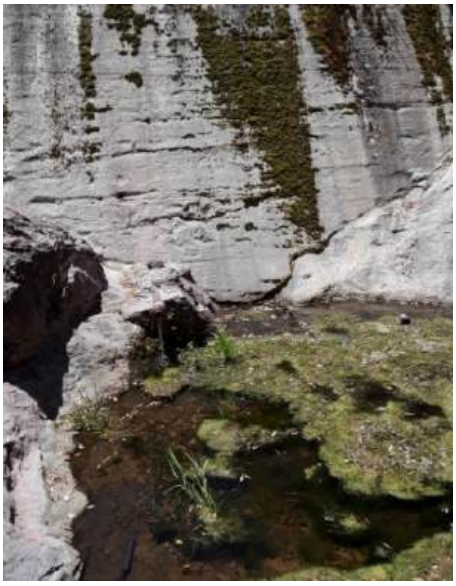
Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/30/2018	2.80	7.20	15.0	623
5/24/2019	0.00	7.45	17.8	682	12/8/2019	Not Measured[1]	8.08	11.8	422
6/23/2020	<0.25	8.01	37.5	1148	10/13/2020	Dry			
1/14/2021	Dry				8/30/2021	8.20	7.03	21.7	589
3/9/2021	0.04	6.95	12.6	1750	11/16/2021	0.07	6.83	15.6	1734
5/18/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/30/2018	No Exceedances
5/24/2019	No Exceedances	12/8/2019	No Exceedances
6/23/2020	No Exceedances	10/13/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/14/2021	Dry	11/16/2021	No Exceedances
5/18/2021	Dry		

Aquatic and Vegetation Survey Findings: A relic concrete dam that has silted in within an unnamed tributary to Harshaw Creek, downstream of Great Silver Mine supports water at the base of the dam in form of pools and flowing runs during the wet season. Algae is typically present as floating substrate. Understory vegetation is dominated by deergrass (*Muhlenbergia rigens*) and seepwillow (*Baccharis salicifolia*) with seep monkeyflower (*Mimulus guttatus*), a wetland associated plant, also present. Non-native annual rabbitsfoot grass (*Polypogon monspeliensis*) has been noted. Aquatic invertebrates that have observed include boatmen, backswimmers, dragonflies, belostomatids, and beetles. Canyon treefrog (*Hyla arenicolor*) tadpoles, toad (*Bufo* sp.) tadpoles, and black-necked gartersnakes (*Thamnophis cyrtopsis*) have been observed at this site.

Dry Season Photo (May 2018)	Wet Season Photo (11/30/2018)
	
Note [1]= Flows too high to measure with conventional methods	
Dry Season Photo (5/24/2019)	**Wet Season Photo (12/8/2019)**
	

Dry Season Photo (6/23/2020)	Wet Season Photo (10/13/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/30/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TH16-AD-01	**Interpretation of Groundwater Age:** Lightly evaporative and modern.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 10 gpm. No changes are predicted at this site.
Number of Visits	11	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/3/2017	<0.25	2.74	9.5	6017
5/21/2018	0.00	2.77	26.4	4450	11/30/2018	<0.25	2.70	11.3	7830
5/24/2019	<0.25	2.24	32.0	3999	12/8/2019	10.00	7.98	12.3	393
6/23/2020	Dry				10/8/2020	Dry			
1/14/2021	Dry				8/30/2021	Dry			
5/18/2021	Dry				12/2/2021	Dry			

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/3/2017	Lead, cadmium, copper, zinc, pH
5/21/2018	Only an isotope sample was collected due to low sample volume	11/30/2018	Cyanide, arsenic, cadmium, copper, zinc, selenium, pH
5/24/2019	Arsenic, cadmium, copper, zinc, selenium, pH	12/8/2019	No Exceedances
6/23/2020	Dry	10/8/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/14/2021	Dry	12/2/2021	Dry
5/18/2021	Dry		

Aquatic and Vegetation Survey Findings: This adit is located in a sandy, gravelly portion of an unnamed tributary to Harshaw Creek; the site was completely filled in and the area around it reclaimed in 2019. There is no remaining aquatic resource thus, no aquatic invertebrates or vertebrates are present. Upland vegetation includes mesquite (*Prosopis* sp.), oak (*Quercus* sp.), juniper (*Juniperus* sp.) and sumac (*Rhus* sp.). The reclaimed area is covered primarily by Canadian horseweed (*Conyza canadensis*) and non-native Mexican tulip poppy (*Hunnemannia fumariifolia*).

Dry Season Photo (5/21/2018)	Wet Season Photo (11/30/2018)
	
Dry Season Photo (5/24/2019)	**Wet Season Photo (12/8/2019)**
	

Dry Season Photo (6/23/2020)	Wet Season Photo (10/8/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/30/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TH17-01	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Tributary to Harshaw Creek	
Monitoring Period	1/2021 - 12/2021	**Potential Impacts/Effects: F**low has been observed at this site to range from 0.06 to 0.18 gpm. Predictions will be made once additional data is obtained.
Number of Visits	5	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
1/14/2021	0.06	7.42	13.3	1371	8/30/2021	0.14	6.71	23.8	1330
3/10/2021	0.18	7.23	11.6	1363	12/2/2021	0.09	7.90	10.3	1245
5/18/2021	0.08	7.27	20.5	1349					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
1/14/2021	Lead	12/2/2021	No Exceedances
5/18/2021	No Exceedances		

Aquatic and Vegetation Survey Findings: Water seeps from the cutout on the northwest bank. Flows atop bedrock and shallow, alluvial veneer. Vegetation is described as Madrean evergreen woodland. This site is dominated by a woody overstory of Arizona white oak (*Quercus arizonica*) and alligator juniper (*Juniperus deppeana*) and a woody understory that includes Wright's silk tassel (*Garrya wrightii*) and evergreen sumac (*Rhus virens var. choriophylla*). Ground cover is dominated by tick-trefoil (*Desmodium rosei*) and deergrass (*Muhlenbergia rigens*) with Rocky Mountain rush (*Juncus saximontanus*) and sedges (*Cyperus* sp.) present at the seep periphery. Invasive Bermudagrass (*Cynodon dactylon*) is present. Aquatic beetles and damselflies have been observed. One red-spotted toad (*Anaxyrus punctatus*) metamorph has been observed. The site and surroundings are subject to cattle grazing, and deer tracks were observed during multiple visits.

Dry Season Photo (05/18/2021)

Wet Season Photo (08/30/2021)

MONTGOMERY & ASSOCIATES

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TH21-WELL-ST-01	**Interpretation of Groundwater Age:** Modern water.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** This site is not a seep or spring; it is fed by a well. No changes are predicted at this site.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Pumping Rate (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Pumping Rate (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/3/2017	0.00	6.79	15.0	1633
5/21/2018	0.00	9.02	24.1	2931	11/30/2018	0.00	6.40	Not Measured[1]	185
5/24/2019	Dry				12/8/2019	0.00	8.50	13.6	919
6/24/2020	0.00	8.47	28.3	2540	10/13/2020	0.00	7.96	21.2	1546
1/14/2021	Dry				8/30/2021	0.00	7.35	29.6	207
3/9/2021	0.00	7.92	13.7	1826	11/16/2021	0.00	8.18	16.1	1594
5/18/2021	0.00	8.26	23.6	1887					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/3/2017	No Exceedances
5/21/2018	pH	11/30/2018	pH
5/24/2019	Dry	12/8/2019	No Exceedances
6/24/2020	No Exceedances	10/13/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/14/2021	Dry	11/16/2021	No Exceedances
5/18/2021	No Exceedances		

Aquatic and Vegetation Survey Findings: This site is a plastic stock drinker located in an unnamed tributary to Harshaw Creek. Algae has been observed as submerged vegetation at this site. This site does not support emergent or perimeter riparian vegetation. Understory and overstory vegetation at the site includes velvet mesquite (*Prosopis velutina*) and weakleaf bur ragweed (*Ambrosia confertiflora*). Invasive Bermudagrass (*Cynodon dactylon*) has been observed at this site. Aquatic invertebrates observed in this drinker include backswimmers, boatmen, beetles, dragonflies, and belostomatids. There have been no aquatic vertebrates observed.

Dry Season Photo (5/21/2018)	Wet Season Photo (11/30/2018)
	
Note [1]=Temperature not measured due to instrument malfunction	
Dry Season Photo (5/24/2019)	**Wet Season Photo (12/8/2019)**
	

Dry Season Photo (6/24/2020)	Wet Season Photo (10/13/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/30/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TH24-01	**Interpretation of Groundwater Age:** Precipitative (lightly evaporative) and modern. Source is primarily surface water and shallow groundwater.
Watershed	Trib. to Harshaw Creek	
Monitoring Period	11/2017 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 gpm to 109 gpm. In the first 4 years, there may be up to 0.13 gpm increase in flow.
Number of Visits	12	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					11/3/2017	0.00	4.72	16.3	1974
5/21/2018	0.00	4.52	28.5	2132	11/30/2018	3.40	6.20	Not Measured[1]	354
5/24/2019	12.00	7.05	20.0	1871	12/8/2019	109.00	7.19	14.8	1410
6/24/2020	<0.25	7.29	29.3	2720	10/20/2020	<0.25	7.41	23.1	2105
1/20/2021	Wet				8/30/2021	0.51	7.14	25.1	1997
3/9/2021	0.00	5.27	12.6	2167	11/15/2021	0.64	6.16	10.9	2254
5/18/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		11/3/2017	pH
5/21/2018	pH	11/30/2018	Lead, pH
5/24/2019	No Exceedances	12/8/2019	No Exceedances
6/24/2020	No Exceedances	10/20/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	Unable to sample	11/15/2021	pH
5/18/2021	Dry		

Aquatic and Vegetation Survey Findings: Located in unnamed tributary to Harshaw Creek in portion with bedrock channel. Generally, water is present in shallow pools. Aquatic beetles, boatmen, belostomatids, and dragonflies have been observed. No aquatic vertebrates have been observed along drainage. Riparian overstory is limited to a few individual cottonwood (*Populus fremontii*) trees in the vicinity. Understory vegetation is dominated by seepwillow (*Baccharis salicifolia*), skunkbush sumac (*Rhus trilobata*), and deergrass (*Muhlenbergia rigens*). Riparian obligate forbs, seep monkeyflower (*Mimulus guttatus*) and annual rabbitsfoot grass (*Polypogon monspeliensis*), have been noted. Upland vegetation is characterized as oak woodlands with pointleaf manzanita (*Arctostaphylos pungens*).

Dry Season Photo (5/21/2018)	Wet Season Photo (11/30/2018)
	
Note [1]=Temperature not measured due to instrument malfunction	
Dry Season Photo (5/24/2019)	**Wet Season Photo (12/08/2019)**
	

Dry Season Photo (6/24/2020)	Wet Season Photo (10/20/2020)
	
Dry Season Photo (05/18/2021)	**Wet Season Photo (08/30/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	TNC-Cienega Spring	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Sonoita Creek	
Monitoring Period	9/2021 - 12/2021	**Potential Impacts/Effects:** Flows range from 10.5 to 19.4 gpm. Predictions will be made once additional data is obtained.
Number of Visits	2	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					9/14/2021	10.50	6.93	19.6	939
					12/1/2021	19.40	6.73	18.2	868

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		9/14/2021	Isotope sample collected
		12/1/2021	DO

Aquatic and Vegetation Survey Findings: Emergence of spring at the base of small hill flowing out from under log forming large cienega. Predominant floating and emergent vegetation include watercress (*Rorippa nasturtium-aquaticum*), chairmaker's bulrush (*Schoenoplectus americanus*), and whorled pennywort (*Hydrocotyle verticillata*). Perimeter vegetation consists of Himilayan blackberry (*Rubus discolor*), velvet ash (*Fraxinus velutina*), and Goodding's willow (*Salix gooddingii*). An adult red-spotted toad (*Anaxyrus punctatus*) has been observed.

Dry Season Photo	Wet Season Photo (09/14/2021)
N/A	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	WC1-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Washington Camp	
Monitoring Period	5/2019 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 0.51 gpm. This site has been dry during several dry season surveys suggesting the site may not be in connection with a perennial groundwater source. No changes are predicted at this site.
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/23/2019	0.00	4.69	11.7	2447	12/9/2019	Not Measured[1]	7.17	7.8	139
7/1/2020	Dry				10/2/2020	Dry			
1/27/2021	0.06	5.89	0.5	856	9/7/2021	0.51	6.29	22.2	609
3/22/2021	Dry				11/29/2021	Dry			
5/20/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/23/2019	Iron, manganese, copper, zinc, selenium, pH	12/9/2019	Iron, lead
		7/1/2020	Dry
		10/2/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/27/2021	Copper, pH	11/29/2021	Dry
5/20/2021	Dry		

Aquatic and Vegetation Survey Findings: This is a seep is located at exposed bedrock constriction in the upper Finley and Adams Canyon. Grasses and shrubs occur in sparse distributions, mostly dominated by little bluestem (*Schizachyrium* sp.), pinyon ricegrass (*Piptochaetium fimbriatum*), and skunkbush sumac (*Rhus trilobata*). Riparian obligate rushes (*Juncus* spp.) are also present at the site. Overstory vegetation cover is dominated by Mexican pinyon (*Pinus cembroides*) and oak (*Quercus* spp.). Invasive plants observed include Lehmann lovegrass (*Eragrostis lehmanniana*). No aquatic invertebrates or vertebrates have been observed at this site.

Dry Season Photo (5/23/2019)	Wet Season Photo (12/9/2019)
	

Note [1]=Flows too high to measure with conventional methods. Heavy rain and road drainage increased flows, turbidity and TSS

Dry Season Photo	Wet Season Photo (10/2/2020)
No photo taken	

Dry Season Photo (05/20/2021)	Wet Season Photo (09/07/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	WC2-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Washington Camp	
Monitoring Period	5/2019 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 32.1 gpm. No changes are predicted at this site.
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/21/2019	0.00	6.62	16.8	454	12/6/2019	32.10	6.72	12.8	177
7/1/2020	0.00	6.78	22.5	428	10/1/2020	0.00	7.02	20.7	465
1/27/2021	0.00	6.63	2.8	607	9/15/2021	2.66	7.05	26.6	207
3/22/2021	0.00	7.04	10.6	562	11/29/2021	0.00	6.93	13.8	511
5/20/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/21/2019	No Exceedances	12/6/2019	Iron, lead, copper
7/1/2020	Iron, nickel	10/1/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/27/2021	No Exceedances	11/29/2021	No Exceedances
5/20/2021	Dry		

Aquatic and Vegetation Survey Findings: This seep is located in a rocky/gravelly section of Finley and Adams Canyon. Water is typically present in a small, shallow pool. Limited herbaceous cover is dominated by deergrass (*Muhlenbergia rigens*) and riparian obligate Rocky Mountain rush (*Juncus saximontanus*). Understory shrub cover is dominated by pointleaf manzanita (*Arctostaphylos pungens*), skunkbush sumac (*Rhus trilobata*), and Wright's silktassel (*Garrya wrightii*). Overstory vegetation is dominated by Arizona sycamore (*Platanus wrightii*), a preferential riparian tree species, and oak (*Quercus* spp.). Aquatic invertebrates observed along the Finley and Adams drainage include backswimmers and beetles. No aquatic vertebrates have been observed at this site.

Dry Season Photo (5/21/2019)	Wet Season Photo (12/6/2019)
	

Dry Season Photo (7/1/2020)	Wet Season Photo (10/1/2020)
	
Dry Season Photo (05/20/2021)	**Wet Season Photo (09/15/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	WC2-02	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Washington Camp	
Monitoring Period	5/2019 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have rangef from 0 to 41.6 gpm. No changes are predicted at this site.
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/21/2019	0.00	4.88	16.9	866	12/9/2019	Not Measured[1]	6.19	10.1	285
7/1/2020	Dry				10/1/2020	Dry			
1/27/2021	Dry				9/7/2021	41.60	6.38	25.9	296
3/22/2021	Dry				11/29/2021	Dry			
5/20/2021	Dry								

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/21/2019	Iron, zinc, pH	12/9/2019	Copper, zinc, pH
7/1/2020	Dry	10/1/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/27/2021	Dry	11/29/2021	Dry
5/20/2021	Dry		

Aquatic and Vegetation Survey Findings: This site is located in rocky/bouldery section of Finley and Adams Canyon. Herbaceous cover is sparsely distributed, dominated by bullgrass (*Muhlenbergia emersleyi*) and pinyon ricegrass (*Piptochaetium fimbriatum*). Riparian obligate Rocky Mountain rush (*Juncus saximontanus*) is also present. Overstory vegetation is dominated by oak (*Quercus* spp.) and pine (*Pinus* spp.) trees. No aquatic invertebrates or vertebrates have been observed at this site.

Dry Season Photo (5/21/2019)	Wet Season Photo (12/9/2019)
	

Note [1]=Flows too high to measure with conventional methods

Dry Season Photo (7/1/2020)	Wet Season Photo (10/1/2020)
	
Dry Season Photo (05/20/2021)	**Wet Season Photo (09/07/2021)**
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	WC2-03	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Washington Camp	
Monitoring Period	5/2019 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site have ranged from 0 to 88.9 gpm. In the first 4 years, there may be up to 2.0 x 10-5 gpm decrease in flow
Number of Visits	9	

Flows and Field Parameters (pH, Temp, SC)

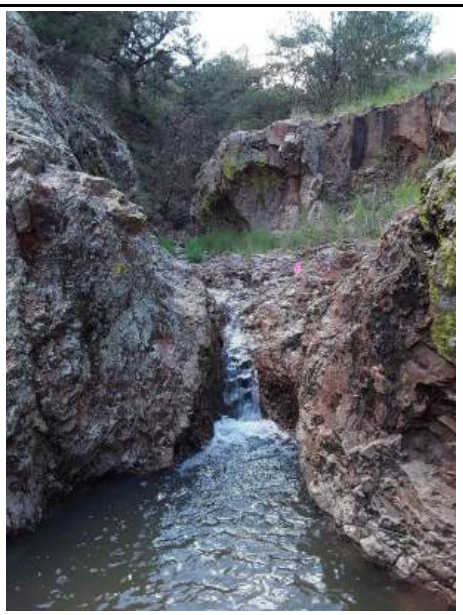
Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
5/21/2019	0.00	7.42	23.1	243	12/9/2019	Not Measured[1]	6.77	9.9	183
7/1/2020	0.00	7.44	25.6	238	10/1/2020	0.00	8.58	24.6	114
1/27/2021	0.82	6.33	0.6	72	9/7/2021	88.90	6.84	26.4	146
3/22/2021	0.00	10.24	15.6	137	11/29/2021	0.00	8.07	9.2	309
5/20/2021	0.00	7.60	19.5	304					

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/21/2019	Copper	12/9/2019	Copper, zinc
		7/1/2020	No Exceedances
		10/1/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/27/2021	Copper, pH	11/29/2021	No Exceedances
5/20/2021	Unable to sample		

Aquatic and Vegetation Survey Findings: Seep is located at a bedrock constriction in Finley and Adams Canyon were a plunge pool is present at the base of the bedrock. The plunge pool does not support emergent or perimeter vegetation. Within the drainage, understory vegetation is sparse, dominated by deergrass (*Muhlenbergia rigens*) and hummingbird trumpet (*Epilobium canum*). Other perennial grasses (*Poaceae* family) and riparian obligate Baltic rush (*Juncus balticus*) are present. Alligator juniper (*Juniperus deppeana*) and Mexican pinyon (*Pinus cembroides*) dominate the overstory vegetation within this section of the drainage. Invasive plant species observed include Johnson grass (*Sorghum halepense*). Aquatic invertebrates observed include backswimmers and water striders. No aquatic herpetofauna have been observed at this site. Deer tracks have been noted during some visits.

Dry Season Photo (5/21/2019)	Wet Season Photo (12/9/2019)
	
Notes [1] = Flows too high to measure with conventional methods	
Dry Season Photo	**Wet Season Photo (10/1/2020)**
No photo taken	

Dry Season Photo (05/20/2021)	Wet Season Photo (09/07/2021)
	

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	WC2-04	**Interpretation of Groundwater Age:** Inconclusive
Watershed	Washington Camp	
Monitoring Period	03/2021 - 12/2021	**Potential Impacts/Effects:** Flows observed at this site, has ranged from less than 0.01 to 0.09 gpm. Predictions will be made once additional data is obtained.
Number of Visits	4	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
3/22/2021	0.04	6.73	12.2	241	9/7/2021	0.09	6.41	29.2	242
5/20/2021	<0.01	7.13	19.6	255	11/29/2021	0.04	6.69	20.6	255

Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
5/20/2021	No exceedances	9/7/2021	Isotope sample collected
		11/29/2021	No exceedances

Aquatic and Vegetation Survey Findings: Hillslope spring emergence is captured in the springbox and plumbed to the downstream concrete drinker. The ground is saturated downstream of the spring box in the wash for a slight reach. Concrete, rectangular stock drinker (approx. 4m x 2m) is fed from a pipe sunk into the adjacent hillside. The line may collect water from a subsurface source or the adjacent concrete stock drinker. Upland vegetation is Madrean evergreen woodland. Aquatic beetles, backswimmers, and boatmen have been observed. An elegant trogon (*Trogon elegans*) and grey fox (*Urocyon cinereoargenteus*) have been observed at the site.

Dry Season Photo (05/20/2021)

Wet Season Photo (09/07/2021)

Hermosa Project Spring and Seep Survey Sample Site Summary, Patagonia, Arizona

Site ID	WG2-01	**Interpretation of Groundwater Age:** Inconclusive.
Watershed	Washington Gulch	
Monitoring Period	12/2019 - 12/2021	**Potential Impacts/Effects:** This site has been dry during all site visits except for 1, where flow was measured at 42.8 gpm. In the first 4 years, there may be up to 1.0 x10^{-5} gpm decrease in flow.
Number of Visits	8	

Flows and Field Parameters (pH, Temp, SC)

Dry Season					Wet Season				
Date	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**	**Date**	**Flow (gpm)**	**pH (s.u.)**	**Temp (C)**	**SC (µS/cm)**
					12/6/2019	42.80	8.42	11.7	1007
					7/2/2020	Dry			
					10/2/2020	Dry			
1/20/2021	Dry				8/24/2021	Dry			
3/19/2021	Dry				11/17/2021	Dry			
5/17/2021	Dry								

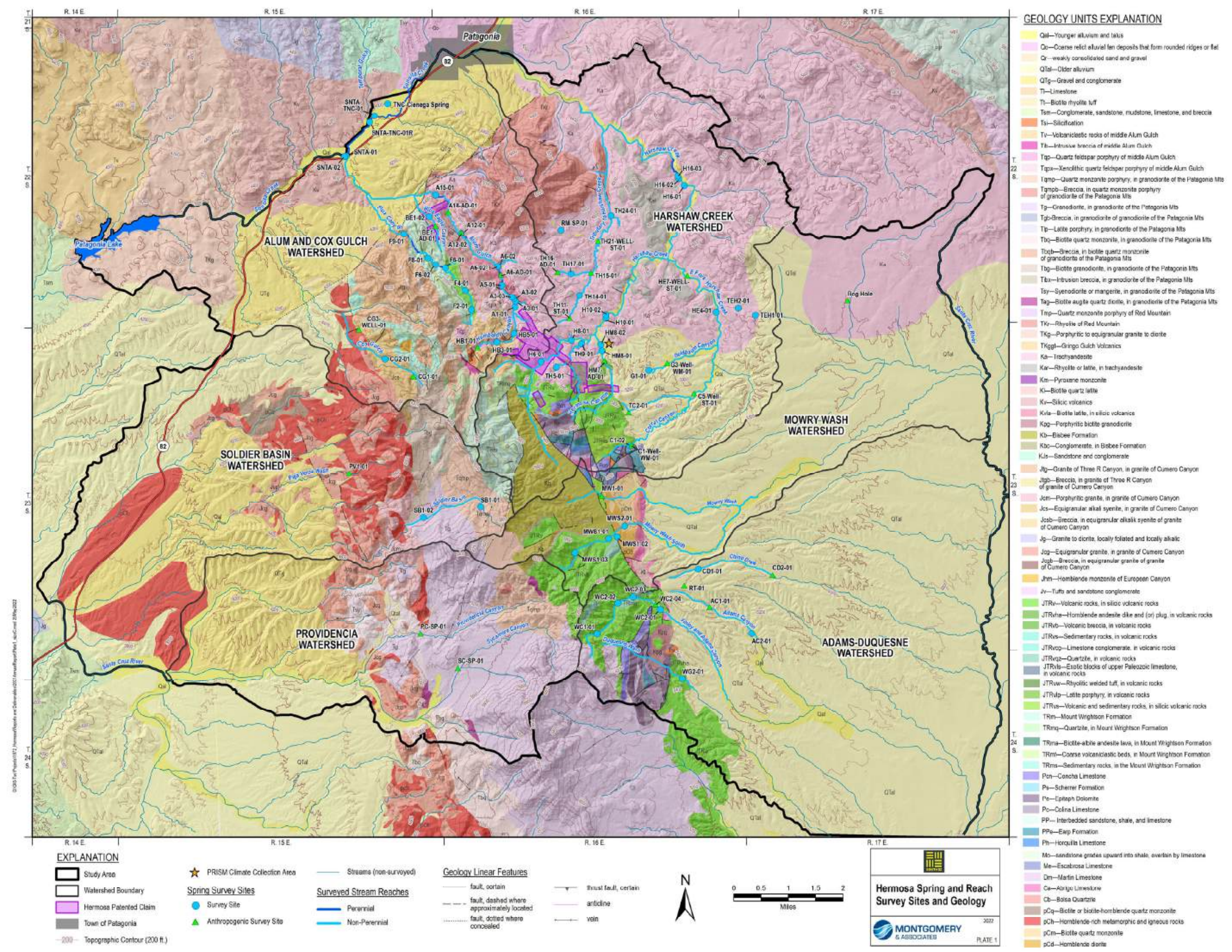
Water Quality Exceedances

Dry Season		Wet Season	
Date	**Parameter**	**Date**	**Parameter**
		12/6/2019	Iron, lead, cadmium, zinc, selenium
7/2/2020	Dry	10/2/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	Dry	11/17/2021	Dry
5/17/2021	Dry		

Aquatic and Vegetation Survey Findings: Site is located in silty and cobbly section of Washington Gulch. Herbaceous vegetation is sparse, dominated by hairy grama (*Bouteloua hirsuta*), Wright's buckwheat (*Eriogonum wrightii*), and annual muhly (*Muhlenbergia minutissima*). Limited overstory cover is provided by oak (*Quercus* spp.), and alligator juniper (*Juniperus deppeana*) trees. No aquatic invertebrates or vertebrates have been observed at this site.

Dry Season Photo	Wet Season Photo (12/6/2019)
Photo not taken	

Dry Season Photo	Wet Season Photo (10/2/2020)
Photo not taken	
Dry Season Photo (05/17/2021)	**Wet Season Photo (08/24/2021)**
	



GEOLOGY UNITS EXPLANATION

- Qal—Younger alluvium and talus
- Qo—Coarse relict alluvial fan deposits that form rounded ridges or flat
- Qr—weakly consolidated sand and gravel
- QTal—Older alluvium
- QTg—Gravel and conglomerate
- Tl—Limestone
- Tt—Biotite rhyolite tuff
- Tsm—Conglomerate, sandstone, mudstone, limestone, and breccia
- Tsi—Silicification
- Tv—Volcaniclastic rocks of middle Alum Gulch
- Tib—Intrusive breccia of middle Alum Gulch
- Tqp—Quartz feldspar porphyry of middle Alum Gulch
- Tqpx—Xenolithic quartz feldspar porphyry of middle Alum Gulch
- Tqmp—Quartz monzonite porphyry, in granodiorite of the Patagonia Mts
- Tqmpb—Breccia, in quartz monzonite porphyry of granodiorite of the Patagonia Mts
- Tg—Granodiorite, in granodiorite of the Patagonia Mts
- Tgb-Breccia, in granodiorite of granodiorite of the Patagonia Mts
- Tlp—Latite porphyry, in granodiorite of the Patagonia Mts
- Tbq—Biotite quartz monzonite, in granodiorite of the Patagonia Mts
- Tbqb—Breccia, in biotite quartz monzonite of granodiorite of the Patagonia Mts
- Tbg—Biotite granodiorite, in granodiorite of the Patagonia Mts
- Tbx—Intrusion breccia, in granodiorite of the Patagonia Mts
- Tsy—Syenodiorite or mangerite, in granodiorite of the Patagonia Mts
- Tag—Biotite augite quartz diorite, in granodiorite of the Patagonia Mts
- Tmp—Quartz monzonite porphyry of Red Mountain
- TKr—Rhyolite of Red Mountain
- TKg—Porphyritic to equigranular granite to diorite
- TKggl—Gringo Gulch Volcanics
- Ka—Trachyandesite
- Kar—Rhyolite or latite, in trachyandesite
- Km—Pyroxene monzonite
- Kl—Biotite quartz latite
- Kv—Silicic volcanics
- Kvla—Biotite latite, in silicic volcanics
- Kpg—Porphyritic biotite granodiorite
- Kb—Bisbee Formation
- Kbc—Conglomerate, in Bisbee Formation
- KJs—Sandstone and conglomerate
- Jtg—Granite of Three R Canyon, in granite of Cumero Canyon
- Jtgb—Breccia, in granite of Three R Canyon of granite of Cumero Canyon
- Jcm—Porphyritic granite, in granite of Cumero Canyon
- Jcs—Equigranular alkali syenite, in granite of Cumero Canyon
- Jcsb—Breccia, in equigranular alkalik syenite of granite of Cumero Canyon
- Jg—Granite to diorite, locally foliated and locally alkalic
- Jcg—Equigranular granite, in granite of Cumero Canyon
- Jcgb—Breccia, in equigranular granite of granite of Cumero Canyon
- Jhm—Hornblende monzonite of European Canyon
- Jv—Tuffs and sandstone conglomerate
- JTRv—Volcanic rocks, in silicic volcanic rocks
- JTRvha—Hornblende andesite dike and (or) plug, in volcanic rocks
- JTRvb—Volcanic breccia, in volcanic rocks
- JTRvs—Sedimentary rocks, in volcanic rocks
- JTRvcg—Limestone conglomerate, in volcanic rocks
- JTRvqz—Quartzite, in volcanic rocks
- JTRvls—Exotic blocks of upper Paleozoic limestone, in volcanic rocks
- JTRvw—Rhyolitic welded tuff, in volcanic rocks
- JTRvlp—Latite porphyry, in volcanic rocks
- JTRvs—Volcanic and sedimentary rocks, in silicic volcanic rocks
- TRm—Mount Wrightson Formation
- TRmq—Quartzite, in Mount Wrightson Formation
- TRma—Biotite-albite andesite lava, in Mount Wrightson Formation
- TRmf—Coarse volcaniclastic beds, in Mount Wrightson Formation
- TRms—Sedimentary rocks, in the Mount Wrightson Formation
- Pcn—Concha Limestone
- Ps—Scherrer Formation
- Pe—Epitaph Dolomite
- Pc—Colina Limestone
- PP— Interbedded sandstone, shale, and limestone
- PPe—Earp Formation
- Ph—Horquilla Limestone
- Mo—sandstone grades upward into shale, overlain by limestone
- Me—Escabrosa Limestone
- Dm—Martin Limestone
- Ca—Abrigo Limestone
- Cb—Bolsa Quartzite
- pCq—Biotite or biotite-hornblende quartz monzonite
- pCh—Hornblende-rich metamorphic and igneous rocks
- pCm—Biotite quartz monzonite
- pCd—Hornblende diorite

EXPLANATION

- Study Area
- Watershed Boundary
- Hermosa Patented Claim
- Town of Patagonia
- 200 Topographic Contour (200 ft.)
- PRISM Climate Collection Area
- Streams (non-surveyed)

Spring Survey Sites
- Survey Site
- Anthropogenic Survey Site

Surveyed Stream Reaches
- Perennial
- Non-Perennial

Geology Linear Features
- fault, certain
- fault, dashed where approximately located
- fault, dotted where concealed
- thrust fault, certain
- anticline
- vein

N

0 0.5 1 1.5 2 Miles

Hermosa Spring and Reach Survey Sites and Geology

MONTGOMERY & ASSOCIATES

3022

PLATE 1