



October 29, 2024

Version 3.0

Hermosa Spring and Seep Catalog



Hermosa Project Area

Prepared by:



SPRING AND SEEP CATALOG Hermosa Project Area

DATE: October 29, 2024

VERSION: 3.0

INTRODUCTION

This catalog has been prepared to summarize available information for selected springs and seeps in the Harshaw Creek, Alum and Cox Gulch, Mowry Wash, Adams-Duquesne, Providencia, and Soldier Basin watersheds (**Plate 1**). The springs and seeps included in this catalog were selected based on proximity to South32's Hermosa project.

Identification and monitoring of springs and seeps had been performed as part of ongoing hydrological and biological baseline studies conducted during the period 2016 through November 2023.

Springs/seeps were identified using various public sources of information (e.g., United States Geological Survey topographic maps) and discussions with local stakeholders, and field surveys.

Catalog Format

Spring and seep locations are shown on **Plate 1**.

For each catalog entry, there are 5 sections, which are described below:

Section 1 – General Information: Provides detailed information on the following:

- Naming convention and monitoring history
- Interpretation of groundwater age
- Potential for impacts

Section 2 – Hydrological Observations: Provides a summary of field water quality parameters and flow measurements during wet and dry monitoring events.

Section 3 – Water Quality Exceedances: A table of constituents listing surface water quality exceedances, if any, during each sampling event. Federal Drinking Water Standards are shown on **Table 1**.

Section 4 – Aquatic and Vegetation Survey Findings: Provides a summary of flora and fauna observations made during biological surveys and includes general site characteristics.

Section 5 – Photographs: Provides seasonal photographs showing some of the hydrological and biological features for each site.

Version 3.0 of the Spring and Seep Catalog has been revised to remove the previously stated exceedance for Nitrate+Nitrite and Nitrogen. Because general chemistry samples are shipped to ACZ, the 48-hour holding time for analysis of nitrate as nitrogen (NO₃ as N) and nitrite (NO₂) as N by EPA method 300 is not practical. When samples are preserved with sulfuric acid, holding time extends to 28 days. Preserved samples are analyzed for the combined NO₃/NO₂ as N by EPA method 353.2. Unfortunately, preservation converts any NO₂ to NO₃, and the 2 species can no longer be reported separately. Analytical limitations make it impossible to assign a proportion to either species, therefore evaluation of nitrate and nitrite with their respective EPA primary MCLs could not be conducted.

This spring and seep catalog is dynamic; springs and seeps may be added, and formatting may be updated in the future.

Table 1. Federal Drinking Water Standards Spring and Seep Hermosa Project, Patagonia, Arizona

Regulatory Standard Abbreviation	Regulatory Standard	Parameter	Standard	^aUnits
EPA-PMCL	EPA Primary Maximum Contaminant Level	Antimony	0.006	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Arsenic	0.01	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Barium	2	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Beryllium	0.004	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Cadmium	0.005	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Chromium	0.1	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Copper	1.3	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Cyanide; Free	0.2	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Fluoride	4	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Lead	0.015	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Mercury	0.002	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Selenium	0.05	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Thallium	0.002	mg/L
EPA-PMCL	EPA Primary Maximum Contaminant Level	Uranium	0.03	mg/L

Notes & Abbreviation:

EPA - Environmental Protection Agency

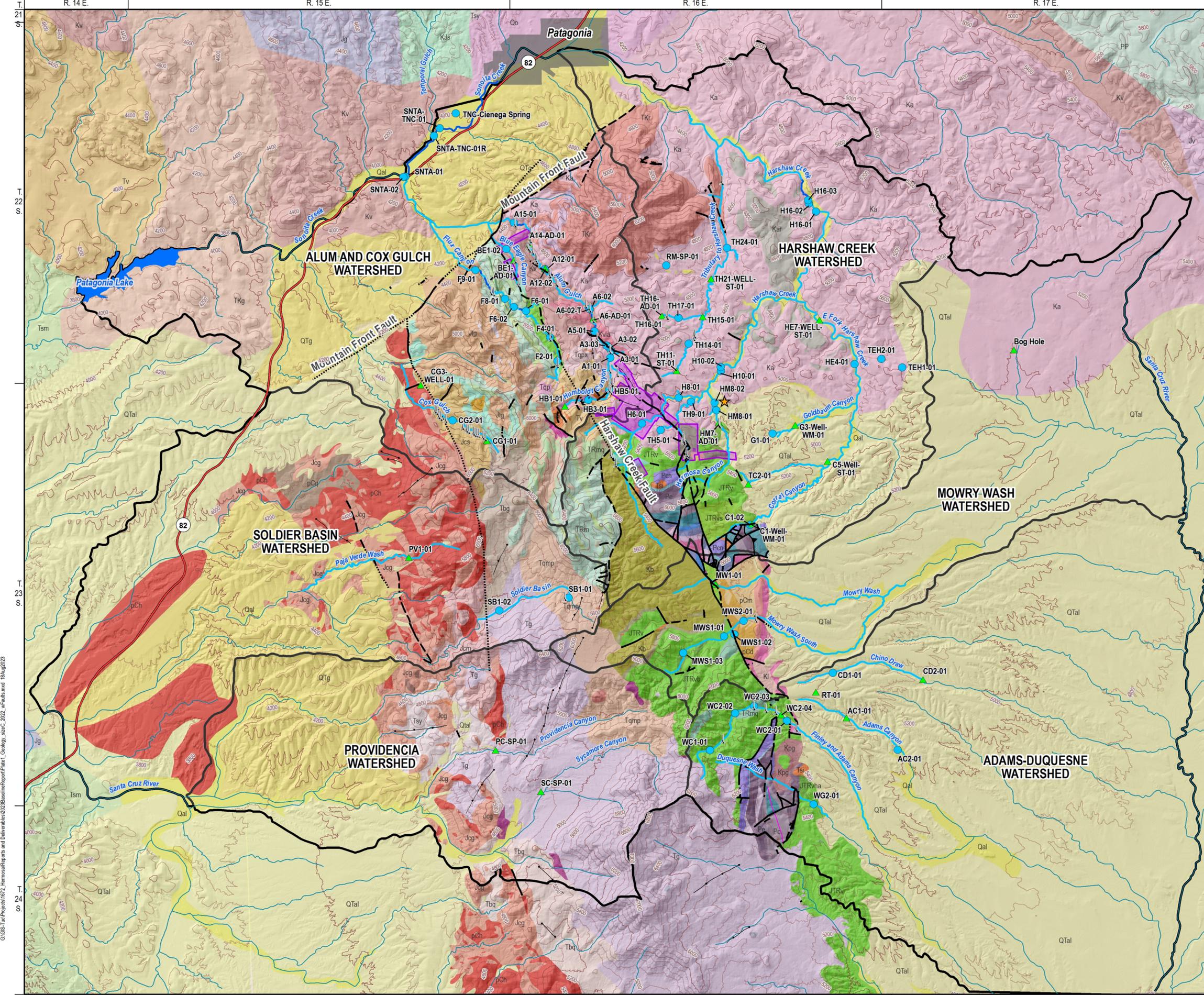
MCL- Maximum Contaminant Level

PMCL- Primary Maximum Contaminant Level

^aUnits

mg/L = milligrams per liter

s.u. = standard units

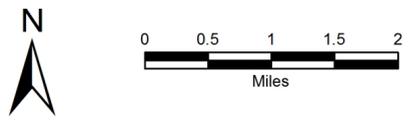


GEOLOGY UNITS EXPLANATION

- 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
- Tampb—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—Lattice 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
- Tibx—Intrusive 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
- TKgg—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
- Josb—Breccia, in equigranular alkali syenite of granite of Cumero Canyon
- Jg—Granite to diorite, locally foliated and locally alcaic
- 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
- TRmt—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
 - South32 Hermosa Private Land
 - Town of Patagonia
 - Topographic Contour (200 ft.)
 - Adit (confirmed by survey)
 - PRISM Climate Collection Area
 - Survey Site
 - Anthropogenic Survey Site
 - Streams (non-surveyed)
 - Surveyed Stream Reaches
 - Persistent
 - Non-Persistent

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



**Hermosa Spring and Reach
Survey Sites and Geology**

MONTGOMERY & ASSOCIATES
Water Resource Consultants

2023
PLATE 1

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

Site ID	A1-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the wet season. Little to no evaporative, modern water during the dry season.
Watershed	Alum Gulch	
Monitoring Period	12/2016 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from zero to 142.6 gpm. No changes are predicted at this site.
Number of Visits	21	

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	34.2	3.45	12.3	638.0
3/22/2021	0.00	4.10	15.0	3120	10/15/2020	0.00	4.18	17.6	2020
5/19/2021	Dry				8/24/2021	27.8	3.49	21.2	1342
2/4/2022	0.01	3.94	0.40	2509	11/16/2021	0.02	4.03	11.1	2068
6/21/2022	0.00	3.82	24.5	2297	8/29/2022	143	3.37	21.2	496.0
2/23/2023	1.22	4.02	11.2	1506	12/15/2022	15.7	3.82	5.28	1056
6/6/2023	0.00	3.51	23.4	2996	8/31/2023	0.09	3.79	27.1	1823
					11/13/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/24/2018	Arsenic, Cadmium, Copper, Lead	12/29/2016	Cadmium, Lead
5/28/2019	Cadmium, Lead	10/23/2017	Cadmium, Lead
6/15/2020	Beryllium, Cadmium, Copper, Lead	11/27/2018	Cadmium, Lead
1/18/2021	Site was dry	12/3/2019	Cadmium, Lead
5/19/2021	Site was dry	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
6/21/2022	Arsenic, Beryllium, Cadmium, Lead	11/16/2021	Cadmium, Lead
		12/15/2022	Cadmium, Copper, Lead
6/6/2023	Beryllium, Cadmium, Copper, Lead	11/13/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/21/2022)



Wet Season Photo (08/29/2022)



Dry Season Photo (6/6/2023)



Wet Season Photo (08/31/2023)



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

Site ID	A3-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season. Little to no evaporative, modern water during the wet season.
Watershed	Alum Gulch	
Monitoring Period	10/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 144 gpm.
Number of Visits	20	

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	63.2	4.73	11.4	551.0
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	3.80	2269	8/24/2021	25.0	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					
2/4/2022	1.51	4.23	1.30	1959	8/31/2022	144	3.98	24.8	849.0
6/21/2022	Dry				12/15/2022	22.8	4.03	5.60	1179
2/23/2023	410	4.62	11.1	506.7	8/31/2023	0.72	5.18	26.7	1771
6/6/2023	0.00	4.16	31.9	2127	11/13/2023	0.00	4.16	16.3	1938

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		10/23/2017	Cadmium, Lead
5/24/2018	Cadmium, Lead	11/27/2018	Cadmium, Lead
5/28/2019	Cadmium, Lead	12/3/2019	Cadmium, Lead
6/12/2020	Cadmium, Lead	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/18/2021	Cadmium, Lead	11/26/2021	Cadmium, Lead
5/19/2021	Cadmium, Lead		
6/21/2022	Dry	12/15/2022	Cadmium, Lead
6/6/2023	Cadmium, Lead	11/13/2023	Cadmium, Lead

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 were 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*).

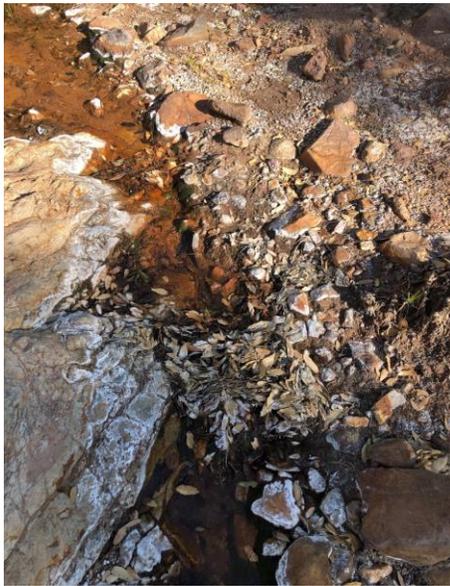
Dry Season Photo (5/24/2018)



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)



Dry Season Photo (06/21/2022)



Wet Season Photo (08/31/2022)



Dry Season Photo (06/06/2023)



Wet Season Photo (08/31/2023)



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

Site ID	A3-02	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season. Little to no evaporative, modern water during the wet season.
Watershed	Alum Gulch	
Monitoring Period	04/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 gpm to 40.6 gpm.
Number of Visits	20	

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	544.0
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	2.40	2412	8/24/2021	24.5	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								
2/4/2022	0.99	3.99	3.60	2036	8/31/2022	40.6	4.18	25.3	815.4
6/21/2022	0.00	4.33	22.3	1412	12/15/2022	27.3	4.76	6.50	1110
2/28/2023	71.1	4.51	6.22	843.7	8/31/2023	0.95	3.78	28.5	1669
6/6/2023	0.03	4.04	30.5	2233	11/13/2023	0.00	8.11	16.4	2798

Notes ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
4/28/2017	Beryllium, Cadmium		
5/23/2018	Beryllium, Cadmium, Copper, Lead, Thallium	11/27/2018	Cadmium, Lead
5/28/2019	Cadmium, Copper, Lead	12/3/2019	Cadmium, Lead
6/12/2020	Beryllium, Cadmium, Lead	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/18/2021	Cadmium, Copper, Lead	11/16/2021	Cadmium, Lead
5/19/2021	Dry		
6/21/2022	Cadmium, Lead	12/15/2022	Cadmium, Lead
6/6/2023	Cadmium, Lead	11/13/2023	Not enough water to collect sample

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (5/28/2019)



Wet Season Photo (12/3/2019)



Dry Season Photo (6/12/2020)



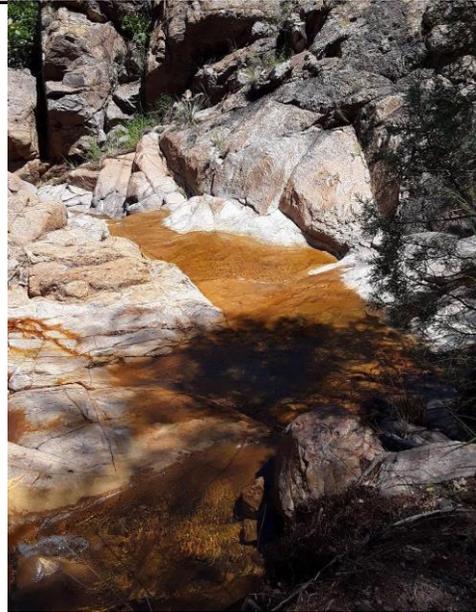
Wet Season Photo (10/15/2020)



Dry Season Photo (05/19/2021)



Wet Season Photo (08/24/2021)



Dry Season Photo (06/21/2022)



Wet Season Photo (08/31/2022)



Dry Season Photo (06/06/2023)



Wet Season Photo (08/31/2023)



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

Site ID	A3-03	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season. Little to no evaporative, modern water during the wet season.
Watershed	Alum Gulch	
Monitoring Period	10/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from near 0 to 169.3 gpm.
Number of Visits	20	

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	7.20	1452
5/28/2019	0.40	3.96	22.6	2033	12/3/2019	Not Measured ¹	4.52	11.3	549.0
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	3.70	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	6.70	2091
5/19/2021	<0.01	3.84	20.4	4438	8/29/2022	169	3.43	27.3	555.9
2/4/2022	1.10	3.94	2.40	1963	12/15/2022	35.0	4.84	4.20	1042
6/22/2022	0.45	3.88	23.9	2163	9/6/2023	0.40	3.92	23.3	1622
2/28/2023	72.9	4.46	7.90	837.3	11/13/2023	Dry			
6/7/2023	0.00	2.18	19.3	2424					

Notes ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		10/24/2017	Cadmium, Lead
5/24/2018	Cadmium, Copper, Lead	11/27/2018	Cadmium, Lead
5/28/2019	Cadmium, Copper, Lead	12/3/2019	Cadmium, Lead
6/12/2020	Cadmium, Copper, Lead	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/18/2021	Cadmium, Lead	11/18/2021	Cadmium, Lead
5/19/2021	Beryllium, Cadmium, Copper, Lead		
6/22/2022	Cadmium, Lead	12/15/2022	Cadmium, Lead
6/7/2023	Cadmium, Lead	11/13/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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. Invasive Bermudagrass (*Cynodon dactylon*) was observed.

Dry Season Photo (5/24/2018)



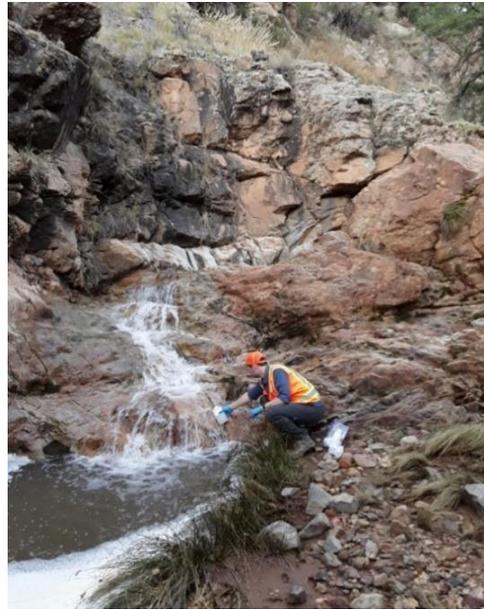
Wet Season Photo (11/27/2018)



Dry Season Photo (5/28/2019)



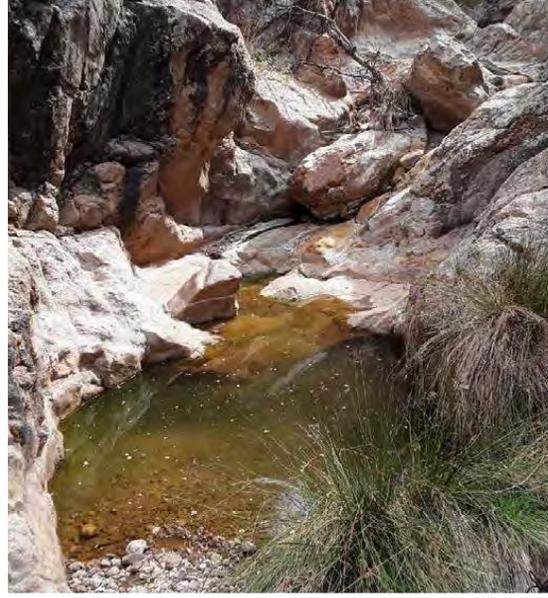
Wet Season Photo (12/3/2019)



Dry Season Photo (6/12/2020)



Wet Season Photo (10/15/2020)



Dry Season Photo (05/19/2021)



Wet Season Photo (08/23/2021)



Dry Season Photo (06/22/2022)



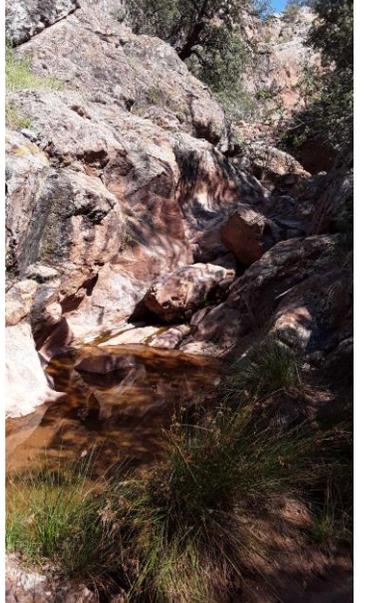
Wet Season Photo (08/29/2022)



Dry Season Photo (06/07/2023)



Wet Season Photo (09/06/2023)



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

Site ID	A5-01	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the dry season. Little to no evaporative, mixed water during the wet season.
Watershed	Alum Gulch	
Monitoring Period	12/2016 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 gpm to 45.4 gpm.
Number of Visits	21	

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	682.0
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	8.50	4228	8/23/2021	19.1	3.76	25.6	1552
3/22/2021	0.50	3.63	17.2	3739	11/18/2021	0.10	3.69	7.70	2824
5/19/2021	<0.01	3.22	15.4	4228	8/29/2022	13.8	3.60	27.9	689.0
2/4/2022	2.75	3.71	9.40	2770	12/15/2022	45.4	4.26	9.20	1241
6/22/2022	<0.01	3.37	19.9	4664	8/31/2023	2.28	3.10	30.6	2921
2/28/2023	114	4.21	11.4	967.8	11/17/2023	0.23	3.33	16.4	3859
6/7/2023	<0.01	2.51	19.6	3029					

Notes ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		12/29/2016	Beryllium, Cadmium, Copper, Lead
		10/24/2017	Beryllium, Cadmium, Copper, Lead
5/24/2018	Beryllium, Cadmium, Lead	11/27/2018	Beryllium, Cadmium, Copper, Lead
5/29/2019	Beryllium, Cadmium, Lead	12/3/2019	Cadmium, Lead
6/12/2020	Beryllium, Cadmium, Lead	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/18/2021	Beryllium, Cadmium, Copper, Lead	11/18/2021	Beryllium, Cadmium, Lead
5/19/2021	Beryllium, Cadmium, Lead		
6/22/2022	Arsenic, Beryllium, Cadmium, Lead	12/15/2022	Cadmium, Lead
6/7/2023	Arsenic, Beryllium, Cadmium, Lead	11/17/2023	Arsenic, Beryllium, Cadmium, Lead

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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.). Invasive Lehmann lovegrass (*Eragrostis lehmanniana*) was observed.

Dry Season Photo (5/24/2018)



Wet Season Photo (11/27/2018)



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)



Dry Season Photo (06/22/2022)



Wet Season Photo (08/29/2022)



Dry Season Photo (06/07/2023)



Wet Season Photo (08/31/2023)



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

Site ID	A6-02	Interpretation of Groundwater Age: Little to no evaporation, mixed to modern water during the dry season. Little to light evaporative, modern water during the wet season. Potential Impacts/Effects: Flows observed at this site have ranged from 0 gpm to 200 gpm.
Watershed	Alum Gulch	
Monitoring Period	04/2017 - 11/2023	
Number of Visits	21	

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	7.50	1816
5/29/2019	0.24	3.83	25.2	2405	12/4/2019	Not Measured ¹	3.87	10.9	840.0
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	30.0	3.69	28.3	1488
3/22/2021	0.11	3.79	20.2	4171	11/17/2021	0.00	3.87	15.5	2160
2/8/2022	1.63	3.69	10.9	2571	8/29/2022	157	3.58	28.3	671.1
6/22/2022	0.00	3.65	28.4	3245	8/30/2022	200	3.76	25.8	793.6
2/28/2023	300	3.88	12.3	887.1	12/16/2022	18.5	4.16	9.00	1245
6/7/2023	0.00	2.67	25.3	2699	9/6/2023	0.11	3.58	31.3	1889
					11/16/2023	Dry			

Notes ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
4/27/2017	Beryllium	10/24/2017	Beryllium, Cadmium, Lead
5/25/2018	Beryllium, Cadmium, Fluoride	11/28/2018	Beryllium, Cadmium, Copper, Lead
5/29/2019	Beryllium, Cadmium, Lead	12/4/2019	Cadmium, Lead
6/18/2020	Beryllium, Cadmium, Lead	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, Lead
6/22/2022	Arsenic, Beryllium, Cadmium, Copper, Lead	12/16/2022	Beryllium, Cadmium, Lead
6/7/2023	Beryllium, Cadmium, Fluoride, Lead	11/16/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (5/29/2019)



Wet Season Photo (12/4/2019)



Dry Season Photo (6/18/2020)



Wet Season Photo (10/14/2020)



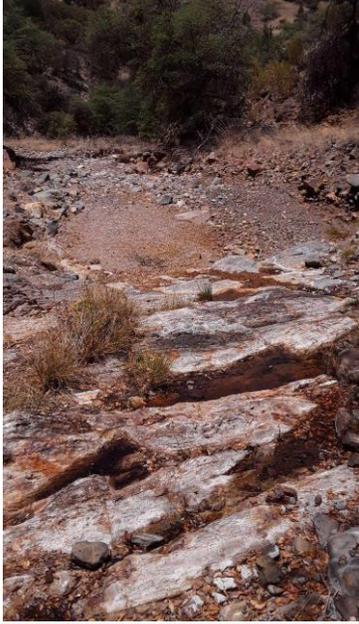
Dry Season Photo (03/22/2021)



Wet Season Photo (08/25/2021)



Dry Season Photo (06/22/2022)



Wet Season Photo (08/29/2022)



Dry Season Photo (06/07/2023)



Wet Season Photo (09/06/2023)



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

Site ID	A6-02-T	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the dry season. Little to no evaporative, mixed to modern water during the wet season.
Watershed	Alum Gulch	
Monitoring Period	05/2018 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 gpm to 19.0 gpm.
Number of Visits	18	

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	8.90	1714
5/29/2019	0.28	4.20	28.5	2383	12/4/2019	Not Measured ¹	4.45	10.7	797.0
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	6.90	2362	8/25/2021	9.40	6.70	26.5	820.0
3/22/2021	0.30	3.95	11.9	3822	11/17/2021	Dry			
5/18/2021	<0.01	6.40	23.8	2766					
2/8/2022	0.01	4.90	19.1	2373					
6/22/2022	Dry				12/16/2022	19.0	4.28	9.40	1265
2/28/2023	20.0	4.34	12.3	789.1	9/6/2023	Dry			
6/7/2023	Dry				11/16/2023	0.00	5.85	18.6	2550

Notes ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/25/2018	Arsenic, Beryllium, Cadmium, Lead	11/28/2018	Beryllium, Cadmium, Lead
5/29/2019	Beryllium, Cadmium, Lead	12/4/2019	Cadmium, Lead
6/18/2020	Arsenic, Beryllium, Lead	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	Arsenic, Beryllium, Lead		
6/22/2022	Dry	12/16/2022	Beryllium, Cadmium, Lead
6/7/2023	Dry	11/16/2023	Arsenic, Beryllium, Lead

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



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)



Dry Season Photo (06/22/2022)



Wet Season Photo (12/16/2022)



Dry Season Photo (06/07/2023)



Wet Season Photo (09/06/2023)



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

Site ID	A6-AD-01	Interpretation of Groundwater Age: Little to no evaporative, mixed to modern water during the dry season. Little to no evaporative, mixed water during the wet season.
Watershed	Alum Gulch	
Monitoring Period	5/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 1.81 gpm. No changes are predicted at this site.
Number of Visits	21	

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	439.0
5/29/2019	<0.25	7.64	12.8	1039	12/4/2019	0.00	7.39	12.4	900.0
6/12/2020	<0.25	7.29	17.0	819.0	10/15/2020	<0.25	7.96	14.5	1203
1/18/2021	<0.01	6.98	7.61	1045	8/23/2021	0.15	7.98	18.4	1008
3/22/2021	<0.01	7.65	8.11	1077	11/18/2021	<0.01	6.74	10.7	1072
5/19/2021	<0.01	7.79	12.1	1072					
2/4/2022	0.01	7.25	3.00	1056	8/29/2022	0.59	7.56	21.6	1054
6/22/2022	0.00	7.09	17.9	1030	12/16/2022	0.00	5.79	8.20	966.8
2/28/2023	1.81	7.35	8.60	979.8	9/6/2023	0.01	6.47	18.3	1077
6/7/2023	0.00	7.54	17.1	1030	11/16/2023	0.00	7.80	15.2	1085

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/2/2017	No Exceedances	10/24/2017	Arsenic
5/28/2018	Antimony, Arsenic, Beryllium, Cadmium, Lead	11/27/2018	No Exceedances
5/29/2019	No Exceedances	12/4/2019	Cadmium
6/12/2020	Beryllium, Cadmium, Copper, Lead	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/18/2021	No Exceedances	11/18/2021	No Exceedances
5/19/2021	No Exceedances		
6/22/2022	Arsenic	12/16/2022	No Exceedances
6/7/2023	No Exceedances	11/16/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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.

Dry Season Photo (5/28/2018)



Wet Season Photo (11/27/2018)



Dry Season Photo (5/29/2019)



Wet Season Photo (12/4/2019)



Dry Season Photo (6/12/2020)



Wet Season Photo (10/15/2020)



Dry Season Photo (05/19/2021)



Wet Season Photo (08/23/2021)



Dry Season Photo (06/22/2022)



Wet Season Photo (08/29/2022)



Dry Season Photo (06/07/2023)



Wet Season Photo (09/06/2023)



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

Site ID	A12-01	Interpretation of Groundwater Age: Little to no evaporation, mixed water during the dry season. Little to no evaporation, modern to mixed water during the wet season.
Watershed	Alum Gulch	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from trace to 159 gpm.
Number of Visits	20	

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					
2/8/2022	0.98	3.4	14.5	2048	8/31/2022	127.0	3.04	28.1	2333
6/22/2022	0.12	3.13	28.4	2690	12/16/2022	50.0	3.97	7.6	1350
2/28/2023	159	3.76	11.6	911.7	9/6/2023	1.05	3.22	26.8	2041
6/6/2023	0.49	2.82	27.3	2279	11/16/2023	<0.01	2.64	17.6	2482

Notes ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/2/2017	Beryllium, cadmium, copper, lead
5/29/2018	Beryllium, cadmium, copper, lead	11/28/2018	Beryllium, cadmium, copper, lead
5/30/2019	Beryllium, cadmium, copper, lead	12/7/2019	Beryllium, cadmium, lead
6/18/2020	Beryllium, cadmium, copper, lead	10/14/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/19/2021	Beryllium, cadmium, copper, lead	11/17/2021	Beryllium, cadmium, lead
5/18/2021	Beryllium, cadmium, copper, lead		
6/22/2022	Beryllium, cadmium, copper, lead	12/16/2022	Beryllium, cadmium, lead
6/6/2023	Beryllium, cadmium, copper, lead	11/16/2023	Beryllium, cadmium, copper, lead

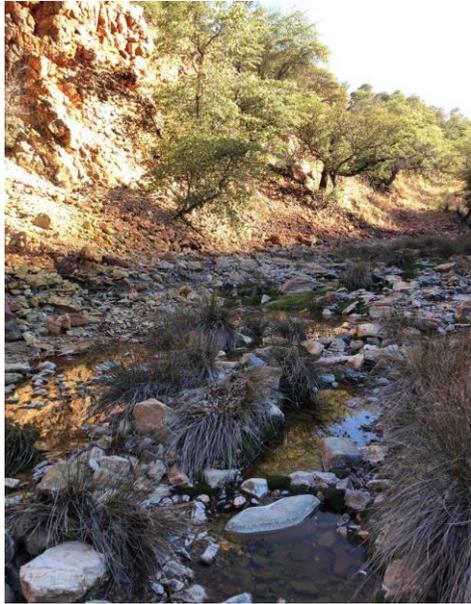
Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

Aquatic and Vegetation Survey Findings: Site is located in exposed bedrock section of Alum Gulch. Generally, water is present in shallow pools. Aquatic beetles have been observed. 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)



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)



Dry Season Photo (06/22/2022)



Wet Season Photo (08/31/2022)



Dry Season Photo (06/06/2023)



Wet Season Photo (09/06/2023)



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

Site ID	A12-02	Interpretation of Groundwater Age: Little to no evaporation, premodern water during the wet season.
Watershed	Alum Gulch	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 0.12.
Number of Visits	20	

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					
2/8/2022	0.01	4.73	16.4	1736	8/31/2022	0.12	4.46	22.5	2323
6/22/2022	0.00	5.11	21.8	1698	12/16/2022	0.00	4.82	16.0	1753
2/28/2023	0.00	3.98	17.1	1783	9/6/2023	0.00	4.88	24.2	1726
6/6/2023	0.00	4.67	21.4	1695	11/16/2023	0.00	4.76	19.7	1775

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/2/2017	Antimony, Arsenic, Beryllium, Cadmium, Copper, Lead
5/29/2018	Dry	11/28/2018	Dry
5/30/2019	Dry	12/7/2019	Arsenic, Cadmium, Copper, Lead
6/18/2020	Antimony, Arsenic, Beryllium, Cadmium, Copper, Lead, Mercury	10/14/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/19/2021	Antimony	11/17/2021	Antimony, Arsenic, Cadmium
5/18/2021	Antimony		
6/22/2022	Antimony	12/16/2022	Antimony, Arsenic, Cadmium
6/6/2023	Antimony, Arsenic	11/16/2023	Antimony, Arsenic

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 toumeyii*) 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.

<p align="center">Dry Season Photo (5/29/2018)</p>	<p align="center">Wet Season Photo (11/28/2018)</p>
	
<p align="center">Dry Season Photo (5/30/2019)</p>	<p align="center">Wet Season Photo (12/7/2019)</p>
<p align="center">No photo taken</p>	

Dry Season Photo (6/18/2020)



Wet Season Photo (10/14/2020)



Dry Season Photo (05/18/2021)



Wet Season Photo (08/25/2021)



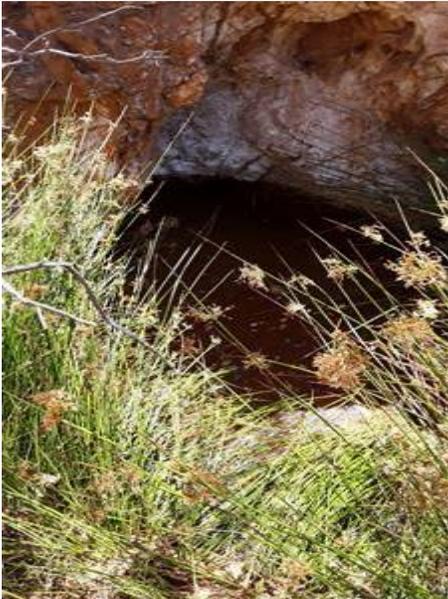
Dry Season Photo (06/22/2022)



Wet Season Photo (08/31/2022)



Dry Season Photo (06/06/2023)



Wet Season Photo (09/06/2023)



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

Site ID	A14-AD-01	Interpretation of Groundwater Age: Little to no evaporation, mixed water during the dry season. Little to no evaporation, premodern water during the wet season.
Watershed	Alum Gulch	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site are always near 0.1 gpm. No changes are predicted at this site.
Number of Visits	20	

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	9.72	2788	8/25/2021	0.26	2.33	19.5	3374
3/18/2021	0.12	2.57	13.0	3129	11/17/2021	0.00	2.40	11.8	3093
5/18/2021	0.04	2.33	15.7	2799	8/31/2022	0.43	2.31	21.7	3042
2/8/2022	0.12	2.41	7.90	2691	12/16/2022	1.50	2.77	6.40	2830
6/22/2022	0.03	2.51	18.9	2535	9/6/2023	0.02	2.43	20.0	2519
2/28/2023	0.01	1.58	8.33	2743	11/16/2023	0.00	2.50	15.4	2635
6/6/2023	0.01	2.42	17.8	2363					

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/2/2017	Arsenic, Beryllium, Cadmium, Copper, Lead
5/29/2018	Arsenic, Cadmium, Copper, Lead	11/28/2018	Arsenic, Cadmium, Copper
5/30/2019	Arsenic, Cadmium	12/7/2019	Arsenic, Cadmium, Copper
6/18/2020	Arsenic, Beryllium, Cadmium, Copper, Thallium	10/14/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/19/2021	Arsenic, Cadmium, Copper	11/17/2021	Arsenic, Cadmium, Copper
5/18/2021	Antimony, Arsenic, Cadmium, Copper, Lead, Thallium		
6/22/2022	Arsenic, Cadmium, Copper	12/16/2022	Antimony, Arsenic, Cadmium, Copper
6/6/2023	Arsenic, Cadmium	11/16/2023	Arsenic, Cadmium, Copper

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



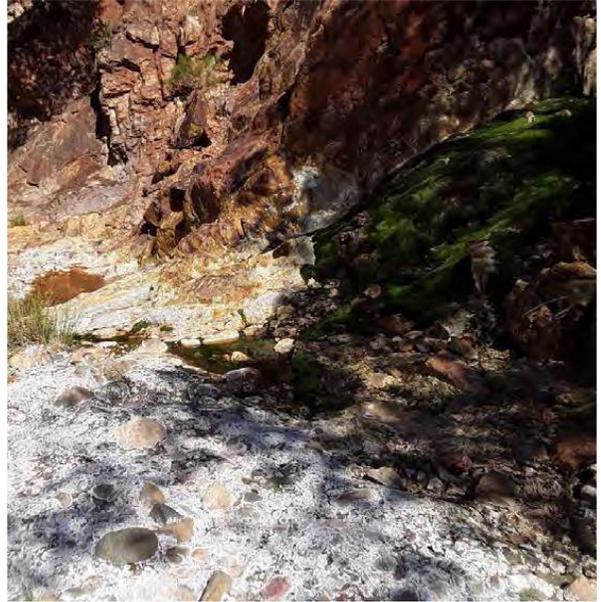
Wet Season Photo (12/7/2019)



Dry Season Photo (6/18/2020)



Wet Season Photo (10/14/2020)



Dry Season Photo (05/18/2021)



Wet Season Photo (08/25/2021)



Dry Season Photo (06/22/2022)



Wet Season Photo (08/31/2022)



Dry Season Photo (06/06/2023)



Wet Season Photo (09/06/2023)



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

Site ID	A15-01	Interpretation of Groundwater Age: Light to moderate evaporation, mixed water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Alum Gulch	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0.04 to 198 gpm. No changes are predicted at this site.
Number of Visits	20	

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	7.90	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	7.22	1944	8/25/2021	50.0	3.39	24.4	1514
3/18/2021	0.83	3.22	11.8	2242	11/17/2021	0.33	3.18	9.33	1990
5/18/2021	0.04	3.08	20.6	351.9					
2/8/2022	1.89	3.08	5.30	2006	8/31/2022	118	3.34	25.2	1183
6/22/2022	1.00	3.07	20.7	3860	12/16/2022	31.1	3.55	4.90	1537
2/28/2023	198	3.03	5.00	1004	9/6/2023	2.40	3.00	23.5	1947
6/6/2023	0.29	2.72	24.7	2478	11/16/2023	0.01	3.48	14.5	2040

Notes ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/2/2017	Beryllium, Cadmium, Copper, Lead
5/29/2018	Beryllium, Cadmium, Copper, Fluoride, Lead	11/28/2018	Beryllium, Cadmium, Copper
5/30/2019	Beryllium, Cadmium, Copper, Lead	12/7/2019	Beryllium, Cadmium, Copper, Lead
6/18/2020	Beryllium, Cadmium, Copper, Lead	10/14/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/19/2021	Beryllium, Cadmium, Copper	11/17/2021	Beryllium, Cadmium, Copper
5/18/2021	Beryllium, Cadmium, Copper, Lead, Selenium		
6/22/2022	Arsenic, Beryllium, Cadmium, Copper, Lead	12/16/2022	Beryllium, Cadmium, Copper
6/7/2023	Beryllium, Cadmium, Copper, Lead	11/16/2023	Beryllium, Cadmium, Copper

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



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)



<p>Dry Season Photo (06/22/2022)</p>	<p>Wet Season Photo (08/31/2022)</p>
	
<p>Dry Season Photo (06/06/2023)</p>	<p>Wet Season Photo (09/06/2023)</p>
	

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

Site ID	AC1-01	Interpretation of Groundwater Age: Light to moderate evaporation, modern water during the dry season. Little to no evaporation, mixed water during the wet season.
Watershed	Adams Canyon	
Monitoring Period	5/2019-11/2023	Potential Impacts/Effects: No changes are predicted at this site.
Number of Visits	17	

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	95.00	12/6/2019	0.00	6.33	12.3	37.00
7/2/2020	0.00	7.87	26.7	107.7	10/2/2020	0.00	7.87	24.5	97.00
1/20/2021	0.00	7.65	10.7	116.0	3/19/2021	0.00	7.71	13.4	128.0
5/17/2021	0.00	6.70	25.8	161.0	8/24/2021	0.00	6.70	31.5	146.0
11/17/2021	0.00	7.31	9.22	92.50					
2/2/2022	0.00	6.21	8.90	87.75	9/8/2022	0.00	6.49	20.7	78.49
6/15/2022	0.00	8.69	26.3	139.2	12/6/2022	0.00	7.24	12.1	98.93
2/21/2023	0.00	8.09	9.80	96.01	8/29/2023	0.00	8.18	27.6	160.8
6/12/2023	0.00	8.66	25.0	144.5	11/22/2023	0.00	7.95	11.8	184.7
Note ¹ = Flows too high to measure with conventional methods									

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/22/2019	No Exceedances	12/6/2019	No Exceedances
7/2/2020	No Exceedances	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		
6/15/2022	Arsenic	12/6/2022	No Exceedances
6/12/2023	No Exceedances	11/22/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 (*Lithobates catesbeianus*) have been observed 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)



Dry Season Photo (06/15/2022)



Wet Season Photo (09/08/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/29/2023)



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

Site ID	AC2-01	Interpretation of Groundwater Age: Little to no evaporation, mixed water during the wet season.
Watershed	Adams Canyon	
Monitoring Period	12/2019 - 11/2023	Potential Impacts/Effects: Site is consistently dry, however, when water was present, flow was 13 gpm.
Number of Visits	16	

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	13.0	6.60	12.6	92.00
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		9/8/2022	5.56	6.57	20.8	125.4
2/2/2022			Dry		12/6/2022			Dry	
6/15/2022			Dry		8/29/2023			Dry	
2/21/2023			Dry		11/22/2023			Dry	
6/12/2023			Dry						

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		12/6/2019	No Exceedances
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	12/6/2022	Dry
6/15/2022	Dry	11/22/2023	Dry
6/12/2023	Dry		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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

No photo taken

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)



Dry Season Photo (06/15/2022)



Wet Season Photo (09/08/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/29/2023)



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

Site ID	BE1-02	Interpretation of Groundwater Age: Little to no evaporation, mixed water during the dry season. Little to no evaporation, mixed water during the wet season.
Watershed	Blue Eagle	
Monitoring Period	5/2019-11/2023	Potential Impacts/Effects: Flows observed at this site during site visits have ranged from 0 to 1.20 gpm. No changes are predicted at this site.
Number of Visits	17	

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	960.0
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					
2/10/2022	0.06	3.13	6.10	1310	8/30/2022	0.59	3.23	25.5	1035
6/22/2022	0.00	3.31	19.3	2204	12/14/2022	1.20	3.10	8.10	1149
2/28/2023	0.12	3.43	11.3	1110	9/5/2023	0.10	3.15	25.7	1385
6/14/2023	<0.01	1.98	20.3	1479	11/17/2023	0.08	2.95	15.0	1733

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/27/2019	Beryllium, Cadmium, Lead	12/11/2019	Beryllium, Cadmium, Copper, Lead
6/22/2020	Beryllium, Cadmium, Lead	10/21/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/4/2021	Beryllium, Cadmium, Copper, Lead	11/23/2021	Beryllium, Cadmium, Copper, Lead
5/25/2021	Unable to sample		
6/22/2022	Beryllium, Cadmium, Copper, Lead	12/14/2022	Beryllium, Cadmium, Copper, Lead
6/14/2023	Beryllium, Cadmium, Lead	11/17/2023	Beryllium, Cadmium, Copper, Lead

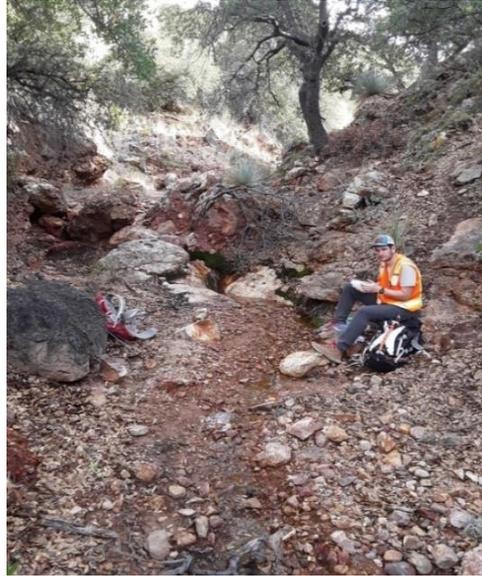
Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 (*Dasyllirion wheeleri*). Overstory vegetation is dominated by oaks (*Quercus* spp.). Aquatic invertebrates observed include aquatic beetles and backswimmers. No aquatic vertebrates have been observed. Invasive Lehmann lovegrass (*Eragrostis lehmanniana*) and natalgrass (*Melinis repens*) were observed.

Dry Season Photo (5/27/2019)



Wet Season Photo (12/11/2019)



Dry Season Photo (6/22/2020)



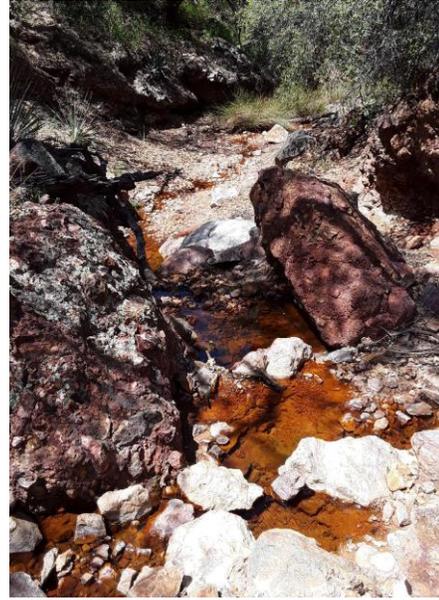
Wet Season Photo (10/21/2020)



Dry Season Photo (05/25/2021)



Wet Season Photo (08/26/2021)



Dry Season Photo (06/22/2022)



Wet Season Photo (08/30/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (09/05/2023)



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

Site ID	BE1-AD-01	Interpretation of Groundwater Age: Little to no evaporation, mixed water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Blue Eagle	
Monitoring Period	5/2019-11/2023	Potential Impacts/Effects: No flow has been measured at this site. No changes are predicted at this site.
Number of Visits	17	

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	8.90	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	8.33	2710	8/26/2021	0.00	2.66	20.8	2064
3/24/2021	0.00	2.85	8.28	2858	11/23/2021	0.00	2.94	14.3	2862
5/25/2021	0.00	2.95	16.6	3038					
2/10/2022	0.00	2.81	5.28	2873	8/30/2022	0.00	2.82	19.6	1308
6/22/2022	0.00	2.68	18.3	2932	12/14/2022	0.00	2.83	3.90	1630
2/28/2023	0.00	2.84	9.80	2281	9/5/2023	0.00	2.86	22.0	2737
6/14/2023	0.00	1.57	16.7	2912	11/17/2023	0.00	2.78	14.7	2840

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/27/2019	Cadmium, Lead	12/11/2019	Arsenic, Cadmium, Lead
6/22/2020	Arsenic, Cadmium, Lead	10/21/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/4/2021	Arsenic, Cadmium, Lead	11/23/2021	Cadmium
5/25/2021	Lead		
6/22/2022	Cadmium, Lead	12/14/2022	Arsenic, Cadmium, Copper, Lead
6/14/2023	Cadmium, Lead	11/17/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/22/2022)



Wet Season Photo (08/30/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (09/05/2023)



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

Site ID	Bog Hole	Interpretation of Groundwater Age: Little to light evaporation, modern water during the wet season.
Watershed	San Rafael Valley	
Monitoring Period	5/2021 - 11/2023	Potential Impacts/Effects: Flows has not been observed at this site. Predictions will be made after additional data is obtained.
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)
5/27/2021	Dry				9/10/2021	0.00	6.78	27.4	162.2
					12/2/2021	0.00	7.21	11.0	264.8
2/10/2022	0.00	8.23	7.00	306.4	9/8/2022	0.00	6.20	21.3	240.9
6/22/2022	Dry				12/8/2022	0.00	7.29	11.1	160.8
3/1/2023	0.00	8.42	9.20	291.4	9/8/2023	0.00	8.67	22.7	433.1
6/15/2023	0.00	7.42	19.8	458.5	11/22/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/27/2021	Dry	9/10/2021	Only Isotopes Collected
6/22/2022	Dry	12/2/2021	No Exceedances
		12/8/2022	No Exceedances
6/15/2023	No Exceedances	11/22/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

Aquatic and Vegetation Survey Findings: Poned 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*). Aquatic invertebrates observed include backswimmers. During the 05/27/21 visit, a dead Sonoran mud turtle (*Kinosternon sonoriense*) and a monarch butterfly (*Danaus plexippus*) were observed. Invasive Lehmann lovegrass (*Eragrostis lehmanniana*) was observed.

Dry Season Photo (05/27/2021)



Wet Season Photo (09/10/2021)



Dry Season Photo (06/22/2022)



Wet Season Photo (09/08/2022)



Dry Season Photo (06/15/2023)



Wet Season Photo (09/08/2023)



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

Site ID	C1-02	Interpretation of Groundwater Age: Little to no evaporation, mixed water during the wet season.
Watershed	Corral Canyon	
Monitoring Period	12/2018 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 4.60. 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	18	

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	507.0
5/23/2019	Dry				12/4/2019	0.00	8.15	11.3	261.0
6/16/2020	Dry				9/30/2020	Dry			
1/11/2021	Dry				8/26/2021	0.01	7.78	25.9	656.8
3/8/2021	Dry				11/15/2021	Dry			
5/17/2021	Dry				8/31/2022	1.14	7.85	26.3	436.3
1/31/2022	Dry				12/5/2022	4.60	7.26	13.0	206.9
6/14/2022	Dry				8/30/2023	Dry			
2/21/2023	0.10	7.53	9.22	390.9	11/13/2023	Dry			
6/5/2023	Dry								

Water Quality Screening Level

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	12/5/2022	No Exceedances
6/14/2022	Dry	11/13/2023	Dry
6/5/2023	Dry		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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. Aquatic invertebrates observed are aquatic beetles, backswimmers, and waterstriders. Canyon treefrogs (*Hyla arenicolor*) have been observed.

Dry Season Photo	Wet Season Photo (12/2/2018)
<p>No photo taken</p>	
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)



Dry Season Photo (06/14/2022)



Wet Season Photo (08/31/2022)



Dry Season Photo (06/05/2023)



Wet Season Photo (08/30/2023)



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

Site ID	C1-WELL-WM-01	Interpretation of Groundwater Age: Little to no evaporation, mixed water during the dry season. Little to no evaporation, modern to mixed water during the wet season.
Watershed	Corral Canyon	
Monitoring Period	5/2017 - 11/2023	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	21	

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)
5/7/2017	0.00	7.32	23.9	657.1	10/25/2017	0.00	6.93	29.9	610.7
5/17/2018	0.00	6.84	19.2	597.7	12/2/2018	<0.25	8.40	9.90	422.0
5/23/2019	0.00	8.36	25.4	468.0	12/4/2019	0.00	9.79	14.7	136.0
6/16/2020	0.00	8.74	30.0	300.0	9/30/2020	0.00	8.37	26.4	318.0
1/11/2021	0.02	7.25	2.56	517.5	8/26/2021	0.00	8.59	29.4	282.0
3/8/2021	0.00	6.88	21.4	658.6	11/15/2021	0.00	8.03	18.1	445.9
5/17/2021	0.01	7.16	21.6	634.8					
1/31/2022	0.00	6.89	7.20	577.9	8/31/2022	0.00	9.95	28.8	169.2
6/14/2022	0.00	7.66	27.4	409.8	12/5/2022	0.00	7.56	16.1	317.6
2/21/2023	0.03	6.80	13.8	619.4	8/30/2023	0.00	7.10	33.0	602.7
6/5/2023	0.25	7.01	31.0	631.0	11/13/2023	0.00	8.13	14.0	548.8

Water Quality Screening Level

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		
6/14/2022	No Exceedances	12/5/2022	No Exceedances
6/23/2023	No Exceedances	11/13/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 (*Lithobates catesbeianus*) and black-necked gartersnake (*Thamnophis cyrtopsis*) have been observed at this drinker. Invasive saltcedar (*Tamarix* sp.), Lehmann lovegrass (*Eragrostis lehmanniana*) and natalgrass (*Melinis repens*) were observed.

Dry Season Photo (5/17/2018)

No Photo Taken

Wet Season Photo (12/2/2018)



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)



Dry Season Photo (06/14/2022)



Wet Season Photo (08/31/2022)



Dry Season Photo (06/05/2023)



Wet Season Photo (08/30/2023)



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

Site ID	C5-WELL-ST-01	Interpretation of Groundwater Age: Little to no evaporation, mixed water during the dry season. Little to no evaporation, modern and mixed water during the wet season.
Watershed	Corral Canyon	
Monitoring Period	11/2017 - 11/2023	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	19	

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	592.8
					12/2/2018	0.00	8.50	8.60	377.0
5/21/2019	0.00	8.17	17.8	359.0	12/4/2019	0.00	8.84	14.3	317.0
6/16/2020	0.00	7.07	22.0	466.0	10/5/2020	0.00	7.95	22.0	555.0
1/11/2021	5.00	7.16	16.8	536.9	8/26/2021	0.00	7.01	28.2	579.9
3/8/2021	0.00	7.47	15.9	574.2	11/15/2021	0.00	7.28	17.6	572.0
5/17/2021	1.00	7.31	24.1	559.7					
1/31/2022	0.00	6.86	23.8	714.2	8/31/2022	0.00	8.37	23.8	330.9
6/14/2022	0.00	9.26	30.6	304.6	12/5/2022	0.00	7.43	15.0	449.4
2/28/2023	0.00	9.85	11.0	168.9	8/30/2023	0.00	8.48	29.1	249.6
6/5/2023	0.00	6.94	29.7	717.6	11/13/2023	0.00	7.53	18.3	557.6

Water Quality Screening Level

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	Beryllium, Thallium	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	No Exceedances	12/5/2022	No Exceedances
6/14/2022	No Exceedances	11/13/2023	No Exceedances
6/5/2023	No Exceedances		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 pleiakantha*) and also includes invasive stinkgrass (*Eragrostis cilianensis*). Cows have been noted at the site. Aquatic invertebrates observed include backswimmers, beetles, boatmen, dragonflies, snails, and leeches. Invasive American bullfrogs (*Lithobates catesbeianus*) have been observed in recent years at this site.

Dry Season Photo	Wet Season Photo (12/02/2018)
<p>No photo taken.</p>	
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)



Dry Season Photo (06/14/2022)



Wet Season Photo (08/31/2022)



Dry Season Photo (06/05/2023)



Wet Season Photo (08/30/2023)



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

Site ID	CD1-01	Interpretation of Groundwater Age: Light to moderate evaporation, modern water during the dry season. Little to no evaporation, mixed water during the wet season.
Watershed	Chino Draw	
Monitoring Period	5/2019 - 11/2023	Potential Impacts/Effects: No flow has been measured at this site. No changes are predicted at this site.
Number of Visits	17	

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	125.0	12/6/2019	0.00	5.96	12.6	44.00
7/6/2020	Dry				10/16/2020	Dry			
1/20/2021	Dry				8/25/2021	0.00	6.83	20.7	328.8
3/19/2021	Dry				11/17/2021	Dry			
5/17/2021	Dry				9/8/2022	0.10	6.17	20.1	58.00
2/2/2022	Dry				12/6/2022	Dry			
6/15/2022	Dry				8/29/2023	0.00	7.45	27.3	86.83
2/21/2023	Dry				11/21/2023	Dry			
6/15/2023	Dry								

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/22/2019	Arsenic, Lead	12/6/2019	No Exceedances
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	12/6/2022	Dry
6/15/2022	Dry	11/21/2023	Dry
6/15/2023	Dry		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/15/2022)



Wet Season Photo (09/08/2022)



Dry Season Photo (06/15/2023)



Wet Season Photo (08/29/2023)



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

Site ID	CD2-01	Interpretation of Groundwater Age: Little to no evaporation, mixed water during the wet season.
Watershed	Chino Draw	
Monitoring Period	12/2019-11/2023	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	16	

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	43.00
7/6/2020	0.00	7.90	29.6	448	10/16/2020	<0.25	8.80	29.1	432.0
1/20/2021	0.00	8.07	6.83	310	8/24/2021	0.00	7.81	28.1	342.6
3/19/2021	0.00	8.69	12.6	249	11/17/2021	0.00	8.52	9.72	250.7
5/17/2021	0.00	9.78	22.3	300					
2/2/2022	0.00	7.37	5.80	267	9/14/2022	0.00	7.78	25.5	583.0
6/15/2022	0.00	9.71	30.7	439	12/6/2022	0.00	8.24	7.70	359.0
2/21/2023	0.00	8.82	9.20	232	8/29/2023	0.00	9.35	28.8	467.3
6/15/2023	0.00	9.96	28.7	355	11/21/2023	0.00	7.88	8.00	739.5

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		12/6/2019	No Exceedances
7/6/2020	No Exceedances	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	No Exceedances	12/6/2022	No Exceedances
6/15/2022	Arsenic	11/21/2023	No Exceedances
6/15/2023	Arsenic		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*) and natalgrass (*Melinis repens*). Aquatic invertebrates observed include beetles, water scorpions, and boatmen. Red spotted toads (*Anaxyrus rufipunctatus*) have been observed.

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

Dry Season Photo (05/17/2021)



Wet Season Photo (08/24/2021)



Dry Season Photo (06/15/2022)



Wet Season Photo (09/14/2022)



Dry Season Photo (06/15/2023)



Wet Season Photo (08/29/2023)



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

Site ID	CG1-01	Interpretation of Groundwater Age: Little to no evaporation, premodern water during the dry season. Little to no evaporation, premodern water during the wet season.
Watershed	Cox Gulch	
Monitoring Period	6/2021 - 11/2023	Potential Impacts/Effects: Flows have varied from 0.32 to 3.97 gpm. Predictions will be made once additional data is obtained.
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)
6/1/2021	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
2/1/2022	0.38	2.64	9.20	3421	9/7/2022	0.38	2.82	18.4	3189
6/14/2022	0.34	2.65	20.1	3475	12/5/2022	1.50	2.42	13.9	3995
2/27/2023	0.25	2.47	9.30	3470	9/5/2023	0.24	2.53	18.9	3686
6/5/2023	0.25	1.81	16.3	3413	11/16/2023	0.24	2.72	15.0	3522

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
6/1/2021	Arsenic, Beryllium, Cadmium, Copper, Uranium	11/30/2021	Arsenic, Beryllium, Cadmium, Copper, Uranium
6/14/2022	Arsenic, Beryllium, Cadmium, Copper, Uranium	12/5/2022	Arsenic, Beryllium, Cadmium, Copper, Thallium, Uranium
6/5/2023	Arsenic, Beryllium, Cadmium, Copper, Uranium	11/16/2023	Arsenic, Beryllium, Cadmium, Copper, Uranium

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/14/2022)



Wet Season Photo (09/07/2022)



Dry Season Photo (06/05/2023)



Wet Season Photo (09/05/2023)



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

Site ID	CG2-01	Interpretation of Groundwater Age: Little to no evaporation, mixed water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Cox Gulch	
Monitoring Period	6/2021 - 11/2023	Potential Impacts/Effects: Flows have varied from zero to 6.32 gpm. Predictions will be made once additional data is obtained.
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)
6/1/2021	0.02	2.86	19.8	2598	9/13/2021	4.60	3.16	24.7	2181
					4453000%	0.54	3.14	8.83	2469
2/1/2022	0.29	3.12	6.90	2277	9/7/2022	6.32	3.09	23.3	2012
6/14/2022	0.00	3.06	28.2	2634	12/5/2022	1.80	2.85	13.0	2380
2/27/2023	0.79	2.94	10.8	2266	9/5/2023	0.11	2.90	14.9	2554
6/5/2023	0.01	2.39	24.6	2540	11/16/2023	0.01	3.04	14.7	2446

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
6/1/2021	Beryllium, Cadmium, Copper, Uranium	11/30/2021	Arsenic, Beryllium, Cadmium, Copper, Uranium
6/14/2022	Arsenic, Beryllium, Cadmium, Copper, Uranium	12/5/2022	Beryllium, Cadmium, Copper, Thallium, Uranium
6/5/2023	Arsenic, Beryllium, Cadmium, Copper, Uranium	11/16/2023	Arsenic, Beryllium, Cadmium, Copper

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 (*Eragrostis lehmanniana*) and invasive natalgrass (*Melinis repens*) occur. Aquatic beetles, water striders, 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)



Dry Season Photo (06/14/2022)



Wet Season Photo (09/07/2022)



Dry Season Photo (06/05/2023)



Wet Season Photo (09/05/2023)



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

Site ID	CG3-WELL-01	Interpretation of Groundwater Age: Little to no evaporation, premodern water during the dry season. Little to no evaporation, premodern water during the wet season.
Watershed	Cox Gulch	
Monitoring Period	6/2021 - 11/2023	Potential Impacts/Effects: Flows has varied from 0.02 to 0.04 gpm. Predictions will be made once additional data is obtained.
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)
6/1/2021	0.02	7.53	24.9	1704	9/13/2021	0.04	7.58	26.3	1672
2/1/2022	0.04	6.84	17.2	1565	11/30/2021	0.04	6.89	22.5	1614
6/14/2022	0.02	7.12	27.8	1653	9/7/2022	0.03	7.17	25.7	1551
2/27/2023	0.03	7.38	19.3	1577	12/5/2022	0.02	6.86	20.4	1541
6/5/2023	0.02	7.77	27.3	1655	9/5/2023	0.03	6.38	34.5	1616
					11/16/2023	0.03	6.48	19.5	1563

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
6/1/2021	Arsenic	11/30/2021	Arsenic
6/14/2022	Arsenic	12/5/2022	Arsenic
6/5/2023	Arsenic	11/16/2023	Arsenic

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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. Aquatic beetles have been observed. No aquatic herpetofauna have been observed; evidence of cattle, deer, and coyotes have been observed. Invasive Bermudagrass (*Cynodon dactylon*) occurs.

Dry Season Photo (06/01/2021)



Wet Season Photo (09/13/2021)



Dry Season Photo (06/14/2022)



Wet Season Photo (09/07/2022)



Dry Season Photo (06/05/2023)



Wet Season Photo (09/05/2023)



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

Site ID	F2-01	Interpretation of Groundwater Age: Little to no evaporation, modern to mixed water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 8.93 gpm. No changes are predicted at this site.
Number of Visits	20	

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	9.56	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					
2/3/2022	0.03	3.45	6.50	1393	8/30/2022	8.93	3.18	21.4	806.6
6/23/2022	0.00	3.47	27.2	1340	12/14/2022	0.64	3.30	8.30	1280
2/23/2023	4.70	3.46	9.40	786.3	9/6/2023	<0.01	3.30	26.3	1360
6/13/2023	0.01	3.05	26.0	1295	11/21/2023	<0.01	5.23	9.28	1465

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/9/2017	Beryllium, Cadmium, Copper
5/30/2018	Beryllium, Cadmium, Copper, Lead	11/29/2018	Beryllium, Cadmium, Copper, Lead
5/27/2019	Cadmium, Copper, Lead	12/7/2019	Cadmium, Copper, Lead
6/11/2020	Cadmium, Copper, Lead	10/21/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/13/2021	Beryllium, Cadmium, Copper, Lead	11/23/2021	Beryllium, Cadmium, Copper
5/24/2021	Beryllium, Cadmium, Copper, Lead		
6/23/2022	Beryllium, Cadmium, Copper, Lead	12/14/2022	Cadmium, Copper, Lead
6/13/2023	Beryllium, Cadmium, Copper, Lead	11/21/2023	Cadmium, Copper, Lead

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/23/2022)



Wet Season Photo (08/30/2022)



Dry Season Photo (06/13/2023)



Wet Season Photo (09/06/2023)



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

Site ID	F4-01	Interpretation of Groundwater Age: Little to no evaporation, modern water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 135 gpm. Three 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	20	

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	8.60	585.0
5/27/2019	0.00	4.05	21.0	1264	12/7/2019	<0.25	4.15	14.9	603.0
6/11/2020	<0.25	4.55	30.7	1290	10/21/2020	Dry			
1/13/2021	0.02	5.81	4.72	2196	9/2/2021	7.31	4.03	23.8	908.0
3/11/2021	<0.01	6.20	9.22	1958	11/23/2021	<0.01	5.72	9.44	1678
5/24/2021	Dry								
2/3/2022	0.01	6.83	4.20	1456	8/30/2022	9.20	3.82	27.6	649.4
6/23/2022	Dry				12/14/2022	9.68	4.17	8.60	739.7
2/23/2023	135	4.49	10.9	502.8	9/6/2023	0.00	3.94	28.8	1559
6/13/2023	Dry				11/21/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/9/2017	Cadmium, Lead
5/30/2018	Dry	11/29/2018	Cadmium, Copper, Lead
5/27/2019	Beryllium, Cadmium, Copper, Lead	12/7/2019	Cadmium, Copper, Lead
6/11/2020	Cadmium, Lead	10/21/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/13/2021	Cadmium	11/23/2021	Cadmium
5/24/2021	Dry		
6/23/2022	Dry	12/14/2022	Cadmium, Copper
6/13/2023	Dry	11/21/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*) and natalgrass (*Melinis repens*). 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)



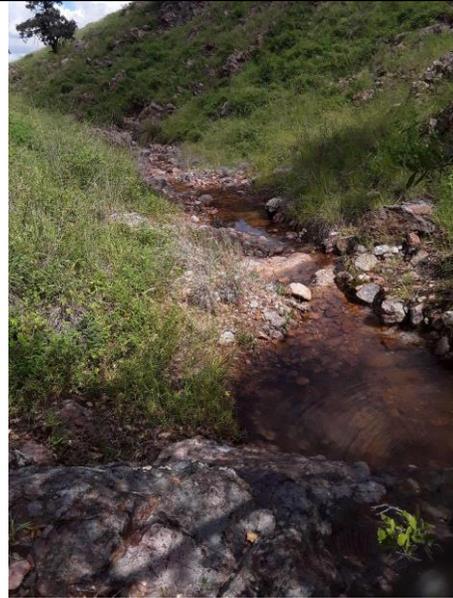
Wet Season Photo (10/8/2020)



Dry Season Photo (05/24/2021)



Wet Season Photo (09/02/2021)



Dry Season Photo (06/23/2022)



Wet Season Photo (08/30/2022)



Dry Season Photo (06/13/2023)



Wet Season Photo (09/06/2023)



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

Site ID	F6-01	Interpretation of Groundwater Age: Little to no evaporation, modern to mixed water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 135 gpm. No changes are predicted at this site.
Number of Visits	20	

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	9.70	1122
5/27/2019	1.10	6.59	20.2	2535	12/7/2019	4.41	5.75	13.4	918.0
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	4.11	2737	9/2/2021	13.9	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					
2/3/2022	0.26	6.73	5.40	2912	8/30/2022	23.3	5.91	26.7	870.3
6/23/2022	0.00	6.05	24.2	2909	12/14/2022	25.1	5.55	8.50	992.6
2/23/2023	135	4.96	9.80	584.7	9/6/2023	0.12	6.66	29.0	2735
6/13/2023	0.01	5.78	27.8	2697	11/20/2023	0.31	7.48	10.8	2808

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/9/2017	Cadmium, Lead
5/30/2018	Cadmium, Lead	11/29/2018	Cadmium, Lead
5/27/2019	Cadmium, Lead	12/7/2019	Cadmium, Lead
6/10/2020	Cadmium, Lead	10/8/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/12/2021	Cadmium, Thallium	11/22/2021	Cadmium, Lead
5/25/2021	Cadmium, Lead		
6/23/2022	No Exceedances	12/14/2022	Cadmium, Lead
6/13/2023	Cadmium, Lead	11/20/2023	Antimony, Arsenic, Cadmium, Lead

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/23/2022)



Wet Season Photo (08/30/2022)



Dry Season Photo (06/13/2023)



Wet Season Photo (09/06/2023)



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

Site ID	F6-02	Interpretation of Groundwater Age: Little to no evaporation, modern to mixed water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from near 0 to 168 gpm.
Number of Visits	20	

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	995.0
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	6.39	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					
2/3/2022	0.70	3.92	5.40	3458	8/30/2022	28.2	3.92	21.4	1679
6/23/2022	0.00	4.21	24.1	3504	12/14/2022	38.6	4.54	8.30	1639
2/23/2023	168	4.74	9.00	734.0	9/6/2023	0.00	3.91	23.3	3101
6/13/2023	0.01	3.87	19.0	2415	11/20/2023	0.01	3.80	13.3	2935

Notes ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/14/2017	Beryllium, Cadmium, Lead
5/31/2018	Beryllium, Cadmium, Lead	11/29/2018	Beryllium, Cadmium, Lead
5/27/2019	Beryllium, Cadmium, Lead	12/7/2019	Beryllium, Cadmium, Lead
6/10/2020	Beryllium, Cadmium, Lead	10/8/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/12/2021	Beryllium, Cadmium, Copper, Lead	11/22/2021	Arsenic, Beryllium, Cadmium, Lead
5/25/2021	Beryllium, Cadmium, Lead		
6/23/2022	Arsenic, Beryllium, Cadmium, Lead	12/14/2022	Cadmium, Lead
6/13/2023	Beryllium, Cadmium, Lead	11/20/2023	Arsenic, Beryllium, Cadmium, Lead

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 hobbush [*Dodonaea viscosa*]), while south-facing slopes are dominated by grasses with sotol (*Dasyllirion wheeleri*) and Palmer agave (*Agave palmeri*) present. Invasive plant species observed are Bermudagrass (*Cynodon dactylon*) and natalgrass (*Melinis repens*).

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 (09/01/2021)



Dry Season Photo (06/23/2022)



Wet Season Photo (08/30/2022)



Dry Season Photo (06/13/2023)



Wet Season Photo (09/06/2023)



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

Site ID	F8-01	Interpretation of Groundwater Age: Little to no evaporation, modern water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from near 0 to 135 gpm.
Number of Visits	20	

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	3.33	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					
2/3/2022	0.92	3.80	3.30	3023	8/30/2022	47.7	4.06	21.4	1067
6/23/2022	0.01	3.63	24.0	3412	12/14/2022	58.7	4.07	6.40	1632
2/23/2023	135	4.17	8.10	873.8	9/6/2023	0.26	3.84	25.5	2439
6/13/2023	0.01	3.43	22.0	1933	11/20/2023	0.01	3.28	11.8	2083

Notes ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/14/2017	Beryllium, Cadmium, Lead
5/31/2018	Beryllium, Cadmium, Lead	11/29/2018	Beryllium, Cadmium, Lead
5/27/2019	Beryllium, Cadmium, Lead	12/11/2019	Beryllium, Cadmium, Lead
6/10/2020	Beryllium, Cadmium, Lead	10/8/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/12/2021	Beryllium, Cadmium, Copper, Lead	11/22/2021	Beryllium, Cadmium, Lead
5/25/2021	Beryllium, Cadmium, Lead		
6/23/2022	Arsenic, Beryllium, Cadmium, Lead	12/14/2022	Beryllium, Cadmium, Lead
6/13/2023	Beryllium, Cadmium, Lead	11/20/2023	Beryllium, Cadmium, Lead

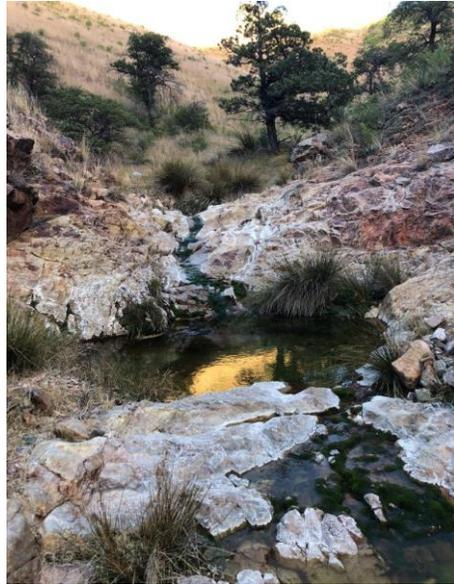
Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*) and Lehmann lovegrass (*Eragrostis lehmanniana*).

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)



Dry Season Photo (06/23/2022)



Wet Season Photo (08/30/2022)



Dry Season Photo (06/13/2023)



Wet Season Photo (09/06/2023)



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

Site ID	F9-01	Interpretation of Groundwater Age: Little to light evaporation, mixed water during the dry season. Little to no evaporation, modern to mixed water during the wet season.
Watershed	Flux Canyon	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site, during site visits, have ranged from near 0 to 270 gpm.
Number of Visits	20	

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	560.0
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	3.17	1088	9/1/2021	86.0	4.00	21.9	1034
3/17/2021	2.70	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					
2/3/2022	3.10	3.84	0.80	1135	8/30/2022	59.5	3.92	21.1	892.6
6/23/2022	0.00	3.79	20.6	2064	12/14/2022	82.1	3.64	5.50	1288
2/23/2023	270	3.54	7.60	1109	9/6/2023	0.78	3.87	23.0	1649
6/13/2023	0.01	3.42	15.5	1347	11/20/2023	0.14	3.89	11.9	1504

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/14/2017	Beryllium, Cadmium, Lead
5/31/2018	Beryllium, Cadmium, Lead	11/29/2018	Cadmium, Lead
5/27/2019	Beryllium, Cadmium, Lead	12/11/2019	Beryllium, Cadmium, Lead
6/10/2020	Beryllium, Cadmium, Lead	10/8/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/12/2021	Beryllium, Cadmium, Lead	11/22/2021	Beryllium, Cadmium, Lead
5/25/2021	Beryllium, Cadmium, Lead		
6/23/2022	Arsenic, Beryllium, Cadmium, Lead	12/14/2022	Beryllium, Cadmium, Lead
6/13/2023	Beryllium, Cadmium, Lead	11/20/2023	Beryllium, Cadmium, Lead

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



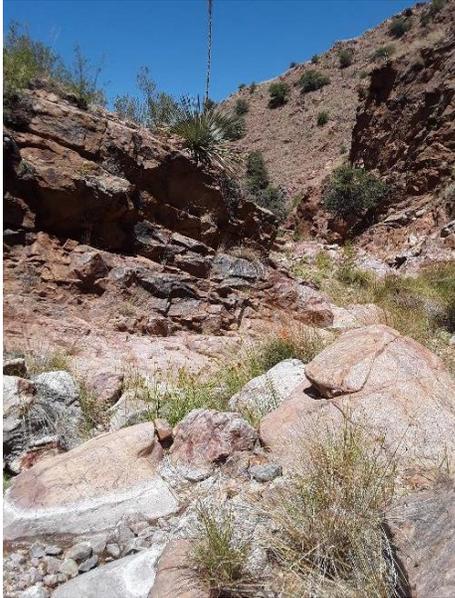
Dry Season Photo (5/27/2019)



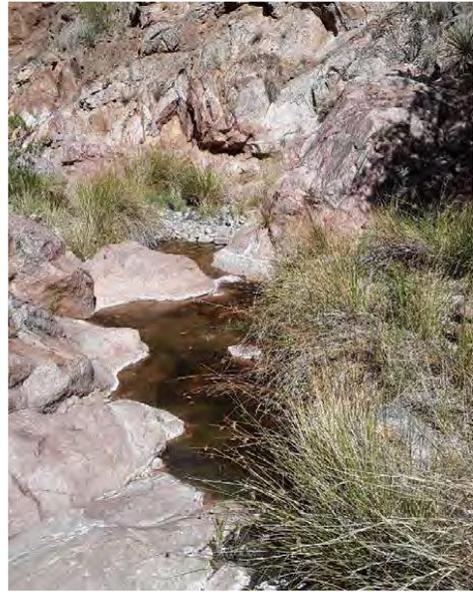
Wet Season Photo (12/11/2019)



Dry Season Photo (6/10/2020)



Wet Season Photo (10/8/2020)



Dry Season Photo (05/25/2021)



Wet Season Photo (09/01/2021)



Dry Season Photo (06/23/2022)



Wet Season Photo (08/30/2022)



Dry Season Photo (06/13/2023)



Wet Season Photo (09/06/2023)



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

Site ID	G1-01	Interpretation of Groundwater Age: Light to moderate evaporation, modern water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Goldbaum Canyon	
Monitoring Period	11/2017 - 11/2023	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	19	

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	7.40	451.2
					12/2/2018	0.00	9.40	10.9	102.0
5/23/2019	0.00	9.96	25.9	116.0	12/5/2019	<0.25	7.38	10.3	70.00
6/25/2020	Dry				10/6/2020	Dry			
2/1/2021	<0.01	8.08	4.56	71.70	9/2/2021	<0.01	9.11	26.4	63.00
3/23/2021	<0.01	9.01	13.1	94.98	11/22/2021	Dry			
6/1/2021	Dry								
2/8/2022	0.00	8.97	1.40	143.8	9/9/2022	0.00	7.69	19.4	178.3
6/17/2022	Dry				12/8/2022	0.00	8.03	7.90	68.83
2/27/2023	0.33	7.36	5.44	65.24	9/7/2023	0.00	6.83	17.5	67.49
6/8/2023	Dry				11/21/2023	0.00	8.23	7.44	60.13

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/16/2017	Arsenic
		12/2/2018	No Exceedances
5/23/2019	Arsenic	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	12/8/2022	No Exceedances
6/17/2022	Dry	11/21/2023	No Exceedances
6/8/2023	Dry		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

Aquatic and Vegetation Survey Findings: This site is located within exposed bedrock in Goldbaum 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*). Invasive plant species observed are Lehmann lovegrass (*Eragrostis lehmanniana*). Canyon treefrog (*Hyla arenicolor*) and red spotted toads (*Anaxyrus rufipunctatus*) 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)



Dry Season Photo (06/17/2022)



Wet Season Photo (09/09/2022)



Dry Season Photo (06/08/2023)



Wet Season Photo (09/07/2023)



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

Site ID	G3-WELL-WM-01	Interpretation of Groundwater Age: Little to light evaporation, modern water during the dry season. Little to no evaporation, mixed to modern water during the wet season.
Watershed	Goldbaum Canyon	
Monitoring Period	11/2017 - 11/2023	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	20	

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	582.3
5/18/2018	0.00	6.91	17.4	541.1	12/2/2018	0.00	9.10	10.1	244.0
5/23/2019	0.00	9.27	22.5	289.0	12/5/2019	0.00	9.04	10.6	171.0
6/25/2020	0.00	7.96	24.8	338.0	10/6/2020	0.00	7.75	26.8	553.0
2/1/2021	0.00	7.40	9.44	519.2	9/2/2021	0.00	7.82	21.3	426.6
3/23/2021	0.00	7.60	10.7	533.5	11/22/2021	0.00	7.37	14.0	530.4
6/1/2021	0.00	7.36	22.1	540.4					
2/8/2022	0.00	8.27	13.3	429.0	9/9/2022	0.00	8.37	21.6	280.0
6/17/2022	0.00	7.74	28.2	736.6	12/8/2022	0.00	7.63	6.70	370.6
2/27/2023	0.13	7.52	7.50	451.2	9/7/2023	0.00	9.02	22.8	213.2
6/8/2023	0.00	7.56	20.8	432.4	11/21/2023	0.00	7.59	6.56	405.1

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/16/2017	Arsenic
5/18/2018	Arsenic	12/2/2018	Arsenic
5/23/2019	Arsenic	12/5/2019	Arsenic
6/25/2020	Arsenic	10/6/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
2/1/2021	Arsenic	11/22/2021	Arsenic
6/1/2021	Arsenic		
6/17/2022	Not sampled due to rancher filling up holding tank with trucked in water	12/8/2022	Arsenic
6/8/2023	Arsenic	11/21/2023	Arsenic

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*) and invasive stinkgrass (*Eragrostis cilianensis*) 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)

Photo Not Taken

Wet Season Photo (12/2/2018)



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)



Dry Season Photo (06/17/2022)



Wet Season Photo (09/09/2022)



Dry Season Photo (06/08/2023)



Wet Season Photo (09/07/2023)



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

Site ID	H6-01	Interpretation of Groundwater Age: Little to no evaporation, modern water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Harshaw Creek	
Monitoring Period	10/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from near 0 to 30.8 gpm.
Number of Visits	20	

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	30.8	7.74	17.0	1296	12/8/2019	29.20	7.45	12.7	948.0
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	9.22	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								
2/9/2022	0.08	6.71	4.80	1616	9/13/2022	5.73	6.53	21.2	1234
6/16/2022	Dry				12/7/2022	3.00	7.14	12.7	1592
3/1/2023	27.6	7.10	11.0	1425	9/7/2023	1.88	7.38	18.8	2094
6/13/2023	20.2	6.74	16.3	1845	11/20/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		10/19/2017	No Exceedances
5/16/2018	Arsenic, 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		
6/16/2022	Dry	12/7/2022	No Exceedances
6/13/2023	No Exceedances	11/20/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 include damselflies, backswimmers, and beetles. 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*). Invasive weeping lovegrass (*Eragrostis curvula*) have been observed.

Dry Season Photo (5/16/2018)



Wet Season Photo (12/1/2018)



Dry Season Photo (5/26/2019)



Wet Season Photo (12/08/2019)



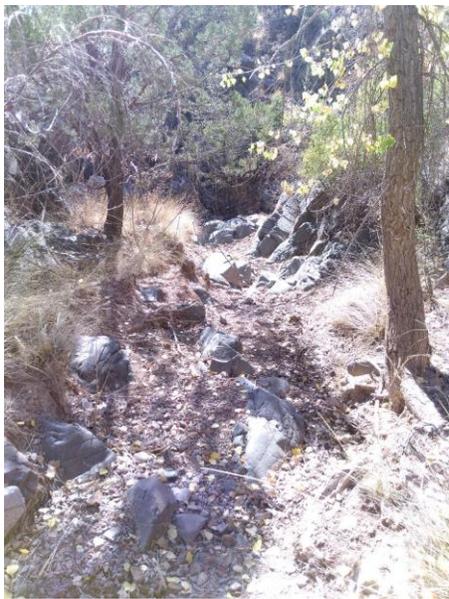
Dry Season Photo (6/29/2020)



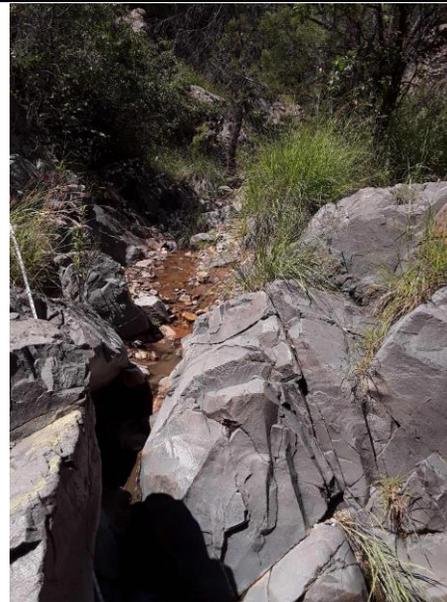
Wet Season Photo (10/9/2020)



Dry Season Photo (06/03/2021)



Wet Season Photo (09/10/2021)



Dry Season Photo (06/16/2022)



Wet Season Photo (09/13/2022)



Dry Season Photo (06/13/2023)



Wet Season Photo (09/07/2023)



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

Site ID	H8-01	Interpretation of Groundwater Age: Little to no evaporation, modern water during the dry season. Little to no evaporation, modern water during the wet season.
Watershed	Harshaw Creek	
Monitoring Period	10/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 140.3 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	19	

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	9.40	1303
5/24/2019	4.41	8.33	26.3	1549	12/8/2019	23.0	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								
2/7/2022	0.00	7.44	6.10	2358	9/1/2022	13.7	7.51	21.1	2049
6/24/2022	0.00	7.09	19.2	947.8	12/13/2022	140	7.31	7.50	1308
3/1/2023	79.0	7.75	15.7	1945	9/7/2023	0	6.93	25.0	2157
6/13/2023	0.00	8.65	30.1	2028	11/20/2023	80.5	7.66	19.1	1084

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		10/19/2017	No Exceedances
		12/1/2018	Arsenic
5/24/2019	Arsenic, 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		
6/24/2022	Not enough water to sample	12/13/2022	Antimony, Arsenic, Beryllium, Cadmium, Lead, Thallium
6/13/2023	No Exceedances	11/20/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/24/2022)



Wet Season Photo (09/01/2022)



Dry Season Photo (06/13/2023)



Wet Season Photo (09/07/2023)



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

Site ID	H10-01	Interpretation of Groundwater Age: Little to no evaporation, modern water during the dry season. Little to no evaporation, modern and mixed water during the wet season.
Watershed	Harshaw Creek	
Monitoring Period	10/2017 - 11/2023	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	19	

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	615.0
5/24/2019	2.25	7.62	25.0	1451	12/8/2019	183	7.62	15.2	846.0
6/25/2020	Dry				10/22/2020	Dry			
1/20/2021	Dry				9/9/2021	59.0	7.83	22.9	1025
3/23/2021	Dry				11/15/2021	Dry			
5/26/2021	Dry								
2/7/2022	Dry				9/1/2022	46.4	7.57	21.7	1040
6/24/2022	Dry				12/13/2022	159	7.74	8.90	1335
2/24/2023	241	6.97	5.70	1149	8/28/2023	Dry			
6/7/2023	Dry				11/15/2023	47.0	7.46	19.4	1725

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		10/19/2017	No Exceedances
		12/3/2018	No Exceedances
5/24/2019	Arsenic, Lead	12/8/2019	Arsenic, 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		
6/24/2022	Dry	12/13/2022	Arsenic, Cadmium, Lead, Thallium
6/7/2023	Dry	11/15/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

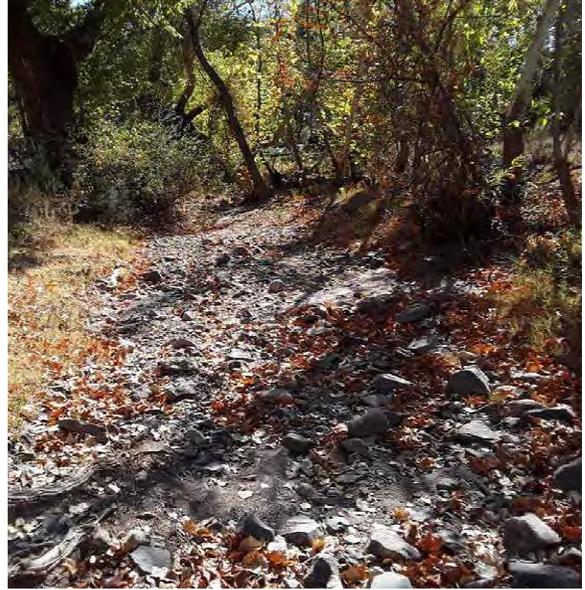
Aquatic and Vegetation Survey Findings: This site is located in a rocky, gravelly, and sandy section of Harshaw Creek with some bedrock constrictions. Riparian tree species including Fremont cottonwood (*Populus fremontii*) and Arizona sycamore (*Platanus wrightii*) dominate the overstory vegetation. 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)
<p>No photo taken.</p>	
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)



Dry Season Photo (06/24/2022)



Wet Season Photo (12/13/2022)



Dry Season Photo (06/07/2023)



Wet Season Photo (08/28/2023)



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

Site ID	H10-02	Interpretation of Groundwater Age: Little to no evaporation, modern water during the dry season. Little to no evaporation, modern to mixed water during the wet season.
Watershed	Harshaw Creek	
Monitoring Period	10/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from nearly 0 to 289 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	19	

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	851.0
6/25/2020	Dry				10/22/2020	Dry			
1/20/2021	Dry				9/9/2021	24.5	7.68	26.9	1017
3/23/2021	Dry				11/15/2021	Dry			
5/26/2021	Dry								
2/7/2022	Dry				9/1/2022	27.7	8.11	23.2	1034
6/24/2022	Dry				12/13/2022	81.7	7.75	10.0	1160
2/24/2023	289	7.64	6.20	1143	8/28/2023	Dry			
6/7/2023	Dry				11/15/2023	12.9	8.05	20.9	1679

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		10/19/2017	Lead
		12/3/2018	Dry
5/31/2019	Arsenic, Lead	12/8/2019	Arsenic, 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		
6/24/2022	Dry	12/13/2022	Antimony, Arsenic, Cadmium, Lead, Thallium
6/7/2023	Dry	11/15/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)
<p>No photo taken.</p>	
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)



Dry Season Photo (06/24/2022)



Wet Season Photo (12/13/2022)



Dry Season Photo (06/07/2023)



Wet Season Photo (08/28/2023)



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

Site ID	H16-01	Interpretation of Groundwater Age: Little to no evaporation, modern water during the wet season.
Watershed	Harshaw Creek	
Monitoring Period	11/2017 - 11/2023	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	19	

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	90.2	7.95	18.0	667.1
					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								
2/7/2022	Dry				9/14/2022	Dry			
6/24/2022	Dry				12/16/2022	Dry			
2/24/2023	Dry				8/30/2023	Dry			
6/5/2023	Dry				11/15/2023	Dry			

Water Quality Screening Level

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	12/16/2022	Dry
6/24/2022	Dry	11/15/2023	Dry
6/5/2023	Dry		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 goodingii*). 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)



Dry Season Photo (06/24/2022)



Wet Season Photo (09/14/2022)



Dry Season Photo (06/05/2023)



Wet Season Photo (08/30/2023)



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

Site ID	H16-02	Interpretation of Groundwater Age: Little to no evaporation, modern to mixed water during the dry season. Little to no evaporation, modern to mixed water during the wet season.
Watershed	Harshaw Creek	
Monitoring Period	05/2018 - 11/2023	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	19	

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	75.0	7.23	19.4	793.4	12/3/2018	5.80	7.40	16.6	712.0
5/23/2019	37.9	7.65	16.4	825.0	12/4/2019	65.6	7.59	17.0	650.0
6/9/2020	8.19	7.65	18.7	849.0	10/20/2020	<0.25	7.41	18.4	881.0
1/21/2021	Dry				9/9/2021	0.01	7.05	21.9	910.0
3/10/2021	Dry				12/2/2021	6.51	6.81	16.9	955.5
5/19/2021	Dry								
2/7/2022	1.63	6.58	13.8	983.9	9/14/2022	3.44	6.89	22.6	909.0
6/24/2022	0.00	7.09	20.6	1004	12/16/2022	5.44	6.67	14.5	972.0
2/24/2023	5.20	7.14	13.2	880.3	8/30/2023	0.00	7.06	29.1	1062
6/7/2023	5.78	7.16	18.9	995.0	11/15/2023	0.00	7.35	17.2	1216

Water Quality Screening Level

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		
6/24/2022	No Exceedances	12/16/2022	No Exceedances
6/7/2023	No Exceedances	11/15/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 (*Symphotrichum expansum*), Johnsongrass (*Sorghum halepense*), deergrass (*Muhlenbergia rigens*), and dock (*Rumex* sp.) are dominant emergent vegetation. Upland vegetation is characterized as oak (*Quercus* 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, water scorpions, belostomatids, and snails have been observed. Invasive plants noted include Johnsongrass (*Sorghum halepense*), common mullein (*Verbascum thapsus*), Bermudagrass (*Cynodon dactylon*), gummy lovegrass (*Eragrostis curtipeccellata*), 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)



Dry Season Photo (06/24/2022)



Wet Season Photo (09/14/2022)



Dry Season Photo (06/07/2023)



Wet Season Photo (08/30/2023)



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

Site ID	H16-03	Interpretation of Groundwater Age: Little to no evaporation, modern to mixed water during the dry season. Little to no evaporation, modern to mixed water during the wet season.
Watershed	Harshaw Creek	
Monitoring Period	11/2017 - 11/2023	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	20	

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	180	7.88	17.2	672.1
5/16/2018	<0.25	7.41	20.0	787.8	12/3/2018	17.6	7.70	13.8	734.0
5/24/2019	60.8	7.94	18.5	841.0	12/4/2019	23.0	7.90	16.5	643.0
6/9/2020	5.98	7.57	19.6	847.0	10/20/2020	11.3	7.56	19.2	1411
1/21/2021	8.60	7.58	11.6	979.1	9/9/2021	8.30	7.35	24.5	964.0
5/19/2021	0.45	7.15	21.9	988.8	12/2/2021	70.0	7.55	16.9	951.1
3/10/2021	8.12	7.73	14.6	955.5					
2/7/2022	12.9	7.30	13.3	977.0	9/15/2022	76.8	7.08	19.3	940.0
6/24/2022	6.70	7.26	22.4	1048	12/16/2022	95.6	7.65	12.7	1005
2/24/2023	77.1	7.45	15.1	966.0	8/30/2023	12.9	7.39	23.7	1224
6/12/2023	98.6	7.53	21.8	1044	11/15/2023	2.33	7.50	16.1	1200

Water Quality Screening Level

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		
6/24/2022	No Exceedances	12/16/2022	No Exceedances
6/7/2023	No Exceedances	11/15/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*), Bermudagrass (*Cynodon dactylon*), Lehmann lovegrass (*Eragrostis lehmanniana*), 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, water striders, and snails have been observed.

Dry Season Photo (5/16/2018)	Wet Season Photo (12/3/2018)
<p>No Photo Taken</p>	
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)



Dry Season Photo (06/24/2022)



Wet Season Photo (12/16/2022)



Dry Season Photo (06/07/2023)



Wet Season Photo (08/30/2023)



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

Site ID	HB1-01	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Humboldt Canyon	
Monitoring Period	4/2017 - 11/2023	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	21	

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	311.8	10/20/2017	1.80	3.51	18.3	301.5
5/23/2018	0.16	3.51	17.7	305.2	11/28/2018	0.40	3.90	10.7	290.0
5/28/2019	0.00	3.61	15.3	326.0	12/3/2019	29.2	3.51	7.70	161.0
6/19/2020	0.40	3.70	19.6	311.0	10/15/2020	0.30	3.99	16.4	605.0
1/13/2021	0.70	3.69	1.11	296.6	8/24/2021	Dry			
3/11/2021	1.73	3.57	12.2	299.4	11/16/2021	0.00	4.05	13.6	498.2
5/24/2021	Dry								
2/4/2022	Dry				8/29/2022	Dry			
6/21/2022	Dry				12/15/2022	Dry			
2/24/2023	Dry				8/31/2023	0.00	3.16	19.7	335.3
6/6/2023	Dry				11/13/2023	0.00	3.90	10.9	362.4

Water Quality Screening level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
4/24/2017	No Exceedances	10/20/2017	Arsenic, Mercury
5/23/2018	Mercury	11/28/2018	Copper
5/28/2019	No Exceedances	12/3/2019	No Exceedances
6/19/2020	Lead	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/13/2021	No Exceedances	11/16/2021	Too little water to sample
5/24/2021	Dry	12/15/2022	Dry
6/21/2022	Dry	11/13/2023	No Exceedances
6/6/2023	Dry		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



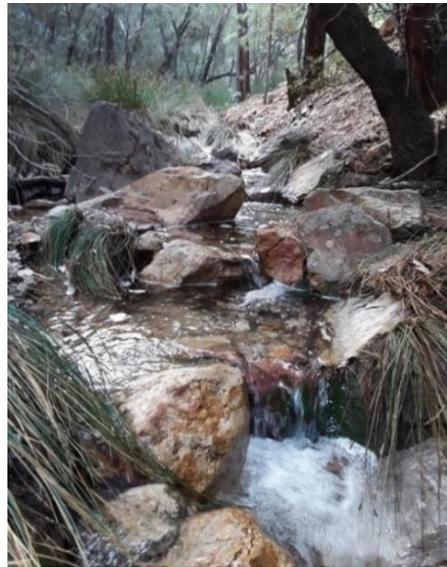
Wet Season Photo (11/28/2018)



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)



Dry Season Photo (02/04/2022)



Wet Season Photo (08/29/2022)



Dry Season Photo (06/06/2023)



Wet Season Photo (08/31/2023)



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

Site ID	HB3-01	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Humboldt Canyon	
Monitoring Period	4/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 85.0 gpm. No changes to flow are predicted at this site.
Number of Visits	21	

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	817.0
5/28/2019	0.50	3.16	26.2	947.0	12/3/2019	29.2	3.24	10.6	169.0
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	0.00	1142	8/24/2021	1.77	2.46	20.2	932.0
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					
2/4/2022	0.15	2.66	0.70	1184	8/29/2022	85.0	3.33	22.9	378.0
6/21/2022	0.10	2.94	22.0	1450	12/15/2022	26.9	2.87	5.80	580.0
2/24/2023	254	3.24	6.67	384.1	8/31/2023	3.47	2.90	20.5	875.0
6/6/2023	0.01	2.23	18.3	1282	11/13/2023	<0.01	3.02	12.7	1400

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
4/27/2017	Cadmium, Copper	10/20/2017	Cadmium, Copper
5/23/2018	Cadmium, Copper	11/28/2018	Cadmium, Copper
5/28/2019	Cadmium, Copper	12/3/2019	Copper
6/19/2020	Cadmium, Copper	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/13/2021	Cadmium, Copper	11/16/2021	Cadmium, Copper
5/24/2021	Cadmium, Copper	12/15/2022	Cadmium, Copper
6/21/2022	Cadmium, Copper, Thallium	11/13/2023	Cadmium, Copper
6/6/2023	Cadmium, Copper		Cadmium, Copper

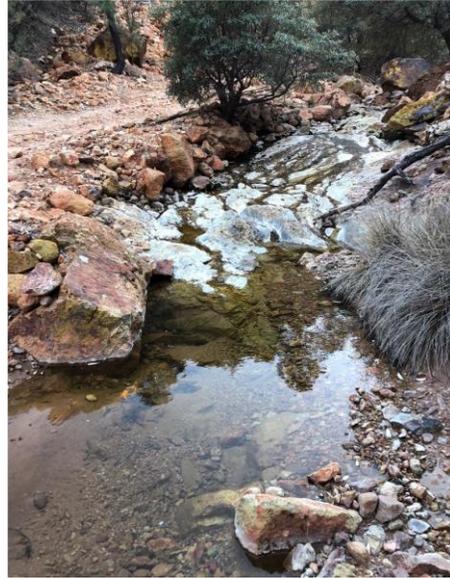
Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



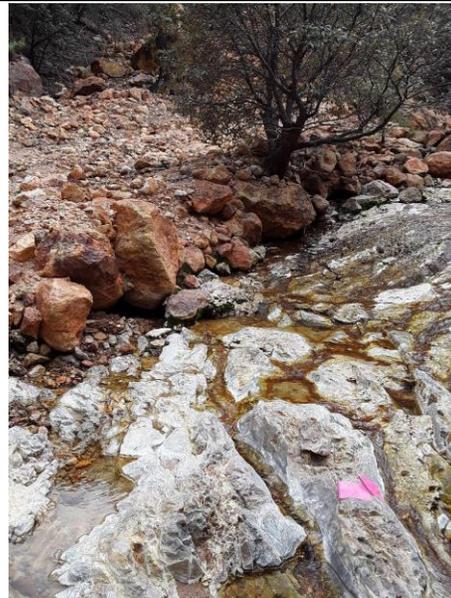
Wet Season Photo (10/15/2020)



Dry Season Photo (05/24/2021)



Wet Season Photo (08/24/2021)



Dry Season Photo (06/21/2022)



Wet Season Photo (08/29/2022)



Dry Season Photo (06/06/2023)



Wet Season Photo (08/31/2023)



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

Site ID	HB5-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Humboldt Canyon	
Monitoring Period	12/2016 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 296 gpm. No changes to flow are predicted at this site.
Number of Visits	22	

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	939.8
4/27/2017	0.00	3.11	20.8	1021	10/23/2017	0.00	3.10	13.2	835.4
5/23/2018	0.00	3.06	20.1	1002	11/28/2018	0.70	3.10	12.2	720.0
5/28/2019	<0.25	3.24	22.8	922.0	12/3/2019	34.2	3.29	10.9	388.0
6/15/2020	<0.25	3.08	32.7	834.0	10/15/2020	<0.25	2.86	19.1	1545
1/13/2021	Dry				8/24/2021	9.10	2.67	26.2	696.0
3/11/2021	1.10	3.01	14.1	996.8	11/16/2021	0.10	3.17	10.1	898.1
5/24/2021	Dry								
2/4/2022	0.01	3.10	0.00	1063	8/29/2022	155	3.23	23.5	447.0
6/21/2022	0.00	3.07	22.9	742.0	12/15/2022	22.6	3.20	3.50	668.1
2/24/2023	296	3.28	7.50	462.0	8/31/2023	1.2	2.98	23.20	941.5
6/6/2023	0.00	2.67	19.4	864.0	11/13/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		12/29/2016	Cadmium, Copper
4/27/2017	Cadmium, Copper	10/23/2017	Cadmium, Copper
5/23/2018	Cadmium, Copper	11/28/2018	Cadmium, Copper
5/28/2019	Cadmium, Copper	12/3/2019	Cadmium, Copper
6/15/2020	Beryllium, Cadmium, Copper	10/15/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/13/2021	Dry	11/16/2021	Cadmium, Copper
5/24/2021	Dry		
6/21/2022	Sample was not collected due to heavy rainfall	12/15/2022	Cadmium, Copper
6/6/2023	Cadmium, Copper	11/13/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 Chihuahuah 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)



Dry Season Photo (06/21/2022)



Wet Season Photo (08/29/2022)



Dry Season Photo (06/06/2023)



Wet Season Photo (08/31/2023)



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

Site ID	HE4-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the wet season.
Watershed	E. Fork of Harshaw Creek	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: This site has been dry during site visits except for 3 visits where flow ranged from 2.24 to 9.09 gpm.
Number of Visits	19	

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	569.1
					12/2/2018	Dry			
5/23/2019	Dry				12/4/2019	7.29	7.53	17.7	479.0
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								
1/31/2022	Dry				9/13/2022	9.09	7.37	23.4	554.0
6/14/2022	Dry				12/5/2022	Dry			
2/21/2023	Dry				8/28/2023	Dry			
6/5/2023	Dry				11/13/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/7/2017	Arsenic
		12/2/2018	Dry
5/23/2019	Dry	12/4/2019	Arsenic
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		
6/14/2022	Dry	12/5/2022	Dry
6/5/2023	Dry	11/13/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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. Invasive weeping lovegrass (*Eragrostis curvula*) has been observed. Aquatic beetles have been observed. No aquatic invertebrates or vertebrates have been observed.

<p style="text-align: center;">Dry Season Photo</p> <p style="text-align: center;">No photo taken.</p>	<p style="text-align: center;">Wet Season Photo (12/2/2018)</p> 
<p style="text-align: center;">Dry Season Photo (5/23/2019)</p> 	<p style="text-align: center;">Wet Season Photo (12/4/2019)</p> 

Dry Season Photo (7/6/2020)



Wet Season Photo (10/27/2020)



Dry Season Photo (05/19/2021)



Wet Season Photo (08/31/2021)



Dry Season Photo (06/14/2022)



Wet Season Photo (09/13/2022)



Dry Season Photo (06/06/2023)



Wet Season Photo (08/28/2023)



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

Site ID	HE7-WELL-ST-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season; little to no evaporative, modern water during the wet season.
Watershed	E. Fork of Harshaw Creek	
Monitoring Period	11/2017 - 11/2023	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	20	

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	668.4
5/16/2018	0.00	7.68	21.4	561.5	12/2/2018	0.00	9.80	10.1	311.0
5/23/2019	0.00	9.64	20.5	656.0	12/4/2019	0.00	9.20	12.1	393.0
7/6/2020	0.00	8.02	29.7	555.0	10/27/2020	0.00	8.53	15.3	1049
1/21/2021	0.00	7.46	17.9	687.6	8/31/2021	0.00	8.14	24.1	545.9
3/10/2021	0.00	8.04	13.5	661.5	11/15/2021	0.00	8.25	12.5	597.4
5/19/2021	0.00	7.82	22.1	714.2					
1/31/2022	0.00	7.39	14.5	650.4	9/9/2022	0.00	9.96	24.4	424.3
6/14/2022	0.00	10.4	30.6	511.3	12/5/2022	0.00	7.59	17.3	575.6
2/21/2023	0.00	7.64	12.6	627.7	8/28/2023	0.00	8.31	27.9	421.4
6/5/2023	0.00	7.74	26.6	613.0	11/13/2023	0.00	8.06	20.7	617.3

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/6/2017	No Exceedances
5/16/2018	No Exceedances	12/2/2018	No Exceedances
5/23/2019	No Exceedances	12/4/2019	No Exceedances
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		
6/14/2022	No Exceedances	12/5/2022	No Exceedances
6/5/2023	No Exceedances	11/13/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*) and invasive stinkgrass (*Eragrostis cilianensis*) 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)

No Photo Taken

Wet Season Photo (12/02/2018)



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)



Dry Season Photo (06/14/2022)



Wet Season Photo (09/09/2022)



Dry Season Photo (06/05/2023)



Wet Season Photo (08/28/2023)



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

Site ID	HM7-AD-01	Interpretation of Groundwater Age: Little to no evaporative, premodern water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Hermosa Canyon	
Monitoring Period	4/2017 - 11/2023	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	21	

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	411.7	10/18/2017	0.45	6.72	18.3	413.1
5/22/2018	0.00	7.49	14.1	412.1	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	412.9
3/23/2021	Dry				11/22/2021	Dry			
6/1/2021	Dry								
2/10/2022	Dry				9/14/2022	Dry			
6/17/2022	Dry				12/15/2022	Dry			
2/27/2023	Dry				9/7/2023	Dry			
6/14/2023	Dry				11/21/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
4/28/2017	No Exceedances	10/18/2017	Arsenic
5/22/2018	Arsenic	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	12/15/2022	Dry
6/17/2022	Dry	11/21/2023	Dry
6/14/2023	Dry		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/17/2022)



Wet Season Photo (09/14/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (09/07/2023)



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

Site ID	HM8-01	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the wet season.
Watershed	Hermosa Canyon	
Monitoring Period	5/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 19.04 gpm. This site has been dry during most dry season surveys suggesting the site may not be in connection with a perennial groundwater source.
Number of Visits	20	

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	448.8	10/18/2017	Dry			
5/26/2019	Dry				12/1/2018	Dry			
6/26/2020	Dry				12/10/2019	0.00	7.09	14.9	377.0
2/1/2021	Dry				10/27/2020	Dry			
3/23/2021	Dry				9/1/2021	Dry			
6/1/2021	Dry				11/22/2021	Dry			
2/10/2022	Dry				9/14/2022	Dry			
6/17/2022	Dry				12/15/2022	0.00	6.58	9.90	159.8
2/27/2023	19.04	7.16	14.1	295.5	9/7/2023	Dry			
6/14/2023	Dry				11/21/2023	Dry			

Water Quality Screening Level

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	Antimony
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		
6/17/2022	Dry	12/15/2022	Antimony, Arsenic, Lead
6/14/2023	Dry	11/21/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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.

<p align="center">Dry Season Photo</p>	<p align="center">Wet Season Photo (12/01/2018)</p>
<p align="center">No photo taken</p>	
<p align="center">Dry Season Photo (5/26/2019)</p>	<p align="center">Wet Season Photo (12/10/2019)</p>
<p align="center">No photo taken</p>	

Dry Season Photo (6/26/2020)



Wet Season Photo (10/27/2020)



Dry Season Photo (06/01/2021)



Wet Season Photo (09/01/2021)



Dry Season Photo (06/17/2022)



Wet Season Photo (09/14/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (09/07/2023)



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

Site ID	HM8-02	Interpretation of Groundwater Age: Little to no evaporative, premodern water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Hermosa Canyon	
Monitoring Period	01/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 15 gpm.
Number of Visits	21	

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)
1/12/2017	13.5	7.18	13.9	457.6	10/18/2017	0.00	7.15	19.7	517.0
5/22/2018	0.00	7.04	16.9	489.2	12/1/2018	0.00	7.20	18.7	211.0
5/24/2019	Dry				12/8/2019	15.0	7.69	13.9	350.0
6/26/2020	Dry				10/27/2020	Dry			
2/1/2021	Dry								
3/23/2021	Dry				9/1/2021	Dry			
6/1/2021	Dry				11/22/2021	Dry			
2/10/2022	Dry				9/14/2022	Dry			
6/17/2022	Dry				12/15/2022	0.00	6.50	4.80	179.7
2/27/2023	6.25	7.17	12.3	324.1	9/7/2023	Dry			
6/14/2023	Dry				11/21/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		1/12/2017	No Exceedances
		10/18/2017	Arsenic
5/22/2018	Antimony, Arsenic, Lead	12/1/2018	Arsenic
5/24/2019	Dry	12/8/2019	Antimony, Arsenic
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		
6/17/2022	Dry	12/15/2022	Antimony, Arsenic, Lead
6/14/2023	Dry	11/21/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*). Nettleleaf hackberry (*Celtis reticulata*) and alligator juniper (*Juniperus deppeana*) are also present overstory tree species. Bermudagrass (*Cynodon dactylon*) occurs.

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)



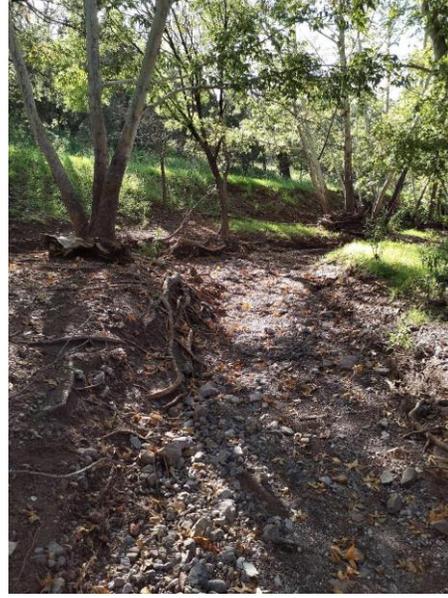
Wet Season Photo (10/27/2020)



Dry Season Photo (06/01/2021)



Wet Season Photo (09/01/2021)



Dry Season Photo (06/17/2022)



Wet Season Photo (09/14/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (09/07/2023)



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

Site ID	MW1-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the wet season.
Watershed	Mowry Wash	
Monitoring Period	12/2019 - 11/2023	Potential Impacts/Effects: This site has been dry during most 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	16	

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	379.0
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								
2/8/2022	Dry				9/14/2022	Dry			
6/17/2022	Dry				12/13/2022	0.00	6.63	1.90	68.41
2/22/2023	2.61	7.15	7.00	275.5	8/29/2023	Dry			
6/15/2023	Dry				11/17/2023	Dry			

Water Quality Screening Level

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		
6/17/2022	Dry	12/13/2022	No Exceedances
6/15/2023	Dry	11/17/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*). Aquatic beetles have been observed. No aquatic invertebrates or vertebrates have been observed at this site.

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

Dry Season Photo (06/02/2021)



Wet Season Photo (08/31/2021)



Dry Season Photo (06/17/2022)



Wet Season Photo (12/13/2022)



Dry Season Photo (06/15/2023)

Wet Season Photo (08/29/2023)



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

Site ID	MWS1-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Mowry Wash South	
Monitoring Period	5/2019 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 84 gpm.
Number of Visits	17	

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	399.0	12/5/2019	83.8	6.91	11.8	132.0
6/30/2020	Dry				10/23/2020	Dry			
1/28/2021	Dry				9/10/2021	13.5	6.81	21.9	171.0
3/25/2021	Dry				11/29/2021	Dry			
5/26/2021	Dry								
2/8/2022	Dry				9/12/2022	11.6	6.94	24.9	210.0
6/17/2022	Dry				12/8/2022	0.00	6.48	5.30	288.0
2/24/2023	50.0	6.11	4.83	176.0	8/31/2023	Dry			
6/15/2023	Dry				11/22/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/30/2019	No Exceedances	12/5/2019	No Exceedances
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		
6/17/2022	Dry	12/8/2022	No Exceedances
6/15/2023	No Exceedances	11/22/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*), Lehmann lovegrass (*Eragrostis lehmanniana*), and natalgrass (*Melinis repens*) have been observed. Aquatic invertebrates observed along this drainage include beetles, water striders, 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)



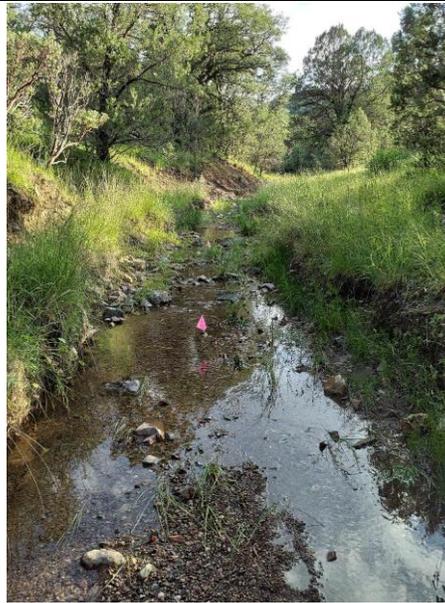
Wet Season Photo (10/23/2020)



Dry Season Photo (05/26/2021)



Wet Season Photo (09/10/2021)



Dry Season Photo (06/17/2022)



Wet Season Photo (09/12/2022)



Dry Season Photo (06/15/2023)



Wet Season Photo (08/31/2023)



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

Site ID	MWS1-02	Interpretation of Groundwater Age: Little to no evaporative, premodern water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Mowry Wash South	
Monitoring Period	05/2019 - 11/2023	Potential Impacts/Effects: No surface flow has been observed at this site during site visits, rather it exists as a still pond.
Number of Visits	17	

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	10.2	23.9	219.0	12/5/2019	0.00	6.58	9.50	135.0
6/30/2020	0.00	8.48	27.5	200.0	10/23/2020	0.00	7.27	15.4	944.0
1/28/2021	0.00	6.78	-0.78	252.4	9/10/2021	0.00	7.20	22.0	85.80
3/25/2021	0.00	7.29	9.33	292.2	11/29/2021	0.00	6.05	2.50	264.4
5/26/2021	0.00	7.14	18.8	338.4					
2/8/2022	0.00	6.68	0.10	253.0	9/12/2022	0.00	6.70	23.4	198.9
6/17/2022	0.00	7.07	19.3	450.0	12/8/2022	0.00	6.38	4.20	276.8
2/24/2023	0.00	6.10	4.30	58.3	8/31/2023	0.00	9.37	25.9	167.0
6/15/2023	0.00	6.25	17.7	250.8	11/22/2023	0.00	7.60	5.17	241.4

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/21/2019	Arsenic	12/5/2019	No Exceedances
6/30/2020	Arsenic	10/23/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/28/2021	Arsenic	11/29/2021	Arsenic
5/26/2021	Arsenic		
6/17/2022	Arsenic, Lead	12/8/2022	Arsenic
6/15/2023	Arsenic	11/22/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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.) barnyardgrass (*Echinochloa crus-galli*), Lehmann lovegrass (*Eragrostis lehmanniana*), 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)



Dry Season Photo (06/17/2022)



Wet Season Photo (09/12/2022)



Dry Season Photo (06/15/2023)



Wet Season Photo (08/31/2023)



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

Site ID	MWS1-03	Interpretation of Groundwater Age: Little to no evaporative, modern water during the wet season.							
Watershed	Mowry Wash South								
Monitoring Period	03/2021 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 32.0 gpm. Predictions will be made once additional data is obtained.							
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)
3/25/2021	0.12	7.03	5.33	403.8	9/10/2021	11.9	7.02	21.1	89.20
5/26/2021	Dry				11/29/2021	Dry			
2/8/2022	0.17	6.82	5.70	363.8	9/12/2022	0.00	6.88	21.6	187.7
6/17/2022	Dry				12/8/2022	0.31	7.15	8.90	327.7
2/24/2023	32.0	6.50	5.70	77.11	8/31/2023	0.02	7.16	27.8	298.4
6/15/2023	Dry				11/22/2023	Dry			
Water Quality Screening Level									
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			
6/17/2022	Dry				12/8/2022	No Exceedances			
6/15/2023	Dry				11/22/2023	Dry			
Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)									
<p>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, waterstriders, and backswimmers have been observed. The dominant vegetation is Madrean oak woodland, dominated by alligator juniper (<i>Juniperus deppeana</i>) and Mexican pinyon (<i>Pinus cembroides</i>). Invasive Lehmann lovegrass (<i>Eragrostis lehmanniana</i>) has been observed. Deer and javelina tracks and livestock sign have been noted.</p>									

Dry Season Photo (05/26/2021)



Wet Season Photo (09/10/2021)



Dry Season Photo (06/17/2022)



Wet Season Photo (09/12/2022)



Dry Season Photo (06/15/2023)



Wet Season Photo (08/31/2023)



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

Site ID	MWS2-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season; little to no evaporative, modern water during the wet season.
Watershed	Mowry Wash South	
Monitoring Period	5/2019 - 11/2023	Potential Impacts/Effects: Site has been dry for a majority visits, but when flowing, the site flowrate has ranged from 1.92 to 128 gpm.
Number of Visits	17	

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	785.0	12/5/2019	128	7.05	11.4	227.0
6/30/2020	Dry				10/23/2020	Dry			
1/28/2021	Dry				9/15/2021	32.6	6.98	26.2	422.0
3/25/2021	Dry				11/29/2021	Dry			
5/26/2021	Dry								
2/8/2022	Dry				9/12/2022	27.8	6.63	21.6	551.7
6/17/2022	Dry				12/8/2022	1.92	6.75	8.00	758.1
2/24/2023	80.0	6.09	7.10	221.3	8/31/2023	0.00	7.17	24.8	621.0
6/15/2023	0.00	6.64	24.2	868.1	11/22/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/21/2019	Lead	12/5/2019	No Exceedances
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		
6/17/2022	Dry	12/8/2022	Lead
6/15/2023	Lead	11/22/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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, waterstriders, and backswimmers. Canyon tree frogs (*Hyla arenicolor*) 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)



Dry Season Photo (06/17/2022)



Wet Season Photo (09/12/2022)



Dry Season Photo (06/15/2023)



Wet Season Photo (08/31/2023)



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

Site ID	PC-SP-01	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the wet season.
Watershed	Providencia Canyon	
Monitoring Period	06/2021 - 11/2023	Potential Impacts/Effects: No flow has been observed 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)
6/2/2021	Wet				9/16/2021	0.00	7.86	22.3	1769
2/9/2022	0.00	7.21	13.2	1794	12/2/2021	0.00	7.26	18.2	1774
6/15/2022	0.00	7.63	20.0	2086	9/6/2022	0.00	7.15	20.7	1308
3/1/2023	0.00	6.87	11.1	1641	12/15/2022	0.00	7.14	7.60	1420
6/14/2023	Dry				9/8/2023	0.00	7.53	20.8	1682
					11/22/2023	0.00	8.34	12.4	1680

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
6/2/2021	Unable to sample	9/16/2021	Isotope samples collected
		12/2/2021	Uranium
6/15/2022	Antimony, Arsenic, Cadmium, Copper, Lead, Uranium	12/15/2022	No Exceedances
6/14/2023	No Exceedances	11/22/2023	Arsenic, Lead, Uranium

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/15/2022)



Wet Season Photo (09/06/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (09/08/2023)



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 - 11/2023	Potential Impacts/Effects: The site has been predominantly dry with flow measure twice ranging from 0.02-0.03 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)
6/1/2021	Dry				9/16/2021	Dry			
2/9/2022	Dry				11/30/2021	Dry			
6/15/2022	Dry				9/7/2022	0.03	6.80	23.4	591.5
2/27/2023	0.02	6.97	18.6	599.6	12/7/2022	Dry			
6/14/2023	Dry				9/5/2023	Dry			
					11/16/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
6/1/2021	Dry	9/16/2021	Dry
		11/30/2021	Dry
6/15/2022	Dry	12/7/2022	Dry
6/14/2023	Dry	11/16/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*) Lehmann lovegrass (*Eragrostis lehmanniana*), and natalgrass (*Melinis repens*) occur. No aquatic herpetofauna or invertebrates have been observed.

Dry Season Photo (06/1/2021)



Wet Season Photo (09/16/2021)



Dry Season Photo (06/15/2022)



Wet Season Photo (09/07/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (09/05/2023)



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

Site ID	RM-SP-01	Interpretation of Groundwater Age: Little to no evaporative, premodern water during the dry season; little to no evaporative, modern water during the wet season.
Watershed	Red Mountain Tributary	
Monitoring Period	06/2021 - 11/2023	Potential Impacts/Effects: Flows measured at this site have ranged from 0 to 3.0 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)
5/19/2021	<0.01	7.14	20.5	2612	9/10/2021	0.01	6.32	18.9	2237
2/7/2022	0.01	7.37	9.20	2694	11/30/2021	0.00	7.96	10.2	2466
6/23/2022	0.00	7.50	19.6	5121	9/1/2022	0.01	7.68	20.8	2449
2/22/2023	0.71	6.76	6.60	2004	12/13/2022	3.00	5.93	6.20	669.1
6/12/2023	0.01	7.15	16.1	2939	8/30/2023	0.01	7.91	21.7	2584
					11/15/2023	0.01	7.19	15.8	2480

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/19/2021	No Exceedances	9/10/2021	Isotope samples collected
		11/30/2021	No Exceedances
6/23/2022	Arsenic	12/13/2022	Cadmium
6/12/2023	No Exceedances	11/15/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL) ²

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 toumeyii*). Invasive Lehmann lovegrass (*Eragrostis lehmanniana*) has been observed. Aquatic beetles have been observed. No aquatic herpetofauna has 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)



Dry Season Photo (06/23/2022)



Wet Season Photo (09/01/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/30/2023)



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

Site ID	RT-01	Interpretation of Groundwater Age: Light to moderate evaporative, modern water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Ridge Tank	
Monitoring Period	5/2019 - 11/2023	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	17	

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	87.00	12/6/2019	0.00	6.88	14.7	27.00
7/2/2020	0.00	6.83	27.1	115.0	10/2/2020	0.00	8.12	21.1	88.70
1/20/2021	0.00	8.31	5.44	113.8	8/24/2021	0.00	6.70	33.3	54.34
3/19/2021	0.00	7.54	12.9	108.2	11/17/2021	0.00	7.64	10.5	80.17
5/17/2021	0.00	6.66	14.4	144.6					
2/2/2022	0.00	6.35	8.30	70.85	9/8/2022	0.00	7.25	20.0	38.11
6/15/2022	0.00	7.60	22.9	121.5	12/6/2022	0.00	8.01	13.2	54.23
2/21/2023	0.00	8.15	9.20	59.22	8/29/2023	0.00	6.74	23.0	80.98
6/12/2023	0.00	8.33	25.9	100.6	11/22/2023	0.00	8.25	9.17	144.5

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/22/2019	Lead	12/6/2019	No Exceedances
7/2/2020	Lead	10/2/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/20/2021	No Exceedances	11/17/2021	Arsenic, Lead
5/17/2021	Lead		
6/15/2022	Arsenic, Lead	12/6/2022	No Exceedances
6/12/2023	Arsenic, Lead	11/22/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 watercress (*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, waterstriders, 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)



Dry Season Photo (06/15/2022)



Wet Season Photo (09/08/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/29/2023)



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

Site ID	SB1-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the wet season.
Watershed	Soldier Basin	
Monitoring Period	06/2021 - 11/2023	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	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)
6/2/2021	Dry				9/15/2021	0.77	6.70	22.4	646.0
					11/30/2021	Dry			
2/7/2022	Dry				9/9/2022	0.46	7.62	23.7	551.8
6/21/2022	Dry				12/16/2022	0.00	6.88	2.20	634.8
2/21/2023	0.28	7.10	8.70	809.5	8/28/2023	Dry			
6/8/2023	Dry				11/15/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
6/2/2021	Dry	9/15/2021	Isotope samples collected
		11/30/2021	Dry
6/21/2022	Dry	12/16/2022	No Exceedances
6/8/2023	Dry	11/15/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/21/2022)



Wet Season Photo (09/09/2022)



Dry Season Photo (06/08/2023)

Wet Season Photo (08/28/2023)



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

Site ID	SB1-02	Interpretation of Groundwater Age: Little to no evaporative, modern water during the wet season.
Watershed	Soldier Basin	
Monitoring Period	06/2021 - 11/2023	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	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)
6/2/2021	Dry				9/15/2021	0.01	6.87	21.9	1571
2/7/2022	Dry				11/30/2021	Dry			
6/21/2022	Dry				9/9/2022	0.07	6.43	20.2	1090
2/21/2023	0.11	6.42	10.3	1251	12/16/2022	0.00	7.78	6.50	590.6
6/8/2023	Dry				8/28/2023	0.02	6.37	30.2	1395
					11/15/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
6/2/2021	Dry	9/15/2021	Isotope samples collected
6/21/2022	Dry	11/30/2021	Dry
		12/16/2022	Not enough to sample
6/8/2023	Dry	11/15/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



Dry Season Photo (06/09/2022)



Wet Season Photo (09/09/2022)



Dry Season Photo (06/08/2023)



Wet Season Photo (08/28/2023)



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

Site ID	SC-SP-01	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Sycamore Canyon	
Monitoring Period	6/2021 - 11/2023	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	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)
6/2/2021	0.00	7.60	16.3	1033	9/16/2021	0.01	7.42	17.7	1069
2/10/2022	0.01	7.14	11.0	1072	11/30/2021	0.00	7.13	10.3	1033
6/15/2022	0.00	7.94	17.9	1141	9/6/2022	0.00	7.38	18.3	1018
3/1/2023	0.00	7.34	10.1	1014	12/7/2022	0.00	7.28	13.3	982.0
6/14/2023	0.00	5.99	19.6	1039	9/8/2023	0.00	7.34	18.3	1034
					11/22/2023	0.00	NA	NA	NA

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
6/2/2021	Uranium	11/30/2021	Uranium
6/15/2022	Uranium	12/7/2022	Uranium
6/14/2023	Uranium	11/22/2023	Unable to safely sample

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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. Goldfish were observed in a nearby cistern. Unknown mammal tracks were present in the mud.

Dry Season Photo (06/2/2021)



Wet Season Photo (09/16/2021)



Dry Season Photo (06/15/2022)



Wet Season Photo (09/06/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (09/08/2023)



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

Site ID	SNTA-01	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Sonoita Creek	
Monitoring Period	6/2018-12/2022	Potential Impacts/Effects: Flows observed at this site have ranged from 545 to 4,620 gpm (1.2 to 10 cfs).
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)
6/4/2018	2244	8.08	22.1	829.2	11/30/2018	1347	8.30	16.8	787.0
5/29/2019	1122	7.89	18.8	786.0	12/9/2019	Not Measured ¹	7.96	15.7	739.0
6/24/2020	545.0	7.93	18.7	1156	10/20/2020	4620	8.69	22.5	1133
2/4/2021	1346	8.12	15.6	817.2	9/14/2021	1950	7.95	24.1	811.0
3/24/2021	1450	8.12	15.6	847.2	12/1/2021	2217	8.00	17.3	863.6
5/27/2021	1798	8.10	21.1	850.0	9/15/2022	3888	7.77	18.9	887.0
2/11/2022	2533	7.51	10.2	922.6	Q3 2022-Property owner denied access request				
Q2 2022-Property owner denied access request					Q4 2022-Property owner denied access request				
Q1 2023-Property owner denied access request					Q3 2023-Property owner denied access request				
Q2 2023-Property owner denied access request					Q4 2023-Property owner denied access request				

Note ¹ = Flows too high to measure with flume

Water Quality Screening Level

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	No Exceedances	12/1/2021	No Exceedances
5/27/2021	No Exceedances	Q4 2022-Property owner denied access request	
Q2 2022-Property owner denied access request			
Q2 2023-Property owner denied access request		Q4 2023-Property owner denied access request	

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 beetles, waterstriders, belostomatids and damselfly.

Dry Season Photo (6/4/2018)



Wet Season Photo (11/30/2018)



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)



Dry Season Photo (02/11/2022)



Wet Season Photo (09/15/2022)



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

Site ID	SNTA-02	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Sonoita Creek	
Monitoring Period	6/2018-12/2022	Potential Impacts/Effects: Flows observed at this site have ranged from 549 to 4,620 gpm (1.2 to 10 cfs).
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)
6/4/2018	2244	8.09	22.6	826.5	11/30/2018	1347	8.20	18.2	776.0
5/29/2019	1122	7.88	19.6	789.0	12/9/2019	Not Measured ¹	7.97	15.6	739.0
6/24/2020	549.0	8.03	19.0	1137	10/20/2020	4620	8.20	22.9	693.0
2/4/2021	1346	8.12	15.6	817.9	9/14/2021	2103	7.89	24.2	816.0
3/24/2021	1450	8.10	15.8	847.3	12/1/2021	2326	7.92	18.4	861.9
5/27/2021	1798	8.17	22.0	848.1	9/15/2022	3693	7.57	20.8	888.3
2/11/2022	3037	7.86	11.9	910.3	Q3 2022-Property owner denied access request				
Q2 2022-Property owner denied access request					Q4 2022-Property owner denied access request				
Q1 2023-Property owner denied access request					Q3 2023-Property owner denied access request				
Q2 2023-Property owner denied access request					Q4 2023-Property owner denied access request				

Note ¹ = Flows too high to measure with flume

Water Quality Screening Level

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	No Exceedances	12/1/2021	No Exceedances
5/27/2021	No Exceedances	Q4 2022-Property owner denied access to site	
Q2 2022-Property owner denied access to site			
Q2 2023-Property owner denied access to site		Q4 2023-Property owner denied access to site	

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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, waterstriders, damselflies, water scorpions, and snails.

Dry Season Photo (6/4/2018)



Wet Season Photo (11/30/2018)



Dry Season Photo (5/29/2019)



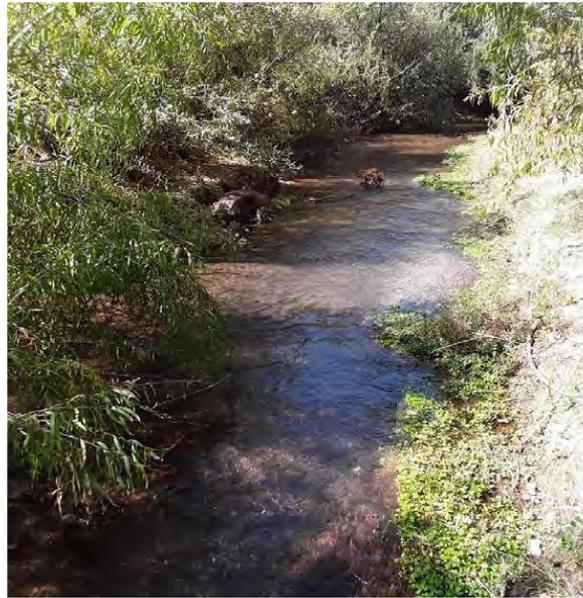
Wet Season Photo (12/9/2019)



Dry Season Photo (6/24/2020)



Wet Season Photo (10/20/2020)



Dry Season Photo (05/27/2021)



Wet Season Photo (09/14/2021)



Dry Season Photo (02/11/2022)



Wet Season Photo (09/15/2022)



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

Site ID	SNTA-TNC-01R	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Sonoita Creek	
Monitoring Period	9/2021 - 11/2023	Potential Impacts/Effects: Flows range from 760.5 to 2796 gpm. Predictions will be made once additional data is obtained.
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)
2/9/2022	2128	7.37	13.7	953.7	9/14/2021	760.5	7.35	22.9	935.0
6/15/2022	1598	7.84	17.7	930.9	12/1/2021	1362	7.84	16.4	916.5
2/28/2023	2795	7.90	13.7	904.2	9/8/2022	1780	7.82	21.3	914.0
6/7/2023	1705	7.61	17.7	930.9	12/7/2022	2212	7.75	16.2	866.0
					9/5/2023	2796	8.02	20.1	856.5
					11/15/2023	1715	7.95	16.4	858.3

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
6/15/2022	No Exceedances	9/14/2021	Isotope samples collected
		12/1/2021	No Exceedances
		12/7/2022	No Exceedances
6/7/2023	No Exceedances	11/15/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*) with an overstory of Fremont cottonwood (*Populus fremontii*). Invasive Johnsongrass (*Sorghum halepense*) and Lehmann lovegrass (*Eragrostis lehmanniana*) was observed. Fish that have been observed at this site include speckled dace (*Rhinichthys osculus*) and longfin dace (*Agosia chrysogaster*). Aquatic invertebrates observed include beetles, waterstriders, and damselflies.

Dry Season Photo (05/27/2021)

See SNTA-TNC-01

Wet Season Photo (09/14/2021)



Dry Season Photo (06/15/2022)



Wet Season Photo (09/08/2022)



Dry Season Photo (06/7/2023)



Wet Season Photo (09/05/2023)



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

Site ID	TC2-01	Interpretation of Groundwater Age: Heavy evaporative, modern water during the dry season; light to moderate evaporative, modern water during the wet season.
Watershed	Trib. To Corral Canyon	
Monitoring Period	10/2017 - 11/2023	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	19	

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	102.1
5/17/2018	0.00	8.51	26.4	161.7	12/2/2018	0.00	8.20	11.1	1466
5/26/2019	0.00	8.67	24.4	302.1	12/5/2019	0.00	7.50	11.1	46.00
6/16/2020	0.00	8.48	31.5	148.0	9/30/2020	0.00	9.21	28.1	79.00
1/11/2021	Dry				11/15/2021	0.00	7.51	18.6	134.8
3/8/2021	Dry				8/31/2022	0.00	6.40	26.6	133.0
5/17/2021	Dry				12/5/2022	0.00	7.26	17.8	96.47
1/31/2022	0.00	6.83	13.9	111.0					
6/14/2022	Dry								
2/21/2023	0.00	8.20	11.3	66.00	8/30/2023	0.00	7.67	31.4	129.8
6/5/2023	0.00	9.19	29.6	83.40	11/13/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		10/27/2017	Arsenic
5/17/2018	Arsenic	12/2/2018	Arsenic
5/26/2019	Arsenic, Lead	12/5/2019	No Exceedances
6/16/2020	Arsenic, Thallium	9/30/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/11/2021	Dry	11/15/2021	Arsenic
5/17/2021	Dry		
6/14/2022	Dry	12/5/2022	Arsenic
6/5/2023	Arsenic	11/13/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 watercress (*Marsilea mollis*), as well as perimeter vegetation dominated by non-native jungle rice (*Echinochloa colona*). Invasive plants observed include Bermudagrass (*Cynodon dactylon*), barnyardgrass (*Echinochloa crus-galli*), weeping lovegrass (*Eragrostis curvula*), 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 (*Lithobates 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)



Dry Season Photo (06/14/2022)



Wet Season Photo (08/31/2022)



Dry Season Photo (06/05/2023)



Wet Season Photo (08/30/2023)



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

Site ID	TH5-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the wet season.
Watershed	Tributary to Harshaw Creek	
Monitoring Period	12/2018 - 11/2023	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 0.37 gpm, suggesting the site is not in connection with a perennial groundwater source. No changes are predicted at this site.
Number of Visits	17	

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	5.10	155.0
5/31/2019	Dry				12/10/2019	15.0	6.83	8.00	67.00
6/29/2020	Dry				10/7/2020	Dry			
2/2/2021	0.37	7.65	8.83	136.3	9/8/2021	3.78	7.50	23.9	98.60
3/23/2021	Dry				12/1/2021	Dry			
6/3/2021	Dry				9/13/2022	0.00	7.47	27.2	264.5
2/9/2022	Dry				12/7/2022	0.08	8.38	9.00	139.5
3/1/2023	7.25	6.51	7.80	95.22	9/7/2023	0.00	6.94	22.1	475.7
6/13/2023	Dry				11/20/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
1/17/2017	No Exceedances	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		
6/16/2022	Dry	12/7/2022	No Exceedances
6/13/2023	Dry	11/20/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*). Invasive Johnsongrass (*Sorghum halepense*) and natalgrass (*Melinis repens*) occur. Aquatic invertebrates observed include beetles and boatmen. No aquatic invertebrates and no aquatic vertebrates have been observed.

Dry Season Photo	Wet Season Photo (12/3/2018)
<p>No photo taken</p>	
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)



Dry Season Photo (06/16/2022)



Wet Season Photo (09/13/2022)



Dry Season Photo (06/13/2023)



Wet Season Photo (09/07/2023)



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

Site ID	TH9-01	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the wet season.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	12/2019 - 11/2023	Potential Impacts/Effects: This site was dry during most site visits. When wet, the flow was measured from 0.85 to 12.5 gpm.
Number of Visits	16	

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	288.0
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						
2/2/2022			Dry		9/1/2022	0.85	8.20	24.9	527.8
6/16/2022			Dry		12/6/2022			Dry	
3/1/2023	12.5	8.08	12.8	326.2	9/7/2023			Dry	
6/7/2023			Dry		11/20/2023			Dry	

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		12/8/2019	Arsenic, 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	12/6/2022	Dry
6/16/2022	Dry	11/20/2023	Dry
6/7/2023	Dry		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

Aquatic and Vegetation Survey Findings: This site located within a gravelly 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*) and Lehmann lovegrass (*Eragrostis lehmanniana*). Aquatic invertebrates observed are beetles. No aquatic vertebrates have been observed.

Dry Season Photo	Wet Season Photo (12/8/2019)
<p>No photo taken</p>	
Dry Season Photo (7/14/2020)	Wet Season Photo (10/22/2020)
	

Dry Season Photo (05/24/2021)



Wet Season Photo (09/09/2021)



Dry Season Photo (06/16/2022)



Wet Season Photo (09/01/2022)



Dry Season Photo (06/07/2023)



Wet Season Photo (09/07/2023)



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

Site ID	TH11-ST-01	Interpretation of Groundwater Age: Little to no evaporative, premodern water during the dry season; little to no evaporative, premodern water during the wet season.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	5/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have remained below 0.56. No changes are predicted at this site.
Number of Visits	21	

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	651.5	10/26/2017	0.00	6.78	13.3	641.3
6/1/2018	0.00	7.08	26.0	711.1	11/30/2018	<0.25	8.50	9.80	529.0
5/30/2019	<0.25	8.07	23.3	421.0	12/9/2019	<0.25	7.27	9.90	564.0
6/23/2020	<0.25	7.61	30.7	766.0	10/13/2020	0.00	8.09	20.4	665.0
1/14/2021	<0.01	6.82	5.11	646.3	8/31/2021	0.00	7.50	21.9	816.0
5/18/2021	<0.01	7.09	24.6	730.0	11/16/2021	0.00	7.64	8.33	651.8
3/9/2021	0.00	7.50	11.3	639.7	9/6/2022	0.01	7.31	21.0	691.9
2/3/2022	0.01	6.63	1.50	657.4	12/13/2022	0.00	6.55	4.60	609.8
6/23/2022	0.00	7.27	24.7	675.3					
2/22/2023	0.01	7.37	6.40	677.0	8/30/2023	0.56	7.01	22.5	1341
6/12/2023	0.00	7.94	28.2	414.8	11/14/2023	0.00	7.35	12.5	667.3

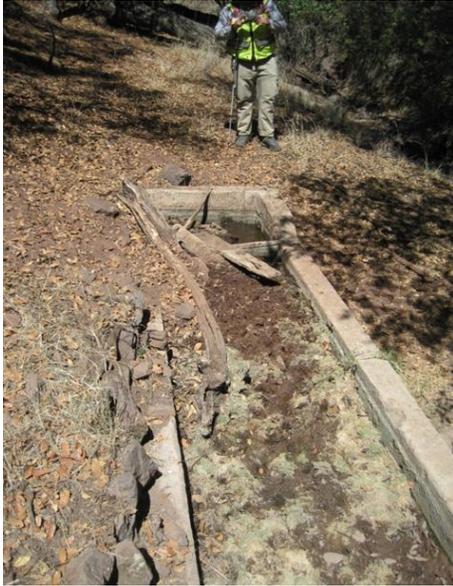
Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/3/2017	No Exceedances	10/26/2017	No Exceedances
6/1/2018	Arsenic, Cadmium, Lead	11/30/2018	No Exceedances
5/30/2019	No Exceedances	12/9/2019	No Exceedances
6/23/2020	Arsenic, Cadmium, 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	Arsenic, Lead		
6/23/2022	Arsenic	12/13/2022	No Exceedances
6/12/2023	No Exceedances	11/14/2023	Arsenic, Lead

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 and waterstriders 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)



Dry Season Photo (06/23/2022)



Wet Season Photo (09/06/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/30/2023)



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

Site ID	TH14-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season; little to no evaporative, modern water during the wet season.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	5/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 55 gpm. No changes are predicted at this site.
Number of Visits	21	

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	748.3	10/26/2017	<0.25	7.77	15.3	692.9
6/1/2018	0.00	7.96	22.0	670.1	11/30/2018	0.60	8.40	12.1	621.0
5/30/2019	0.00	8.12	2.37	518.0	12/9/2019	Not Measured ¹	7.86	13.8	500.0
6/23/2020	<0.25	8.99	28.8	561.0	10/13/2020	<0.25	7.92	24.3	735.0
1/14/2021	0.09	7.09	12.1	723.0	8/31/2021	9.20	8.06	22.2	612.0
3/9/2021	0.04	7.70	9.17	760.6	11/16/2021	0.05	7.58	8.78	719.1
5/18/2021	0.00	7.82	22.2	981.4	9/6/2022	2.36	8.18	23.7	704.2
2/3/2022	0.01	6.96	0.80	727.2	12/13/2022	5.00	7.05	7.70	229.2
6/23/2022	0.00	7.71	25.2	414.4					
2/22/2023	55.0	8.01	8.20	509.8	8/30/2023	0.00	8.16	28.2	528.4
6/12/2023	0.22	7.62	24.0	617.3	11/14/2023	0.00	7.31	11.8	1387

Note ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/3/2017	No Exceedances	10/26/2017	No Exceedances
6/1/2018	Arsenic	11/30/2018	No Exceedances
5/30/2019	No Exceedances	12/9/2019	No Exceedances
6/23/2020	Arsenic	10/13/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/14/2021	Arsenic	11/16/2021	No Exceedances
5/18/2021	Arsenic		
6/23/2022	Arsenic	12/13/2022	No Exceedances
6/12/2023	No Exceedances	11/14/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 (*Dasyliion wheeleri*), green sprangletop (*Leptochloa dubia*), and Gentry yucca (*Yucca madrensis*). Non-native rabbitsfoot grass (*Polypogon monspeliensis*) and invasive Lehmann lovegrass (*Eragrostis lehmanniana*) and barnyardgrass (*Echinochloa crus-galli*) have been observed. Aquatic beetles, boatmen, snails, water scorpions, damselflies, backswimmers, and dragonflies have been observed along this portion of the drainage. Canyon treefrogs (*Hyla arenicolor*) 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)



Dry Season Photo (06/23/2022)



Wet Season Photo (09/06/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/30/2023)



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

Site ID	TH15-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season; little to no evaporative, modern water during the wet season.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	11/2018 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 75.1 gpm. No changes are predicted at this site.
Number of Visits	18	

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	623.0
5/24/2019	0.00	7.45	17.8	682.0	12/8/2019	Not Measured ¹	8.08	11.8	422.0
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	589.0
3/9/2021	0.04	6.95	12.6	1750	11/16/2021	0.07	6.83	15.6	1734
5/18/2021	Dry				9/6/2022	3.40	7.01	21.8	544.6
2/3/2022	0.16	6.52	13.2	1410	12/13/2022	20.0	7.07	8.22	368.8
6/23/2022	Dry								
2/22/2023	75.1	7.17	8.80	619.8	8/30/2023	0.54	6.89	21.0	915.8
6/12/2023	1.51	7.06	19.9	720.7	11/14/2023	Dry			

Note ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/30/2018	Arsenic
5/24/2019	Arsenic	12/8/2019	Arsenic
6/23/2020	Arsenic	10/13/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/14/2021	Dry	11/16/2021	Arsenic, Uranium
5/18/2021	Dry		
6/23/2022	Dry	12/13/2022	No Exceedances
6/12/2023	Arsenic	11/14/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 been 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)



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)



Dry Season Photo (06/23/2022)



Wet Season Photo (12/13/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/30/2023)



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

Site ID	TH16-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the wet season.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	12/2019 - 11/2023	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	15	

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)
6/23/2020			Dry		12/8/2019	10.0	7.98	12.3	393.0
1/14/2021			Dry		10/8/2020			Dry	
5/18/2021			Dry		8/30/2021			Dry	
2/7/2022			Dry		12/2/2021			Dry	
6/23/2022			Dry		9/1/2022			Dry	
2/22/2023	0.55	7.47	7.22	248.1	12/14/2022	0.80	6.54	3.60	1412
6/14/2023			Dry		8/30/2023			Dry	
					11/15/2023			Dry	

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
6/23/2020	Dry	12/8/2019	No Exceedances
1/14/2021	Dry	10/8/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
5/18/2021	Dry	12/2/2021	Dry
		12/14/2022	No Exceedances
6/23/2022	Dry	11/15/2023	Dry
6/14/2023	Dry		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)☒

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 horsetweed (*Conyza canadensis*) and non-native Mexican tulip poppy (*Hunnemannia fumariifolia*).

Dry Season Photo	Wet Season Photo (12/8/2019)
<p>See TH16-AD-01</p>	
Dry Season Photo (6/23/2020)	Wet Season Photo (10/8/2020)
	

Dry Season Photo (05/18/2021)



Wet Season Photo (08/30/2021)



Dry Season Photo (06/23/2022)



Wet Season Photo (12/14/2022)



Dry Season Photo (5/14/2023)



Wet Season (8/30/2023)



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

Site ID	TH16-AD-01	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the dry season; little to no evaporative, modern water during the wet season.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	11/2017 - 5/2019	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to <0.25 gpm. No changes are predicted at this site.
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)
					11/3/2017	<0.25	2.74	9.50	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					

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/3/2017	Arsenic, Beryllium, Cadmium, Copper, Fluoride, Lead, Uranium
5/21/2018	Only an isotope sample was collected due to low sample volume	11/30/2018	Antimony, Arsenic, Beryllium, Cadmium, Copper, Fluoride, Selenium, Uranium
5/24/2019	Antimony, Arsenic, Beryllium, Cadmium, Copper, Fluoride, Selenium, Uranium		

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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

See TH16-01

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

Site ID	TH17-01	Interpretation of Groundwater Age: Little to no evaporative, premodern water during the dry season; little to no evaporative, premodern water during the wet season.
Watershed	Tributary to Harshaw Creek	
Monitoring Period	1/2021 - 11/2023	Potential Impacts/Effects: Flow has been observed at this site to range from 0.06 to 32.28 gpm. Predictions will be made once additional data is obtained.
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)
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	9/1/2022	0.16	6.80	23.1	1342
2/7/2022	0.07	7.52	6.06	1311	12/14/2022	11.10*	7.35	4.44	471.5
6/23/2022	0.06	6.53	26.3	1295					
2/22/2023	32.28*	6.90	13.8	1290	8/30/2023	0.08	6.57	22.4	1341
6/14/2023	0.13	6.21	21.1	1274	11/15/2023	0.01	6.79	20.1	1373

*Flow within the channel from upstream and the spring. This is not the flow from the spring itself.

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
1/14/2021	Arsenic, Lead	12/2/2021	No Exceedances
5/18/2021	Arsenic		
6/23/2022	Arsenic	12/14/2022	No Exceedances
6/14/2023	Arsenic	11/15/2023	Arsenic

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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, belostomatids, 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)



Dry Season Photo (06/23/2022)



Wet Season Photo (09/01/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (08/30/2023)



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

Site ID	TH21-WELL-ST-01	Interpretation of Groundwater Age: Heavy evaporative, modern water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Trib. To Harshaw Creek	
Monitoring Period	11/2017 - 11/2023	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	20	

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	185.0
5/24/2019	Dry				12/8/2019	0.00	8.50	13.6	919.0
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	206.6
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	9/1/2022	0.00	7.98	32.2	661.3
2/3/2022	0.00	8.18	3.90	1545	12/14/2022	0.00	8.12	8.10	1085
6/23/2022	0.00	8.05	28.6	892.0					
2/22/2023	0.00	8.21	8.22	1836	8/31/2023	0.00	8.26	23.4	3512
6/14/2023	0.00	8.35	21.5	3052	11/14/2023	0.00	8.44	15.4	2971

Note ¹ = Temperature not measured due to instrument malfunction

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/3/2017	No Exceedances
5/21/2018	No Exceedances	11/30/2018	Arsenic, Beryllium, Lead
5/24/2019	No Exceedances	12/8/2019	Arsenic, Cadmium
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	No Exceedances
5/18/2021	Dry		
6/23/2022	Beryllium, Cadmium	12/13/2022	No Exceedances
6/14/2023	Arsenic	11/14/2023	Arsenic

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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)



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)



Dry Season Photo (06/23/2022)



Wet Season Photo (09/01/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (08/31/2023)



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

Site ID	TH24-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season; little to no evaporative, modern water during the wet season.
Watershed	Trib. to Harshaw Creek	
Monitoring Period	11/2017 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 gpm to 166 gpm.
Number of Visits	20	

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	354.0
5/24/2019	12.0	7.05	20.0	1871	12/8/2019	109.0	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, insufficient water for sample				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				9/6/2022	0.97	6.73	27.4	2094
2/3/2022	0.05	5.31	10.8	2090	12/13/2022	87.1	7.36	11.0	980.5
6/23/2022	0.00	4.43	30.2	2205					
2/22/2023	166	7.15	8.60	1293	8/28/2023	0.00	5.48	23.9	2162
6/14/2023	1.61	7.32	23.9	2078	11/14/2023	0.00	4.90	15.9	2227

Note ¹ = Temperature not measured due to instrument malfunction

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		11/3/2017	No Exceedances
5/21/2018	No Exceedances	11/30/2018	Arsenic, Beryllium, Lead
5/24/2019	No Exceedances	12/8/2019	Arsenic, Cadmium
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	No Exceedances
5/18/2021	Dry		
6/23/2022	Beryllium, Cadmium	12/13/2022	No Exceedances
6/14/2023	No Exceedances	11/14/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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*). Aquatic beetles, boatmen, belostomatids, water scorpions, and dragonflies have been observed. No aquatic vertebrates have been observed along drainage.

Dry Season Photo (5/21/2018)



Wet Season Photo (11/30/2018)



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)



Dry Season Photo (06/23/2022)



Wet Season Photo (12/13/2022)



Dry Season Photo (06/14/2023)



Wet Season Photo (08/28/2023)



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

Site ID	TNC-Cienega Spring	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the wet season.
Watershed	Sonoita Creek	
Monitoring Period	9/2021 - 11/2023	Potential Impacts/Effects: Flows range from 9.28 to 35.2 gpm. Predictions will be made once additional data is obtained.
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)
					9/14/2021	10.5	6.93	19.6	939.0
					12/1/2021	19.4	6.73	18.2	867.9
2/9/2022	27.3	6.39	17.2	872.5	9/8/2022	35.2	6.81	20.2	945.1
6/15/2022	24.9	6.56	18.5	962.9	12/7/2022	19.6	6.57	17.7	919.3
2/28/2023	22.2	6.71	14.8	944.8	9/5/2023	15.0	7.06	19.3	966.3
6/7/2023	9.29	6.50	18.5	929.6	11/15/2023	7.70	6.99	18.8	967.3

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
		9/14/2021	Isotope sample collected
		12/1/2021	No Exceedances
6/15/2022	No Exceedances	12/7/2022	No Exceedances
6/7/2023	No Exceedances	11/15/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 Himalayan blackberry (*Rubus discolor*), velvet ash (*Fraxinus velutina*), and Goodding's willow (*Salix gooddingii*). Invasive Johnsongrass (*Sorghum halepense*) occurs. Aquatic beetles have been observed. An adult red-spotted toad (*Anaxyrus punctatus*) has been observed.

Dry Season Photo	Wet Season Photo (09/14/2021)
<p>N/A</p>	
Dry Season Photo (06/15/2022)	Wet Season Photo (12/07/2022)
	

Dry Season Photo (06/07/2023)



Wet Season Photo (09/05/2023)



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

Site ID	WC1-01	Interpretation of Groundwater Age: Light to moderate evaporative, modern water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Washington Camp	
Monitoring Period	5/2019 - 11/2023	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	17	

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	7.80	139.0
7/1/2020	Dry				10/2/2020	Dry			
1/27/2021	0.06	5.89	0.50	855.9	9/7/2021	0.51	6.29	22.2	609.0
3/22/2021	Dry				11/29/2021	Dry			
5/20/2021	Dry				9/7/2022	0.00	6.76	16.1	256.8
2/2/2022	Dry				12/6/2022	0.00	6.53	8.89	467.4
6/16/2022	Dry								
2/22/2023	0.40	5.49	4.20	926.2	8/29/2023	Dry			
6/12/2023	Dry				11/17/2023	Dry			

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

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/23/2019	Beryllium	12/9/2019	Arsenic, Lead
		7/1/2020	Dry
		10/2/2020	Wet season 2020 samples were not collected due to Covid-19 restrictions
1/27/2021	No Exceedances	11/29/2021	Dry
5/20/2021	Dry		
6/16/2022	Dry	12/6/2022	Not enough water to sample
6/12/2023	Dry	11/17/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

Aquatic and Vegetation Survey Findings: This seep is located at an 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.

<p align="center">Dry Season Photo (5/23/2019)</p>	<p align="center">Wet Season Photo (12/9/2019)</p>
	
<p align="center">Dry Season Photo</p>	<p align="center">Wet Season Photo (10/2/2020)</p>
<p align="center">No photo taken</p>	

Dry Season Photo (05/20/2021)



Wet Season Photo (09/07/2021)



Dry Season Photo (06/16/2022)



Wet Season Photo (09/07/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/29/2023)



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

Site ID	WC2-01	Interpretation of Groundwater Age: Little to no evaporative, mixed water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Washington Camp	
Monitoring Period	5/2019 - 11/2023	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	17	

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	454.0	12/6/2019	32.1	6.72	12.8	177.0
7/1/2020	0.00	6.78	22.5	428.0	10/1/2020	0.00	7.02	20.7	465.0
1/27/2021	0.00	6.63	2.83	606.8	9/15/2021	2.66	7.05	26.6	207.0
3/22/2021	0.00	7.04	10.6	562.1	11/29/2021	0.00	6.93	13.8	510.9
5/20/2021	Dry				9/8/2022	0.47	6.41	18.9	277.7
2/2/2022	0.00	6.63	8.20	534.7	12/6/2022	Dry			
6/16/2022	Dry								
2/22/2023	2.97	7.18	5.60	239.2	8/29/2023	Dry			
6/12/2023	Dry				11/17/2023	Dry			

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/21/2019	No Exceedances	12/6/2019	No Exceedances
7/1/2020	No Exceedances	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	12/6/2022	Dry
6/16/2022	Dry		
6/12/2023	Dry	11/17/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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 siltkassel (*Garrya wrightii*). Overstory vegetation is dominated by Arizona sycamore (*Platanus wrightii*), a preferential riparian tree species, and oak (*Quercus* spp.). Invasive Bermudagrass (*Cynodon dactylon*) occurs. 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)



Dry Season Photo (06/16/2022)



Wet Season Photo (09/08/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/28/2023)



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

Site ID	WC2-02	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season; little to no evaporative, modern water during the wet season.
Watershed	Washington Camp	
Monitoring Period	5/2019 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 41.6 gpm. No changes are predicted at this site.
Number of Visits	17	

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	866.0	12/9/2019	Not Measured ¹	6.19	10.1	285.0
7/1/2020	Dry				10/1/2020	Dry			
1/27/2021	Dry				9/7/2021	41.6	6.38	25.9	296.1
3/22/2021	Dry				11/29/2021	Dry			
5/20/2021	Dry				9/7/2022	0.48	5.25	18.9	317.7
2/2/2022	Dry				12/6/2022	0.00	5.68	8.00	492.9
6/16/2022	Dry								
2/22/2023	2.56	5.13	4.10	438.4	8/29/2023	Dry			
6/12/2023	Dry				11/17/2023	Dry			

Note ¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/21/2019	Beryllium	12/9/2019	No Exceedances
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	12/6/2022	Not enough water to sample
6/16/2022	Dry		
6/12/2023	Dry	11/17/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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. Invasive Lehmann lovegrass (*Eragrostis lehmanniana*), barnyardgrass (*Echinochloa crus-galli*), and natalgrass (*Melinis repens*) have been observed. Aquatic invertebrates observed are backswimmers. Aquatic vertebrates observed are tadpoles of an unidentified species.

Dry Season Photo (5/21/2019)



Wet Season Photo (12/9/2019)



Dry Season Photo (7/1/2020)



Wet Season Photo (10/1/2020)



Dry Season Photo (05/20/2021)



Wet Season Photo (09/07/2021)



Dry Season Photo (06/16/2022)



Wet Season Photo (09/07/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/29/2023)



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

Site ID	WC2-03	Interpretation of Groundwater Age: Little to no evaporative, modern water during the dry season; little to no evaporative, mixed water during the wet season.
Watershed	Washington Camp	
Monitoring Period	5/2019 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from 0 to 88.9 gpm.
Number of Visits	17	

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	243.0	12/9/2019	Not Measured ¹	6.77	9.90	183.0
7/1/2020	0.00	7.44	25.6	238.0	10/1/2020	0.00	8.58	24.6	114.0
1/27/2021	0.82	6.33	0.61	72.10	9/7/2021	88.9	6.84	26.4	146.4
3/22/2021	0.00	10.2	15.6	136.7	11/29/2021	0.00	8.07	9.17	308.6
5/20/2021	0.00	7.60	19.5	303.5	9/7/2022	0.00	7.57	21.3	145.0
2/2/2022	0.00	7.95	6.11	95.93	12/6/2022	0.00	6.56	8.61	60.85
6/16/2022	Dry								
2/22/2023	33.7	5.81	4.40	336.7	8/29/2023	0.00	6.60	29.4	121.9
6/12/2023	Dry				11/17/2023	0.00	6.93	12.2	220.6

Notes¹ = Flows too high to measure with conventional methods

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/21/2019	No Exceedances	12/9/2019	No Exceedances
		7/1/2020	No Exceedances
		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	Unable to sample		
6/16/2022	Dry	12/6/2022	No Exceedances
2/22/2023	No Exceedances	8/29/2023	No Exceedances
6/12/2023	Dry	11/17/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

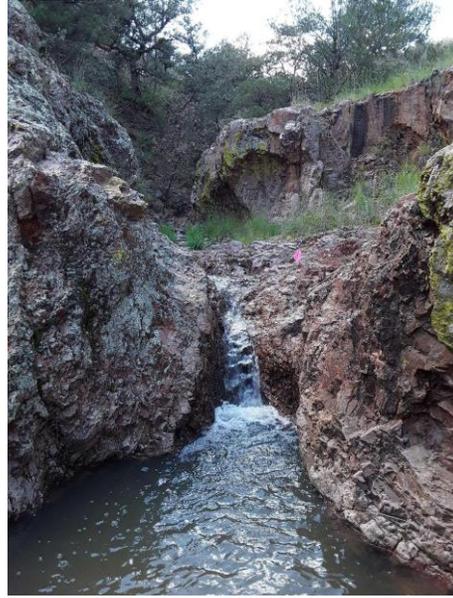
Aquatic and Vegetation Survey Findings: Seep is located at a bedrock constriction in Finley and Adams Canyon where a plunge pool is present at the base of the bedrock. The plunge pool does not support emergent or perimeter vegetation. Within the drainage, understory vegetation is sparse, dominated by 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*), barnyardgrass (*Echinochloa crus-galli*), and natalgrass (*Melinis repens*). Aquatic invertebrates observed include beetles, boatmen, backswimmers, and waterstriders. Aquatic vertebrates observed are tadpoles and metamorphs of an unidentified species. Deer tracks have been noted during some visits.

<p align="center">Dry Season Photo (5/21/2019)</p>	<p align="center">Wet Season Photo (12/9/2019)</p>
	
<p align="center">Dry Season Photo</p>	<p align="center">Wet Season Photo (10/1/2020)</p>
<p align="center">No photo taken</p>	

Dry Season Photo (05/20/2021)



Wet Season Photo (09/07/2021)



Dry Season Photo (06/16/2022)



Wet Season Photo (09/07/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (09/29/2023)



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

Site ID	WC2-04	Interpretation of Groundwater Age: Little to no evaporative, premodern water during the dry season; little to no evaporative, modern water during the wet season.
Watershed	Washington Camp	
Monitoring Period	03/2021 - 11/2023	Potential Impacts/Effects: Flows observed at this site have ranged from less than 0.01 to 0.09 gpm. Predictions will be made once additional data is obtained.
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)
3/22/2021	0.04	6.73	12.2	240.5	9/7/2021	0.09	6.41	29.2	242.2
5/20/2021	<0.01	7.13	19.6	255.4	11/29/2021	0.04	6.69	20.6	255.0
2/2/2022	0.02	7.08	4.61	253.7	9/7/2022	0.04	6.58	17.0	230.1
6/16/2022	0.01	6.68	21.2	497.7	12/6/2022	0.02	6.18	13.0	239.5
2/22/2023	0.01	6.53	4.20	197.0	8/29/2023	0.08	5.92	32.9	209.8
6/12/2023	0.04	6.77	17.7	250.9	11/17/2023	0.02	6.67	14.0	274.1

Water Quality Screening Level

Dry Season		Wet Season	
Date	Parameter	Date	Parameter
5/20/2021	No Exceedances	9/7/2021	Isotope sample collected
		11/29/2021	No Exceedances
6/16/2022	Arsenic	12/6/2022	No Exceedances
6/12/2023	No Exceedances	11/17/2023	No Exceedances

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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. Invasive Bermudagrass (*Cynodon dactylon*) and barnyardgrass (*Echinochloa crus galli*) occur. 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)



Dry Season Photo (06/16/2022)



Wet Season Photo (09/07/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/29/2023)



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

Site ID	WG2-01	Interpretation of Groundwater Age: Little to no evaporative, modern water during the wet season.
Watershed	Washington Gulch	
Monitoring Period	12/2019 - 11/2023	Potential Impacts/Effects: This site has been dry during most site visits, where flow was measured from 5.45 to 42.8 gpm.
Number of Visits	16	

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	42.8	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		9/6/2022	5.45	8.48	25.0	870.3
2/2/2022			Dry		12/13/2022	Dry			
6/15/2022			Dry						
2/21/2023			Dry		8/29/2023	Dry			
6/12/2023			Dry		11/17/2023	Dry			

Water Quality Screening Level

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	12/13/2022	Dry
6/15/2022	Dry	8/29/2023	Dry
2/21/2023	Dry		
6/12/2023	Dry	11/17/2023	Dry

Reference Table 1 for EPA Primary Maximum Contaminant Levels (MCL)

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. Invasive natalgrass (*Melinis repens*) occurs. Aquatic beetles have been observed. No aquatic invertebrates or vertebrates have been observed at this site.

<p align="center">Dry Season Photo</p>	<p align="center">Wet Season Photo (12/6/2019)</p>
<p align="center">Photo not taken</p>	
<p align="center">Dry Season Photo</p>	<p align="center">Wet Season Photo (10/2/2020)</p>
<p align="center">Photo not taken</p>	

Dry Season Photo (05/17/2021)



Wet Season Photo (08/24/2021)



Dry Season Photo (06/16/2022)



Wet Season Photo (09/06/2022)



Dry Season Photo (06/12/2023)



Wet Season Photo (08/29/2023)

