Version 3.0

April 21, 2020

Prepared for:

RESOLUTION COPPER

Superior, Arizona

Spring and Seep Catalog

Resolution Copper Project Area

Upper Queen Creek, Devils Canyon, Mineral Creek, Dripping Springs Wash Watersheds

Prepared by:

WestLand Resources, Inc.
Engineering and Environmental Consultants

MONTGOMERY & ASSOCIATES
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SPRING AND SEEP CATALOG
Resolution Copper Project Area
Upper Queen Creek, Devils Canyon, Mineral Creek, and Dripping Springs Wash Watersheds

DATE: April 21, 2020 VERSION: 3.0

INTRODUCTION

This catalog has been prepared to summarize available information for selected springs and seeps in the Upper Queen Creek, Devils Canyon, Mineral Creek, and Dripping Springs Wash watersheds (UQC/DC/MC/DSW). The springs and seeps included in this catalog were selected based on proximity to planned facilities as proposed by Resolution Copper (RC) for the Resolution mine project. The catalog was prepared by Montgomery & Associates (M&A) and WestLand Resources, Inc. (WRI) on behalf of RC.

Identification of springs and seeps in the UQC/DC/MC/DSW watersheds was accomplished as part of ongoing hydrological and biological baseline studies conducted by RC consultants and RC personnel during the period 2002 to present. Many springs/seeps were targeted for field verification based on locations shown on United States Geological Survey (USGS) topographic maps, or available in Arizona Department of Water Resources (ADWR) and Arizona State Land Department (ASLD) databases. Additional springs were identified during discussions with local ranchers and stakeholders. The remaining springs and seeps were identified during field transects along with analysis of high-resolution satellite imagery and aerial photography.

Sixteen springs and seeps from the UQC/DC/MC watersheds were identified as Groundwater Dependent Ecosystems (GDEs) through the NEPA process (M&A 2019). As part of the RC Monitoring and Mitigation Plan (M&A 2019), each spring will be surveyed on a quarterly basis through 2020. **Table 1** shows the springs selected as GDEs.

TABLE 1. GROUNDWATER DEPENDENT ECOSYSTEM SPRINGS (GDEs)	
WATERSHED	SPRING NAME
Queen Creek	Bitter Spring
	Bored Spring
	Hidden Spring
	Iberri Spring
	Kanes Spring
	McGinnel Mine Spring
	McGinnel Spring
	No Name Spring
	Rock Horizontal Spring
	Walker Spring
Devils Canyon	DC 4.1E
	DC 6.1E
	DC 6.6W
	DC 8.2W
Mineral Creek	Government Springs
	MC-3.4W

Twenty-three potential springs have been identified in the area of the proposed Skunk Camp Tailings Site Facility (TSF). Twenty of them have been surveyed; three were not located, despite significant effort to identify springs. Of the twenty, fifteen have been identified as relevant to the project, because of their persistence, distance and elevation relative to the TSF. These springs will continue to be monitored and surveyed on a quarterly basis through 2020. **Table 2** shows the springs identified in the Skunk Camp study area.

TABLE 2. SKUNK CAMP AREA SPRINGS

WATERSHED	STATUS	SPRING NAME
Dripping Springs Wash	Verified - Quarterly Monitoring	Looney Spring
		Skunk Spring
		Haley Spring
		Dry Spring
		Big Springs
		Mine Spring
		Well Spring
		Armstrong Spring
		Dripping Spring
		Hot Rod Spring
		Elkins Spring
	Verified – Discontinued Monitoring	Woodchopper Spring
		Cockleburr Spring
		Stone Cabin Spring
		Stone Cabin Box Spring
	Unverified – Not Found	Spirit Spring
		Seger Spring
		Dripping Springs
Mineral Creek	Verified - Quarterly Monitoring	Sump Spring
		Laguna Spring
		Walnut Spring
		Indian Spring
	Verified – Discontinued Monitoring	Chimney Spring

Spring locations are shown on **Figure 1**. Springs and seeps added to this catalog are labelled in purple. These springs have been visited and cataloged by RC and its consultants. In several cases, no active spring was found at the locations provided in public databases. In most cases, spring location coordinates differed from those provided in public databases. Field-verified location information is given for each spring, where possible.

For each catalog entry, there are 4 sections, which are described below:

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

- Naming convention and mapping history

- Georeference data including location coordinates and elevation
- Administrative
- General hydrographic and hydrologic information
- Spring classification details (based on classification approaches described by Springer and Stevens (2009) and Stevens, et.al. (2016)
- Description of existing infrastructure, if present.

Section 2 – Hydrological Observations: Section 2 provides a summary of observations by WRI, M&A, GAI, and RC during baseline hydrological studies for RC. It includes observations of flow characteristics, or presence of water. Available field water quality parameters are also provided, when obtained.

Section 3 – Biological Observations: Provides a summary of observations by WRI during biological surveys, including general site characteristics, and specific observations of flora and fauna from each field visit.

Section 4 – Photographs: Provides photographs showing some of the hydrological and biological features for each site.

Primary public sources of information for springs in the UQC/DC/MC/DSW study area include:

- *Arizona Land Resource Information System (ALRIS) database:* Springs and seeps reported in the ALRIS database include data from the USGS Geonames database and the USGS Digital Line Graphs (DLGs).
- *ADWR Surface Water Documents database:* This database includes water rights filings for diversion and beneficial use of surface water, including perennial and intermittent flow in rivers and streams, ephemeral runoff, lakes and ponds, stock tanks, and springs.

This spring and seep catalog is considered a work in progress. As additional springs and/or seeps are identified in locations relevant to the project, they will be added to this catalog.

REFERENCES

Montgomery & Associates, 2019, **Monitoring and Mitigation Plan for Groundwater Dependent Ecosystems and Water Wells, Resolution Copper Co. Pinal County, Arizona:** Report prepared for Resolution Copper Company, April 12, 2019.

Springer, A.E., and L.E. Stevens, 2009, **Spheres of Discharge of Springs:** in Hydrogeology Journal 17:83-93.

Stevens, L.E., J.D. Ledbetter, A.E. Springer, C. Campbell, L. Misztal, M.Joyce, and G. Hardwick, 2016, **Arizona Springs Restoration Handbook:** Spring Stewardship Institute, Museum of Northern Arizona, Flagstaff, Arizona, and Sky Island Alliance, Tucson, Arizona.

ACRONYMS AND ABBREVIATIONS

ADWR – Arizona Department of Water Resources
ALRIS – Arizona Land Resource Information System
ASLD – Arizona State Land Department
DLG – Digital Line Graphs
GAI – Golder Associates
GWSI – Groundwater Site Inventory
HUC – Hydrologic Unit Code
M&A – Montgomery & Associates
RC – Resolution Copper
USFS – United States Forest Service
USGS – United States Geological Survey
UTM – Universal Transverse Mercator
WRI – WestLand Resources, Inc.

gpm – gallons per minute
m – meters
mg/L – milligrams per liter
µS/cm – microSiemens per centimeter

R. 10 E. | R. 11 E. | R. 12 E. | R. 13 E. | R. 14 E. | R. 15 E.

T. 02 N. | T. 01 N. | T. 01 S. | T. 02 S. | T. 03 S. | T. 04 S.

Barge Creek 0601060107
Tortilla Creek 150601060106
Fish Creek 150601060105
West Fork Pinto Creek 150601030702
Upper Pinto Creek 150601030703
Miami Wash 150601030603
Pinto Creek
Whitlow Canyon 150501000801
Haunted Canyon 150601030701
Bloody Tanks Wash 150601030602
Hewitt Canyon 150501000404
Potts Canyon 150501000403
Middle Queen Creek (Local Drainage) 150501000809
Silver King Wash-Queen Creek 150501000402
Upper Queen Creek Watershed
Devil's Canyon Watershed
Devils Canyon 150501000205
Lyons Fork 150501000204
PINAL COUNTY
GILA COUNTY
Alamo Canyon-Queen Creek 150501000405
Superior
Superior Tank 150501000901
Mineral Creek Watershed
Upper Mineral Creek 150501000206
Deep Well Tank 150501000704
Arnett Creek 150501000401
Upper Dripping Spring Wash 150501000106
Cottonwood Canyon 150501000703
Lower Mineral Creek 150501000207
New Tank 150501000701
Box Canyon-Gila River 150501000309
Walnut Canyon 150501000302
China Wash-Gila River 150501000702
Zelleweger Wash-Gila River 150501000303
Dripping Springs Watershed

Mesquite Spring
Black Spring
Maverick Spring
Rattlesnake Spring2
Eagle Spring
Canyon Spring
Millsite Spring
Unnamed Spring (Roblas)
Mud Spring
Rattlesnake Spring
Cedar Horizontal Spring
Javelina Spring (Roblas)
Peacock Spring
Campsite Spring
Byous Spring
Rock Horizontal Spring
Oak Spring
Bee Tree Spring
Upper Queen Creek Spring
Fortuna Spring
Quail Spring
#5 Spring
Silverona Spring
Tunnel Spring
Javelina Spring (Upper Queen)
Government Trough Spring
Hewitt Spring
Whiskey Spring
McGinnel Mine Spring
McGinnel Spring
Bitter Spring
Pump Station Spring
Pot Hole Spring
Junction Spring
Unnamed Spring (TOW Spring)
Underpass Spring
Gibson Springs
Big Spring
Silver King Tailings Site
Perlite Spring
No Name Spring
Silverado Ridge Spring
Conley Spring
Near West Tailings Site
Happy Camp Spring
Gibson Well Spring
Bear Tank Spring
Queen Seeps
The Grotto
Benson Spring
Walker Spring
QC22.6E
Potential Disturbance Area
Resolution Mine
Lower Railroad Spring
Cross Canyon
Rancho Rio Spring
Queen Creek
Devil's Canyon
Queen Creek
Bored Spring
DC8.2W
Trap Spring
DC6.6W
DC6.1E
Fred Spring
Tompson Spring
Hidden Spring
Kanes Spring
DC4.1E
Grapevine Spring
MC 3.4W
Government Springs
Government Springs 2
Mineral Creek
Laguna Spring
Sump Spring
Stone Cabin Spring
Stone Cabin Box Spring
Walnut Spring
Indian Spring
Chimney Spring
Dripping Spring Wash
Woodchopper Spring
Spirit Spring
Cockleburr Spring
Skunk Spring
Looney Spring
Haley Spring
Skunk Camp Tailings Site
Dry Spring
Big Springs
Well Spring
Seger Spring
Mine Spring
Armstrong Spring
Dripping Spring
Elkins Spring
Hot Rod Spring
Dripping Springs
Filaria Spring
Unnamed Spring (Arnett)
South Filaria Spring
Trough Springs
Rudd Spring No.2
Wood Canyon Spring
West Coyote Spring
Unnamed Spring (Wood Cyn)
SOB Spring
Rudd Spring No.1
Seep Spring
Arnett Creek
60
177

EXPLANATION

- Spring (M&A-WestLand Catalog V3, April 2020)
- Spring (M&A-WestLand Catalog V2, June 2018)
- Spring (M&A-WestLand Catalog V1, Oct. 2017)
- Spring (ADWR Surface Water)
- Spring (ALRIS)
- Proposed TSF Footprint
- Watershed Boundary
- HUC Basin Boundary

Lyons Fork — USGS HUC Basin Name
150501000204 – USGS Hydrologic Unit Code Number

N

0 4,000 8,000 12,000 16,000 20,000
Feet

RESOLUTION COPPER

SPRINGS AND SEEPS RESOLUTION PROJECT AREA

WestLand Resources, Inc. Engineering and Environmental Consultants
MONTGOMERY & ASSOCIATES Water Resource Consultants

APRIL 2020 FIGURE 1

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#5 SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
#5 Spring	None	This spring site occurs along Roblas Canyon Wash. Several large cottonwoods are growing in this area of the canyon where alluvium has accumulated, and there are a number of dead cottonwoods. Vegetation occurs on the hillslope and terrace, as well as along the wash bottom. No active spring flow has been observed to date. Abandoned piping and trough are present. It appears the alluvium retains enough water from runoff events to support some riparian vegetation. There may also be some enhanced infiltration on a terrace above the hillslope on the southeast side of the canyon along this reach.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)18aac		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service (USFS)	Tonto National Forest	Picketpost Mountain, AZ / no	NA

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
484594	3689978	3070 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
No	Yes	36-103347 (USFS)	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Roblas Canyon Wash	No flow observed
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000404	Hewitt Canyon		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Stream channel alluvium and fractured Pinal schist	Rheocrene and/or Hillslope	Pinal Schist
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	No	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
None	Steel piping and trough evident	NA	No
ACTIVELY USED?	**USE?**		
No	Unknown		

NA = Not applicable

#5 SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
5-Oct-17	11:22	M&A	0	---	---	---	---	---	---	---	No	Steel piping and trough observed downstream. Dry conditions.
13-Dec-17	9:05	M&A	0	---	---	---	---	---	---	---	No	Dry conditions; dried, clayey mud-lined pool
23-Mar-18	9:50	M&A	0	---	---	---	---	---	---	---	No	Dry conditions; dried, clayey mud-lined pool

M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

#5 SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SUBSTRATE
Southeast	Center	Alluvium

COMMENTS:
Gila monster observed in dry alluvium channel bottom.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
March 2018	Damp soil in alluvium	None recorded	Bermuda grass (Cynodon dactylon)	Canyon ragweed (Ambrosia ambrosioides), cottonwood (Populus fremontii)	Desertbroom (bacharis sarithroides), desert hackberry (Celtis pallida) giant saguaro (Carnegiea gigantea), hopbush (Dodonaea viscosa), jojoba (Simmondsia chinensis), lovegrass (Eragrostis sp.), mesquite (Prosopis sp.), thistle (Cirsium sp.)	None recorded	None recorded	None recorded

Photo 1. #5 Spring drainage with jojoba, desert hackberry, Fremont's cottonwood, and saguaro, March 2018

Photo 3. #5 Spring drainage, view of low in stream, with Bermuda grass (top left), March 2018

Photo 5. # 5 Spring, view of old trough, with desert hackberry and various grasses, March 2018

Photo 2. #5 Spring, moist area with fallen logs, canyon ragweed (left) and various grasses, March 2018

Photo 4. #5 Spring, Gila monster in dry creekbed, March 2018

Photo 6. #5 Spring, hopbush and cottonwood branches, March 2018

ARMSTRONG SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Armstrong Spring		Armstrong Spring is a located in an unnamed drainage of the Dripping Springs Mountains. The spring occurs in a bedrock channel within the Troy Quartzite and may be fault controlled. There are many mine adits and shafts on both sides of the canyon. No surface water flow has been observed at this location.	
COUNTY	**CADASTRAL (40-acre)**		
Gila	(D-03-14)25aca		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Bureau of Land Management		El Capitan AZ / Yes	El Capitan AZ 7.5' (1964)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
512467	3667361	3220 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Dripping Springs Wash	Unnamed tributary	Unknown
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Unknown	Yt - Troy Quartzite; fault zone	Rheocrene	Yt - Troy Quartzite
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Unknown	Mixed runoff / spring dominated	None	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	None	---	No
ACTIVELY USED?	**USE?**		
No	Unknown		

)plicable

ARMSTRONG SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
25-Mar-20	13:02	M&A, WRI	0	Observed	---	---	---	---	---	---	No	Very lush vegetation on Troy Quartzite drainage. Mine adits all over north and south canyonsides. No water or saturated soil. No indication of persistent surface water.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

ARMSTRONG SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Northeast	Center	-	Alluvium over bedrock

COMMENTS

The site is located along a canyon bottom among steep and rugged terrain. The canyon bottom supports a stringer of Arizona sycamore (Playanus wrightii) and Ariona walnut (Juglans major) trees along approximately 400' of the drainage. A 5' x 5' concrete box (possibly a springbox structure) is present on the river-left hillside a few feet upslope from the canyon bottom. Near the concrete box is an approximately 12' deep excavation into the hillside (possibly a mine adit).

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/25/2020	Pooled water present in the concrete box (likely rainwater). Pooled water present at the adit working face (unsafe to sample). No surface water present in the drainage.	None observed	Red brome (bromus rubens)	Arizona sycamore (Platanus wrightii), Arizona walnut (Juglans major)	Shrub oak (Quercus turbinella), texas mulberry (Morus microphylla), Arizona walnut (Juglans major), sugar sumac (Rhus ovata), hollyleaf buckthorn (Rhamnus ilicifolia), oneseed juniper (Juniperus monosperma), graythorn (Ziziphus obtusifolia), Lycium (Lycium sp.), netleaf hackberry (Celtis reticulata), berberis (Berberis sp.), sotol (Dasylirion wheeleri), miner's lettuce (Claytonia perfoliata), bedstraw (Galium aparine), pellitory (Parietaria hespera), hoary bowlesia (Bowlesia incana), scorpion weed (Phacelia sp.), Gila manroot (Marah gilensis), fiddleneck (Amsinckia sp.), hopbush (Dodonaea viscosa), California bricklebush (Brickellia californica), white sage brush (Artemesia ludoviciana).	None observed	Woodhouse's scrub jay (Aphelocoma woodhouseii), gila woodpecker (Melanerpes uropygialis)	None observed

Photo 1. Armstrong Spring, overview of the spring channel looking upstream, March 2020

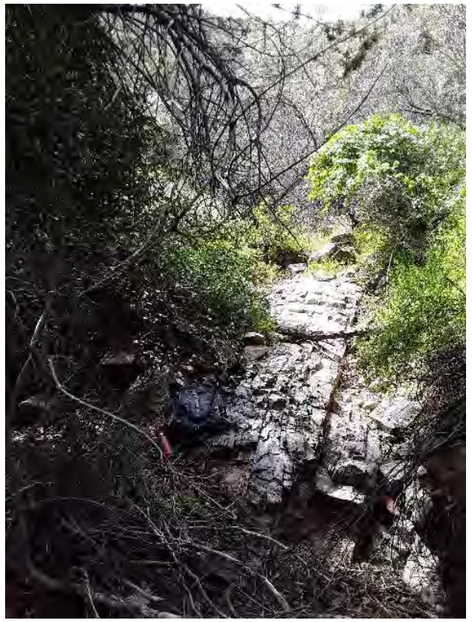

Photo 2. Armstrong Spring, view of dry, but densely vegetated channel, March 2020

Photo 3. The canyon bottom supports a stringer of Arizona walnut (pictured) and Arizona sycamore trees, March 2020

Photo 4. Pooled water is present at the back of the excavation on the river-left hillslope, March 2020

BEAR TANK SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Bear Tank Spring	Unnamed spring; Bear Spring; Bear Tank Canyon Spring	Bear Tank Spring is located in bottom of Bear Tank Canyon upstream from crossing of FS Road 2359; the spring appears to discharge from alluvial cover and from the Gila conglomerate; source of water to discharge pipe is unknown, but is evidence of former spring development. The uppermost water feature is a 10 x 10-meter pool at the base of a conglomerate ledge. About 30 meters downsteam small seeps at the base of a willow flow another 10-meters and converge with another seep under a bedrock ledge. A further 5 meters downstream a muddy pool is formed under the conglomerate outcrop where the discharge pipe is located	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-11)25cd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Picketpost, AZ / Yes	Superior AZ 15' (1948); Picketpost AZ 7.5' (2004, 2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12Z	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
482360	3685637	2390 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	Yes	36-105437 (USFS) 36-76639 (Martin)	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Queen Creek	Bear Tank Canyon	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000405	Alamo Canyon - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Gila Conglomerate (Tg); alluvium	Rheocrene	Bedding in Gila Conglomerate?
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
gravity	mixed runoff/spring	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Cemented rock headwall across creek bottom	Pipe in conglomerate downstream from headwall	Breached headwall below main pool	Main pond at top of spring area, with flow below
ACTIVELY USED?	**USE?**		
Yes?	Stock watering/wildlife?		

BEAR TANK SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
05-2012	---	WRI	0	---	---	---	---	---	---	---	No	Dry
12-Feb-13	12:40	M&A/RC	0.65	stopwatch & 1/2 gallon container	---	---	---	---	---	---	No	Seepage in channel alluvium about 40 feet upstream from first large pool (main pool); inflow observed from creek bottom to main pool; much of the creek floor is on Gila conglomerate with thin alluvial cover; pipe in low outcrop of conglomerate on NW wall of canyon about 120 feet downstream from main pool; remnant of possible old breached(?) headwall about halfway between main pool and pipe in canyon wall; flow rate was measured at pipe; persistent intermittent flow downstream from where water emerges on canyon floor, but not upstream; large main pool is heavily impacted by cows.
18-Feb-13	16:40	M&A/RC	0.65	stopwatch & 4 liter cubitainer	69.8	---	710	3.0	4.5	7.3	Yes	Sample collected from pipe in canyon wall downstream from the main pool; no odor; main pool is clear to murky with lots of floating organic matter; pool area is impacted by cows.
26-Jun-13	12:22	RC	0	---	86.4	---	769	---	3.0	6.6	Yes	Sample collected from stagnant pool.
7-Aug-13	11:02	RC	0	---	81.0	717	685	---	2.0	8.4	Yes	Greenish-brown water; small pool; no flow; no odor; sample collected from pool.
28-Oct-13	14:27	RC	< 1	---	68.0	588	---	4.6	---	7.9	Yes	Small pool--about 250 gallons; sample collected from pool.
4-Mar-14	11:50	RC	3	---	65.3	480	---	2.3	---	8.0	Yes	Murky; no odor; sample collected from pool downstream from spring; stream is flowing ~1 to 5 gpm.
21-May-14	12:07	RC	0	---	81.9	738	---	11.4	0.4	8.5	Yes	Murky; no odor; no evidence of flow; sample collected from spring-fed pool.
14-Aug-14	8:38	RC	0	---	79.3	367.0	---	11.9	6.6	8.9	Yes	Murky; no odor; stagnant; sample collected from spring-fed pool.
4-Nov-14	12:42	RC	---	---	62.1	610.0	---	---	---	8.6	Yes	Sample collected from spring-fed pool.
4-Mar-15	11:00	RC	0	---	58.0	703	---	1.9	12.5	6.9	Yes	Clear; no visible flow; no odor; sample collected from spring-fed pool.
13-May-15	10:40	RC	0	---	72.5	724.0	---	4.3	9.5	7.8	Yes	Murky; no visible flow; no odor; sample collected from spring-fed pool.
9-Sep-15	12:40	RC	---	---	84.2	293	---	7.2	16.0	9.7	Yes	Very murky; no odor; sample collected from spring-fed pool.
20-Oct-15	12:54	RC	0	---	73.9	316	---	---	12.4	9.0	Yes	Clear with yellowish brown tint; no visible flow; no odor.
24-Mar-16	13:45	RC	0	---	67.1	668.0	---	8.8	12.8	7.3	Yes	Slightly murky water; no visible flow; no odor; sample collected from spring-fed pool.
28-Apr-16	14:10	RC	1	---	75.5	722	---	14.8	14.0	7.8	Yes	Murky with surficial film (algae?); no odor; no visible flow; small bubbles coming up to the surface from depth - inflow?; lots of floating organic material; nearby pipe is flowing ~1 gpm; sampled from spring-fed pool.

BEAR TANK SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
26-Jul-16	12:25	RC	0	---	92.0	311	---	33.3	24.6	9.6	Yes	Murky; film on surface; no evidence of flow; odor; no flow out of pipe downstream; observed pool 1/4 mile downstream close to the road - possible groundwater component; sample collected from pool.
9-Nov-16	8:55	RC	<1	---	58.7	166	---	45.7	8.2	7.5	Yes	Water is murky; minor floating debris; no odor; no visible flow; sample collected from spring-fed pool. Took parameters from 1" steel pipe 100 feet downstream: Temp: 76.66 °F, Actual Conductivity: 692 µS, pH: 7.44, DO: 4.90 mg/L (DO measurement was taken in a 1 Liter bottle), clear water, <1 gpm. Took parameters from pool approx. 1/4 mile downstream from Bear Tank Spring: Temp: 61.75 °F, Actual Conductivity: 186 µS, DO: 8.56 mg/L, pH: 8.26, water is murky; seeps on south side of formation (<0.1 gpm); depth of pool is at least 4.5 feet.
30-Mar-17	13:30	RC	0.25 - 2	---	75.6	416	---	261.0	---	8.1	Yes	Clear to semi-murky; no odor; water is flowing into tank from ~20 feet long reach at approx. 0.25 gpm. Surface water is flowing downstream and upstream of tank. Upstream flow a remnant reach from winter storm run-off? 1-inch pipe plumbed into formation downstream is flowing ~2 gpm.
05-2017	---	WRI	---	---	88.3	740	---	---	---	8.8	No	Water is pooled at upper end and seeps over approximately 50 meters.
29-Jun-17	10:07	RC	0	---	82.1	773	---	150.0	18.4	9.0	Yes	Very murky with green tint; foul odor; sample collected from pool; no flow from nearby pipe.
31-Aug-17	14:00	M&A	0.2	---	82.8	---	759	0.6	---	7.1	Yes	Large body of pooled water; clear to very murky; sample collected from pipe: clear; very light yellow tinge.
5-Dec-17	11:30	M&A	0.25	---	65.1	---	717	3.7	---	7.2	Yes	No flow though discharge pipe; pool with minor inflow; collect sample from inflow using syringe.
12-Mar-18	13:17	M&A	---	---	73.3	---	570	5.9	---	9.0	Yes	Large pond (~500-1000 gallons); no inflow observed; yellow, murky with putrid odor.

RC = Resolution Copper
WRI = Westland Resources, Inc.
M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

BEAR TANK SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
South	Center	3	Alluvium over bedrock

COMMENTS

Several seeps that occur in the contact between the bedrock strata maintain a pool at the upstream contact and several wet areas over approximately 40 meters that support herbaceous plants. There is an open-ended horizontal pipe coming out of a concrete slab that drips water, evidence of former spring development. A lone Goodding's willow (Salix gooddingii) and an understory of annual forbs and grasses are present. The vegetation on the slopes immediately adjacent to the spring area is desert scrub. Downstream where the canyon crosses the road, a tinaja may hold water for up to several months following rain events and supports a small patch of herbaceous wetland vegetation.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED*	MAMMAL FAUNA OBSERVED*
May 2012	Water not present	None observed	Cynodon dactylon	None	None Recorded	None Recorded	None Recorded	None Recorded
May 2017	The uppermost water feature is a 10 by 10-meter pool at the base of a conglomerate ledge, 30-meter downsteam small seeps at the base of a willow flow another 10-meter and converge with another seep under a bedrock ledge. A further 5-meters downstream a muddy pool is formed under an open-ended horizontal spring pipe.	None observed	Bermuda grass (Cynodon dactylon), beardless rabbitsfoot grass (Polypogon monspeliensis)	seepwillow (Baccharis salicifolia), yellow monkeyflower (Mimulus guttatus), watercress (Nasturtium officinale)	canyon ragweed (Ambrosia ambrosiodes), Bermuda grass (Cynodon dactylon), cocklebur (Xanthium strumarium)	boatmen, backswimmers, beetles, belostomatids, toebiters, water scorpions, Sonoran desert toad (Incilius alvarius), Sonoran mud turtle (Kinosternon sonoriense)	Abert's towhee (Pipilo aberi), barn owl (Tyto alba), common raven (Corvus corax), Gambel's quail (Callipepla gambelii), Gila woodpecker (Melanerpes uropygialis), greater roadrunner (Geococcyx californianus), house finch (Carpodacus mexicanus), unidentified owl, mourning dove (Zenaida macroura), Northern cardinal (Cardinalis cardinalis), redtailed hawk (Buteo jamaicensis), turkey vulture (Cathartes aura), white-winged dove (Zenaida asiatica)	blacktailed jackrabbit (Lepus californicus), bobcat (Lynx rufus), cottontail (Sylvilagus audubonii), coyote (Canis latrans), gray fox (Urocyon cinereoargenteus), javelina (Tayassu tajacu), mule deer (Odocoileus hemionus), rock squirrel (Spermophila variegatus), whitetailed deer (Odocoileus virginianus), unidentified bat

*Incidental Observations on date of visit and wildlife camera observations February 2014 - March 2016

Photo 1. Bear Tank, view of 10- by 10-meter pool, June 2017.

Photo 2. Bear Tank, view of small seeps at base of Goodding's willow, June 2017.

Photo 3. Bear Tank, view of seep around open-ended horizontal spring pipe, June 2017.

Photo 4. Bear Tank, view downstream from 10- by 10-meter pool Goodding's willow, June 2017.

Photo 5. Bear Tank, view downstream from Goodding's willow towards road, June 2017.

Photo 6. Bear Tank, view of tinaja below road. June 2017.

BENSON SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Benson Spring	None	Benson Spring is located in bottom of Benson Spring Canyon; appears to discharge from Gila Conglomerate upstream from contact with Pinal Schist; seeps emanate from bedding planes in the Gila Conglomerate; site has fenced exclosure; 2 main pools with several smaller pools downstream and alluvial channel connecting pools; small cave with headwall and sump along southeast ledge with pool and pumping equipment. Upper portion of spring is a 20 by 20-meter tinaja in conglomerate. Seeps occur downstream from the loamy substrate and continue for approximately 50 meters, with several small pools along the flow.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-11)35da		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Picketpost, AZ / Yes	Superior AZ 15' (1948) Picketpost AZ 7.5' (2004, 2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
481576	3684496	2300 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Well ?
Yes	Yes	36-76642 (Martin); 36-14696 (USFS)	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Benson Spring Canyon	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000405	Alamo Canyon - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Gila Conglomerate (Tg)	Rheocrene	Bedding in Gila Conglomerate?
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
gravity	mixed runoff/spring dominated	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
concrete headwall at mouth of small cave/sump	Evidence of piping from small cave/sump	Exclosure fencing around source of spring and main pools	Main pond at top of spring area, several smaller pools below
ACTIVELY USED?	**USE?**		
Yes?	Stock watering/wildlife?		

BENSON SPRING
Section 2: Hydrologic Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
31-Oct-02	---	WRI	DRY	---	---	---	---	---	---	---	No	Dry
17-Sep-03	9:54	---	---	---	81.9	231	---	---	7.4	8.3	No	
05-2012	---	WRI	---	---	---	---	---	---	---	---	No	Water present in three small pools and a small channel of water.
18-Feb-13	14:04	M&A/RC	0	---	68.4	---	224	---	---	8.6	No	No observed flow; damp soft bedding plane at base of 10 ft ledge of competent conglomerate; impacted by cows; standing water in potholes on top of ledge; several smaller pools downstream.
7-Aug-13	10:30	RC	0	---	81.0	237	277	---	1.9	8.3	Yes	No flow
28-Oct-13	13:43	RC	DRY	---	---	---	---	---	---	---	No	Dry
4-Mar-14	11:00	RC	0	---	62.8	98	---	13.2	2.0	7.9	Yes	No flow; murky; no odor; could be connected to lower pool as flow disappears into alluvium; sampled from upper pool.
21-May-14	11:45	RC	DRY	---	---	---	---	---	---	---	No	Dry
8-Aug-14	11:00	RC	0	---	---	---	---	---	---	---	No	~20-25 gallons in pool; dark green; murky and stagnant; no visible flow; likely rain water.
4-Nov-14	12:14	RC	0	---	---	---	---	---	---	---	No	No visible flow; water level in pool is much higher than usual; murky with dark yellow tint; water is likely run-off.
4-Mar-15	11:35	RC	0	---	59.4	150	---	1.9	10.3	8.2	Yes	Murky; no visible flow; no odor; sampled from upper pool.
13-May-15	11:05	RC	0	---	---	---	---	---	---	---	No	Dry except for tiny murky puddle.
9-Sep-15	13:20	RC	0	---	86.5	151	---	22.0	10.9	9.9	Yes	Murky; no visible flow; no odor; sampled from upper pool.
20-Oct-15	12:20	RC	0	---	74.6	161	---	---	9.5	8.9	Yes	Clear water with brownish tint; no visible flow; no odor; sampled from pool.
22-Jul-16	14:33	RC	0	---	---	---	---	---	---	---	No	Big, murky, fetid pool; impacted by cows; high water level due to recent rain.
9-Nov-16	10:25	RC	0	---	61.0	115	---	75.1	6.1	8.3	Yes	Murky; minor floating debris; no visible flow; no odor; both pools in area are filled; sampled from upper pool.
30-Mar-17	14:10	RC	0	---	75.8	265	---	75.1	11.8	8.9	No	Slightly murky; lots of floating debris; no inflow.
06-2017	---	WRI	---	---	81.8	915	---	---	---	8.3	No	Standing water present in pool; water present in three pools and a small channel.
22-Jun-17	13:12	RC	---	---	95.4	1080	---	4.6	3.1	7.4	Yes	Sample collected 70 feet downstream from usual location; seep on Gila conglomerate bedding plane.
31-Aug-17	---	M&A	---	---	---	---	---	---	---	---	---	Two large pools of stagnant water with no indication of inflow or outflow though pools; no seepage observed.

BENSON SPRING
Section 2: Hydrologic Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
5-Dec-17	9:40	M&A	---	---	49.4	---	1045	4.9	---	7.9	Yes	Stagnant water in lower pond, ~1.5 feet deep; no observable inflow; sample collected from pond: clear to light yellow with putrid odor.
12-Mar-18	11:58	M&A	---	---	69.2	---	258	2.7	---	7.9	No	Standing water of approximately 10 gallons in upper pool, believed to be rain water (no visible inflow with puddles of rain water nearby); parameters collected from upper pool.
12-Mar-18	12:10	M&A	---	---	72.8	---	562	9.3	---	8.5	Yes	Standing water of approximately 1.5 feet deep and 500 gallons in lower pool; no inflow observed; may be rain water mixed with ground water. Sample and parameters collected from lower pool: slight yellow with slight putrid odor.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

BENSON SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Center	5	Clay loam

COMMENTS:

Several seeps occur in the contact between the bedrock strata; seasonally present are pools and a channel of water that supports herbaceous plants. There is a small cave in the bedrock with water and open-ended metal spring pipe as evidence of former spring development. A canopy of Fremont cottonwood (Populus fremontii), Goodding's willow (Salix gooddingii), desert willow (Chilopsis linearis) and netleaf hackberry (Celtis reticulata) contribute to a thick layer of leaf litter. An understory of annual forbs and grasses cover the ground. The vegetation on the slopes immediately adjacent to the spring area is desert scrub with palo verde (Parkinsonia spp.), saguaro (Carnegeia gigantea), and velvet mesquite (Prosopis velutina).

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED*	MAMMAL FAUNA OBSERVED*
October 2002	No surface water present	None observed	None Recorded	None Recorded	None Recorded	Sonoran mud turtle (Kinosternon sonoriense)	Harris' hawk (Parabuteo unicinctus), Gambel's quail (Callipepla gambelii), Gila woodpecker (Melanerpes uropygialis)	None Recorded
May 2012	Water present in three pools and channel	None observed	Bermuda grass (Cynodon dactylon), sowthistle (Sonchus sp.), beardless rabbitsfoot grass (Polypogon monspeliensis)	pale spikerush (Eleocharis macrostachya), cattail (Typha sp.)	fleabane (Erigeron sp.), flax (Linum sp.), purslane (Portulaca suffrutescens)	Sonoran mud turtle (Kinosternon sonoriense)	None Recorded	None Recorded
June 2017	Upper portion of spring is a 20 by 20-meter tinaja in conglomerate. Seeps occur downstream from the loamy substrate and continue for approximately 50 meters, with several small pools along the flow.	None observed	Cynodon dactylon, Sonchus sp., Polypogon monspeliensis	Eleocharis macrostachya, toadrush (Juncus bufonius), yellow monkeyflower (Mimulus guttatus),pondweed (Potamageton sp.), speedwell (Veronica anagallis-aquatica)	Portulaca suffrutescens	Beetles, water striders, Sonoran desert toad (Incilius alvarius), red spotted toad (Anaxyrus punctatus)	Harris' hawk (Parabuteo unicinctus), Gambel's quail (Callipepla gambelii), Gila woodpecker (Melanerpes uropygialis), greater roadrunner (Geococcyx californianus), great horned owl (Bubo virginianus), Western screech owl (Megascops kennicottii), white-winged dove (Zenaida asiatica)	blacktailed jackrabbit (Lepus californicus), bobcat (Lynx rufus), coyote (Canis latrans), gray fox (Urocyon cinereoargenteus), javelina (Tayassu tajacu), mule deer (Odocoileus hemionus), rock squirrel (Spermophila variegatus), western canyon bat (Parastrellus hesperus), cave myotis (Myotis velifer), Yuma myotis (Myotis yumanensis), pallid bat (Antrozous pallidus)

*Incidental Observations on date of visit and wildlife camera observations February 2014 - March 2017

Photo 1. Benson Spring, view of bedrock strata and area that holds pool of water seasonally, November 2002.

Photo 2. Benson Spring, view of pool and upland desert scrub adjacent to the spring area, March 2009.

Photo 3. Benson Spring, view of a Sonoran mud turtle near a pool with herbaceous vegetation including beardless rabbits foot grass, Bermuda grass and cattail, May 2011.

Photo 4. Benson Spring, view of cave in bedrock and trunks of Goodding's willows, June 2017.

Photo 5. Benson Spring, view upstream from fence at south end of enclosure showing Goodding's willow and velvet mesquite with understory of Bermuda grass and beardless rabbit's foot grass, June 2017.

Photo 6. Benson Spring, view of pool with herbaceous vegetation including pale spikerush and yellow monkeyflower, June 2017.

BIG SPRINGS
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Big Springs	None	Big Springs is located on the bank, west of the Dripping Springs wash; discharges from a tunnel dug into the Gila Conglomerate. The mouth of the tunnel is dammed by a 2.5-foot tall concrete wall, fit with several pipes and valves for historical and current diversion. Water pools into dammed, shallow reservoir below the tunnel. Total flow from the spring is unknown, as water is plumbed from reservoir to several stock watering spots on the property, and even historically into the ranch house. Water seeps through the dam and flows down an earthen canal towards the Dripping Springs wash.	
COUNTY	**CADASTRAL (40-acre)**		
Gila	(D-03-14)23aab		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Jodsaas, Rick L	No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
511006	3669261	2986 feet amsl	ALOS DEM

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	Yes	36-81828.3	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Dripping Springs Wash	Dripping Springs Wash	Perennial/Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Tcg - Gila Conglomerate	Hillslope/Anthropogenic	N/A
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Spring dominated	Dug out at base of Tcg mound; dammed and plumbed	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	Discharge pipe and hoses	Dams; man-made canal	Yes
ACTIVELY USED?	**USE?**		
Yes	Ranch house, stock, and wildlife	N/A = Not applicable	

BIG SPRINGS
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
23-Jan-20	12:00	M&A	5	Estimated	69.7	---	535	0.42	---	7.57	Yes	Water behind dam is clear with patches of organic film on surface.
23-Mar-20	10:05	M&A, WRI	6.5	Estimated	69.9	---	516.4	1.4	6.0	7.4	No	Water is very clear with a slight organic, sulfur odor. Water flows into 25x12 ft reservoir, then seeps through and continues flowing down channel for 275 ft. Total flow estimated from: hose in dam, surface flow down channel, and cattle drinker downstream.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

BIG SPRINGS
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East	Center	-	Masonry and alluvium

COMMENTS

The site is located on a gently sloping, densely vegetated terrace approximately 400' upslope from Dripping Spring Wash. The site consists of a concrete spring box/reservoir underneath a bedrock overhang. Behind the concrete spring box is an excavated reservoir measuring approximately 3' deep x 15' long x 3' wide where water pools. Below the spring/box reservoir is a water catchment area constructed of masonry that measures approximately 1.5' deep x 25' long x 12' wide. Water is transferred from the reservoir to the lower catchment area by a leaky spigot positioned roughly halfway up the concrete springbox. Water seeps through the masonry of the catchment and flows downstream along a natural low-gradient channel. Approximately 400' downstream of the water catchment area is a metal cattle drinker fed by water from a metal standpipe.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/23/2020	An approximately 3' deep pool of water is present in the excavated reservoir. Water is also pooled in the masonry-constructed water catchment area belw the reservoir. Water seeps through the water catchment area and continues downsteam as seepy surface flow for approximately 300 feet. Water is flowing strongly through the metal standpipe and overflowing the metal drinker.	None observed	Red brome (bromus rubens), speedwell (Veronica cf. anagallis-aquatica), chickweed (Stellaria media)	algae, speedwell (Veronica cf. anagallis-aquatica), horned pondweed (Zannichellia palustris), monkeyflower (Erythranthe sp.)	Velvet mesquite (Prosopis velutina), lycium (Lycium sp.), netleaf hackberry (Celtis reticulata), berberis (Berberis haematocarpa), moss (Bryophyta sp.), blue grass (Poa bigelovii), hoary bowlesia (Bowlesia incana)	boatmen (Corixidae)	cactus wren (Campylorhynchus brunneicapillus), raven (Corvus corax), dark-eyed junco (Junco hyemalis)	None observed

Photo 1. Big Springs, view of the concrete dam at the entrance of the excavated cavern, with piping that supplies nearby stock drinker, January 2020

Photo 3. Big Springs, a line of water speedwell (*Veronica anagallis-aquatica*) along the low-gradient channel downstream from the water catchment area, March 2020

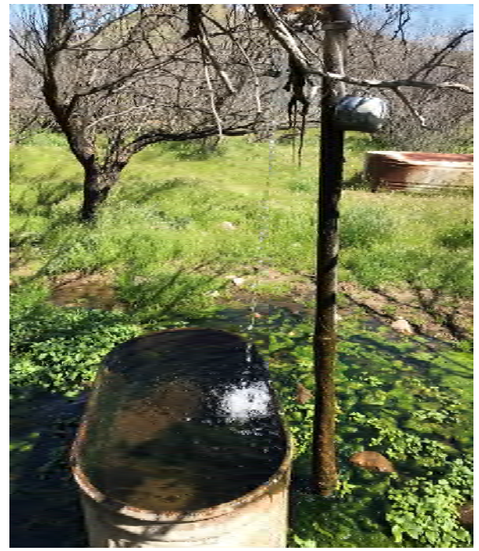

Photo 5. Big Springs, standpipe discharges spring water into cattle drinker approximately 400 feet downstream from reservoir, March 2020

Photo 2. Overstory vegetation at the site *includes netleaf hackberry (Celtis reticulata) and velvet mesquite (Prosopis* velutina), March 2020

Photo 4. Perimeter vegetation at the water catchment area includes nonnative red brome (*Bromus rubens*). Floating and submerged algae is visible within the catchment pond, March 2020

BITTER SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Bitter Spring	None	Bitter Spring is located in an unnamed tributary to the east of Fortuna Wash. The beginning of a flowing reach of the wash appears to source from younger Precambrian quartzites upstream from the contact with Pinal Schist. The reach has been observed flowing intermittently for approximately 850 feet. A wooden deck is constructed at the top of a hand dug sump or well, approximately 8 feet by 6 feet. Deck is 3 - 4 feet above the bottom of the wash. Solar panel and pump are installed. Canyon upstream from sump is fracture-controlled with prominent open fracture running along bottom of V-notch. Some evidence of development or excavation from sump, with some alluvium or fill material downstream from sump.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)13dca		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service (USFS)	Tonto National Forest	Superior, AZ / yes	Superior, AZ 7.5' (2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
492230	3688942	3890 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	Yes	36-24054 (USFS)	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Silver King Wash	Intermittent / ephemeral
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact and fracture controlled	Dripping Spring Quartzite, fractured Cretaceous quartz diorite, and Pinal Schist	Rheocrene	Cretaceous quartz diorite and Pinal schist, fractures in diorite probably feed sump
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	Hand dug sump with solar pump; piping from sump to closed steel tank and trough	Solar panel and pump	Steel storage tank and concrete trough downstream from spring sump
ACTIVELY USED?	**USE?**		
Yes	Stock watering / wildlife		

BITTER SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
9-Aug-12	---	M&A	0	---	---	---	---	---	---	---	No	Developed spring; hand dug well in channel; depth to water 12.21 feet below top of wooden deck; solar panel and pump installed.
9-Sep-15	9:49	RC	---	---	76.9	696	---	3.4	9.5	8.9	Yes	Murky
1-Dec-15	11:50	RC	---	---	42.3	440	---	---	11.7	9.0	Yes	No visible flow; murky water in trough, clear from tank
17-Mar-16	11:30	RC	---	---	65.2	514	---	0.6	7.5	8.3	Yes	Water is clear, comes from water tank. Trough is murky.
10-Jun-16	10:35	RC	---	---	87.3	978	---	1.0	4.9	8.1	Yes	Clear water; heard tank fill up after discharging from spiggot.
26-Jul-16	10:35	RC	---	---	90.2	999	---	1.3	5.1	7.8	Yes	Water is flowing into trough. Water is clear from tap; water in trough is murky with green algae. Not able to detect natural flow.
11-Nov-16	12:00	RC	---	---	65.2	682	---	0.6	7.4	8.1	Yes	Dissolved oxygen measurement was taken from 1 liter bottle.
29-Mar-17	11:30	RC	---	---	64.9	619	---	1.1	7.6	8.4	Yes	Water is very clear; trough is filled 2/3 full. Dissolved oxygen measurement taken in 1 liter field bottle.
05-2017	---	WRI	---	---	---	---	---	---	---	---	No	Surface water present
22-Jun-17	8:50	RC	---	---	88.9	807	---	0.9	5.0	8.4	Yes	From spigot; clear
23-Jan-18	9:25	M&A	0.25 - 0.5	Estimated	40.5	1239	---	---	---	7.9	No	Parameters measured in reach approximately 750 feet upstream from pit.
10-Apr-18	9:10	M&A	---	---	52.9	781.0	---	---	4.6	8.0	No	Parameters measured from tinaja at beginning of saturated reach approximately 750 feet upstream from pit. No observed flow.
24-Sep-19	10:10	M&A	0	---	64.2	---	1503	---	3	7.57	No	Parameters measured from tinaja at beginning of saturated reach approximately 750 feet upstream from pit. No observed flow.
25-Nov-19	13:58	M&A	1	Estimated	53.3	---	757.2	---	5	8.1	No	Water emerges from hole in schist outcrop, flows steadily along channel for approximately 1000 feet. Flow is continuous, water is clear and odorless.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

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BITTER SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Northeast	15	Bedrock

COMMENTS

Spring occurs in incised channel, and is not visible from above. In the streambed, below a rock outcrop, surface water flow is present and supports a dense patch of herbaceous vegetation. Aquatic invertebrates and tadpoles are present. No riparian vegetation overstory. Upland vegetation of desert scrub continues to edge of channel.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
May 2017	Surface water present	None Observed	None Observed	toadrush (Juncus bufonius), yellow monkeyflower (Mimulus guttatus)	oats (Avena sp.), ragwort (Senecio sp.), plumeseed (Rafinesquia), Indian paintbrush (Castilleja sp.), poppy (Eschscholzia sp.)	water boatmen, tadpoles	None Observed	None Observed
September 2019	Dry	None Observed	Tamarisk (Tamarix sp.), Bermuda grass (Cynodon dactylon), red brome (Bromus rubens)	yellow monkeyflower (Mimulus guttatus), Fremont cottonwood (Populus fremontii), Goodding's willow (Salix gooddingii), seepwillow (Baccharis salicifolia)	deergrass (Muhlenbergia rigens), hopbush (Dodonaea sp.), desert broom (Baccharis sarothroides), stonecrop (Crassulaceae), sugar sumac (Rhus ovata)	boatmen observed in the concrete livestock drinker downstream from the spring.	None Observed	None Observed
November 2019	Dry	None Observed	Tamarisk (Tamarix sp.), Bermuda grass (Cynodon dactylon), red brome (Bromus rubens)	yellow monkeyflower (Mimulus guttatus), Fremont cottonwood (Populus fremontii), Goodding's willow (Salix gooddingii), seepwillow (Baccharis salicifolia)	deergrass (Muhlenbergia rigens), hopbush (Dodonaea sp.), desert broom (Baccharis sarothroides), stonecrop (Crassulaceae), sugar sumac (Rhus ovata), sideoats gramma (Bouteloua curtipendula)	None Observed	None Observed	None Observed

Photo 1. Bitter Spring, view upstream, saturated shallow alluvium in channel near contact of Dripping Springs quartzite and Pinal schist, January 2018.

Photo 3. Bitter Spring sump and fracture-controlled canyon upstream, sump collared in quartz diorite, Pinal schist crops out 100 feet upstream, August 2012.

Photo 5. Bitter Spring, view of dense patch of herbaceous vegetation including oats, ragwort, plumeseed, Indian paintbrush and poppy, May 2017.

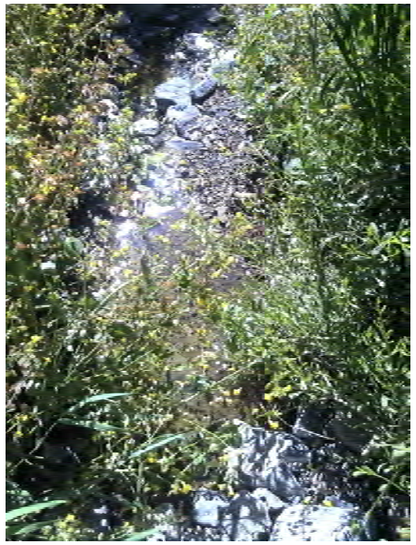

Photo 2. Bitter Spring, view of flow with yellow monkeyflower and oats, May 2017.

Photo 4. Bitter Spring. September 2019. Fremont cottonwood (*Populus fremontii*), sugar sumac (*Rhus ovata*), tamarisk (*Tamarix* sp.), and hopbush (*Dodonaea* sp.) are visible.

Photo 6. Stonecrop (*Crassulaceae* sp.) observed on a rocky outcrop at Bitter Spring. September 2019.

BORED SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Bored Spring	Bored Well Spring	Bored Spring is located in a small drainage immediately east of Arizona Highway 177 downslope from diabase rock quarry. Water seeps out of the ground below a medium-sized cottonwood tree. Water present in 5 meter diameter pond with a cattle trough downstream. Substantial reworking of land surface in the area; historical reports of a well near this location as possible source of spring from artesian flow - not located.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-12)11cb		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Superior AZ / Yes	Superior AZ 7.5' (2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
491129	3681159	2880 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	Yes	4A-2014 (USFS)	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Queen Creek	Pacific Canyon	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash-Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Qal - alluvium/pCd - diabase	Anthropogenic	Diabase/Concentrator Fault
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring dominated	Developed area below seep	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	discharge pipe into cement trough	Man-made spring	Yes
ACTIVELY USED?	**USE?**		
unknown	unknown		

BORED SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
24-Sep-19	14:53	M&A	0	---	---	---	---	---	---	---	No	No Flow
19-Nov-19	9:58	M&A	0	---	---	---	---	---	---	---	No	No Flow, depression in vegetated area is dry. No water present in nearby drinker.

RC = Resolution Copper
M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

BORED SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Center	3	Soil

COMMENTS

In a small drainage immediately east of AZ Highway 177, west of the rock quarry a 20 by 8 meter depression in the ground is overstoried by a large Fremont cottonwood (Populus fremontii). The depression is muddy and evidently held water recently. Approximately 20 meters southwest a cement trough is present. Spring area has concentration of riparian vegetation, with a string of scattered riparian trees for approximately 150 meters southwest. Other trees present include Goodding's willow (Salix gooddingii), velvet mesquite (Prosopis velutina), saltcedar (Tamarix sp.), and African sumac (Rhus lancea).

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
November 2002	Water not present	None observed	None recorded	cattail (Typha sp.)	None recorded	None recorded	None recorded	Javelina (Tayassu tajacu)
May 2017	Water seeps out of the ground below a large cottonwood. A stagnant pool of approximately 5-meter diameter, with cattle sign, is fringed by vegetation. A muddy stretch extends about 20 meter downstream from the pool. Water is present in a cement trough, which was overflowing.	None observed	red brome (Bromus rubens), Bermuda grass (Cynodon dactylon), fountain grass (Pennisetum setaceum), African sumac (Rhus lancea), saltcedar (Tamarix sp.)	yellow monkeyflower (Mimulus guttatus), Goodding's willow (Salix gooddingii)	canyon ragweed (Ambrosia ambrosiodes), desert broom (Baccharis sarothroides), yellow clover (Melilotus officinalis), blue paloverde (Parkinsonia florida)	boatmen, beetles	None observed	javelina (Tayassu tajacu), mule deer (Odocoileus hemionus)
September 2019	Dry	None observed	red brome (Bromus rubens), Bermuda grass (Cynodon dactylon), African sumac (Rhus lancea), saltcedar (Tamarix sp.), london rocket (Sisymbrium irio)	Fremont cottonwood (Populus fremontii)	desert broom (Baccharis sarothroides), greythorn (Ziziphus obtusifolia), desert hackberry (Celtis pallida), brittlebush (Encelia farinosa),velvet mesquite (Prosopis velutina)	None observed	None observed	None observed
November 2019	Dry	None observed	red brome (Bromus rubens), Bermuda grass (Cynodon dactylon), African sumac (Rhus lancea), saltcedar (Tamarix sp.), london rocket (Sisymbrium irio)	Fremont cottonwood (Populus fremontii)	desert broom (Baccharis sarothroides), greythorn (Ziziphus obtusifolia), desert hackberry (Celtis pallida), brittlebush (Encelia farinosa), catclaw acacia (Senegalia gregii), velvet mesquite (Prosopis velutina), blue palo verde (Parkinsonia florida), jojoba (Simmondsia chinensis)	None observed	None observed	None observed

Photo 1. Bored Spring. September 2019. An African sumac (*Rhus lancea*) tree on a hillside adjacent to the ground depression.

Photo 2. Bored Spring. September 2019. Fremont cottonwood (*Populus fremontii*), tamarisk (*Tamarix* sp.), velvet mesquite (*Prosopis velutina*), and desert broom (*Bacchraris sarothroides*) are visible.

Photo 3. Bored Spring. November 2019. Ground cover at the site is comprised of nonnative grasses including Bermuda grass (*Cynadon dactylon*) and red brome (*Bromus rubens*)

Photo 4. Bored Spring. November 2019. Facing upstream towards the ground depression. Canopy cover consists primarily of Fremont cottonwood (*Populus fremontii*) and tamarisk (*Tamarix* sp.).

Photo 5. Bored Spring. September 2019. View looking towards spring from downstream, with dry cattle drinker (left) and cottonwoods near spring source (top).

Chimney Spring
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Chimney Spring		Chimney Spring is a rheocrene spring located in an unnamed tributary west of Dripping Springs Wash and occurs at the contact between Barnes Conglomerate (basal Dripping Springs Quartzite) and diabase. A concrete headwall about 7 feet wide by 2.5 feet high had been constructed across the channel to retain water.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-14)32cbd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Hebbard & Webb	Hot Tomale Peak AZ / Yes	Hot Tomale Peak AZ 7.5' (1964, 2011)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
505296	3674699	3860 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Mineral Creek	Tributary to Walnut Creek	Perennial/intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000206	Upper Mineral Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Yds - Barnes Conglomerate (basal Dripping Springs Quartzite)	Rheocrene	Diabase (Yd)
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	Yes, concrete dam	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	Yes	Concrete dam	Yes
ACTIVELY USED?	**USE?**		
Yes	Livestock / wildlife	N/A = Not applicable	

CHIMNEY SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
5-Jun-18	10:45	M&A, WRI	0	Observed	69.1	---	962	5	---	8.08	Yes	Short contrete dam built to retain water at base of Dripping Springs Quartzite - Barnes Conglomerate; little seepage through dam
13-Jun-19	13:00	M&A	0	Observed	74.5	---	962	5.8		8.13	Yes	Stagnant pool behind dam; yellow turbid water; insects and algae; slight organic odor
13-Nov-19	10:05	M&A	0.001	Estimated	50.2	---	1057	5.72	---	7.83	Yes	Water is yellow tinged, organic oil film on surface, slight organic odor.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

CHIMNEY SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Northeast	Center	1	Bedrock

COMMENTS

Concrete dam tied to bedrock forming 3 m x 2 m pool approximate 0.6 to 0.9 m deep.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
6/5/2018	Surface water present (Pooled), 3m x 2m and 0.6-0.9m deep	None Observed	None Observed	Goodding's willow (Salix gooddingii), seepwillow (Baccharis salicifolia), yellow monkeyflower (Mimulus guttatus)	netleaf hackberry (Celtis reticulata), bentgrass (Agrostis sp.), goldenrod (Solidago sp.), brickell bush (Brickellia sp.)	Damselfly and dragonfly nymphs (Odonata), water strider (Gerridae), water boatmen (Corixidae), backswimmers (Notonectidae)	Turkey vulture	None Observed; ungulate tracks noted

Photo 1. Chimney Spring. Pooled water at concrete dam. Steep bedrock walls surround the majority of the spring, June 2018

Photo 3. Looking upstream towards Chimney Spring, drainage overstory is open and there is little to no herbaceous cover in drainage bottom, June 2018.

Photo 2. Pooled water is approximately 2-3 ft deep, June 2018

Photo 4. Barnes Conglomerate, the basal subunit of the Dripping Springs Quartzite outcropping at spring location, June 2018

COCKLEBURR SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Cockleburr Spring	None	Cockleburr Spring is located in an unnnamed tributary west of Dripping Spring Wash, approximately 0.25 miles north of Skunk Spring. The location of the spring occurs at the contact between the Dripping Springs Quartzite and diabase. Only a small pool was observed after recent rain events, with no indication of prolonged surface flow. The local rancher does not believe that the feature has any persistence of surface water flow.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-03-14)5adc		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
State Trust		No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
506195	3673456	3640 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	None	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Dripping Springs Wash	Unnamed tributary	Ephemeral
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Yds - Dripping Springs Quartzite	Rheocrene	Yd - Precambrian Diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Runoff dominated	No	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	No		No
ACTIVELY USED?	**USE?**		
No	Wildlife?	N/A = Not applicable	

COCKLEBURR SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
21-Jan-19	12:00	M&A	0	Obs	---	---	---	---	---	---	No	Near Dripping Spring Quartzite and Mescal Limestone contact. No indication of recent flow.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

COCKLEBURR SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
---	---	---	---

COMMENTS

WestLand has not surveyed this spring location.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Photo 1. Cockleburr Spring, small tinaja at the base of Dripping Springs Quartzite channel, no indication of spring discharge, January 2019

CONLEY SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Conley Spring	None	Spring located in narrow drainage that runs parallel to the Conley Spring falut. Surface flow starts in small pool underneath dead cottonwood tree. The surface flow extends over bedrock substrate for over 100 meters, occasionally forming small pools. Flow ends where bedrock turns into sandy bottom. Travertine-cemented cobbles in channel. Highly faulted diabase, quartzite and limestone cropping out locally.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)24cc		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
491459	3687135	3640 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Queen Creek	Silver King Wash	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash-Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Fracture/contact spring	Younger Precambrian Mescal (pCm) or Dripping Springs quartzite (pCds); Conley Spring fault zone	Rheocrene	Younger Precambrian Diabase (pCd) and/or possibly the fault
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring dominated	None evident locally	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Unknown	old steel pipe evident	none	none
ACTIVELY USED?	**USE?**		
No	No		

CONLEY SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
9-Aug-12	13:30	M&A	DRY	---	---	---	---	---	---	---	No	Dry, but recently active travertine in steep-sided V-notch channel; travertine cemented cobbles and flowstone whre channel opens up; native tobacco, dead cottonwood; some cattails;
05-2017	---	WRI	---	---	68.0	902	---	---	---	8.1	No	Incised channel has flow for about 100 meters.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

WestLand Resources, Inc.
Engineering and Environmental Consultants

MONTGOMERY & ASSOCIATES

CONLEY SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Northwest	Center	10	Conglomerate

COMMENTS

Spring occurs in incised channel, and is not visible from above. Water seeps where bedrock intrudes across stream channel. Flows and small pools are present for approximately 100 meters occupied by aquatic invertabrates and tadpoles. Where water is present herbaceous vegetation grows along the streambed. Flow ends where bedrock lined channel becomes sandy bottom. No riparian vegetation overstory. Upland vegetation of desert scrub continues to edge of channel.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
May 2017	Incised channel has flow for about 100 meters. Surface flow starts in small pool underneath dead cottonwood. Watercress is present in the pool. The surface flow extends over bedrock substrate for over 100 meters, occasionally forming small pools with aquatic insects and tadpoles present. Flow ends where bedrock turns into sandy bottom.	None observed	fountain grass (Pennisetum setaceum)	Algae, hummingbird trumpet (Epilobium canum), yellow monkeyflower (Mimulus guttatus), watercress (Nasturtium officinale)	oats (Avena sativa)	Beetles, water striders, tadpoles	No Records	No Records

Photo 1. Conley Spring, view of small pool underneath dead cottonwood where surface flow starts. Watercress and yellow monkeyflower are present, May 2017.

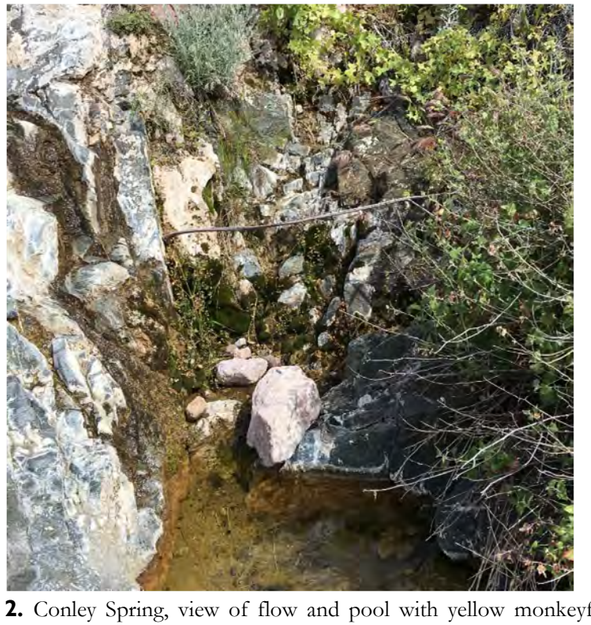

Photo 2. Conley Spring, view of flow and pool with yellow monkeyflower, May 2017.

Photo 3. Conley Spring, view of oats and the invasive plant fountain grass growing along the channel, May 2017.

Photo 4. Conley Spring, view of flow along bedrock lined channel, May 2017.

Photo 5. Conley Spring, view of tadpoles where flow pools along stream channel, May 2017.

Photo 6. Conley Spring, view of end of flow where bedrock lined channel becomes sandy bottom, May 2017.

CROSS CANYON SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Cross Canyon	Cross	Large inactive travertine mound in bottom of Cross Canyon near contact between Paleozoic limestones and quartzites with abundant faulting in area. No evidence of modern flow. Travertine is deeply eroded with no evidence of recent deposition. Paleospring was likely upstream from the mound as there is evidence of travertine for several hundred meters above the mound.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-12)02db		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	No	---

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS (M&A)	NAD83	12Z	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
491923	3682881	3100 feet amsl	Estimated from USGS 7.5' topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	None	NA	NA

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle Gila	Queen Creek	Cross Canyon	dry, paleo-feature
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash-Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Dm - Martin Limestone?; Fault?	Paleospring	Fault? Cb - Bolsa Quartzite?
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Runoff dominated	None	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
none	none	---	no
ACTIVELY USED?	**USE?**		
No	---		

CROSS CANYON SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
17-Jul-10	13:40	M&A	DRY	---	---	---	---	---	---	---	No	No evidence of flow. Deeply eroded travertine mound in bottom of canyon where ledge of Bolsa Quartzite crosses canyon; fault running parallel to canyon offsets Martin limestone and Bolsa qtzt. Travertine evident upstream from main mound - paleospring may have been several hundred meters above mound
Jun-2011	---	WRI	DRY	---	---	---	---	---	---	---	No	No evidence of active spring

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

WestLand Resources, Inc.
Engineering and Environmental Consultants

MONTGOMERY & ASSOCIATES

CROSS CANYON SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	Center	2	Bedrock

COMMENTS

Depicted on the topographic map as a spring at the confluence of two canyons. This spring has not been located in several field efforts. Some more robust upland vegetation visible along a limestone fault with travertine calcium carbonate deposits.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
November 2002	None	None observed		None Observed	Saguaro (Carnegeia gigantea), cholla (Cylindropuntia sp.), ocotillo (Fouquieria splendens), mimosa (Mimosa sp.), palo verde (Parkinsonia sp.), prickly pear (Opuntia sp.), jojoba (Simmondsia chinensis)	N.A.	No Records	No Records
May 2011	None	None observed		None Observed	cane cholla (Cylindropuntia spinosior), catclaw acacia (Senegalia greggii), chuparosa (Anisacanthus thurberi), whitethorn acacia (Vachellia constricta), mariola (Parthenium incanum), brittlebush (Encelia farinosa), golden agave (Agave chrysantha), beebush (Aloysia wrightii), jojoba (Simmondsia chinensis)	N.A.	No Records	No Records

Photo 1. Cross Canyon, view upstream from west of travertine mound, July 2010.

Photo 2. Cross Canyon, view of travertine mound from the south, November 2002.

Photo 3. Cross Canyon, view from south of Cross canyon, November 2002

Photo 4. Cross Canyon, view vegetation along channel showing catclaw acacia and jojoba, June 2011.

Photo 5. Cross Canyon view upstream showing no evidence of spring, June 2011.

Photo 6. Cross Canyon, cave formed in travertine mound, no evidence of modern flow, July 2010.

DRIPPING SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Dripping Spring	None	Dripping Spring discharges in a steep drainage in the Dripping Springs Mountains. The spring occurs at the contact of the Paleozoic carbonates and diabase. Faulting and fractures also likely contribute to the spring flow. There is a hand dug tunnel on the southern side of the gully with several generations of outlet tubing/piping.	
COUNTY	**CADASTRAL (40-acre)**		
Gila	(D-03-14)25add		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Bureau of Land Management		El Capitan AZ / Yes	El Capitan AZ 7.5' (1964, 2011, 2014, 2018)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
512790	3667067	3360 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Dripping Springs Wash	Unnamed tributary	Persistent/Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Fracture/contact spring	Dm - Martin Limestone; Cb - Bolsa Quartzite; Fault	Rheocrene	Yd - Precambrian diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	Spring box	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Spring box at head of spring	Several generations of pipeline from spring box leading down canyon	---	No
ACTIVELY USED?	**USE?**		
Yes	Livestock / wildlife	N/A = Not applicable	

DRIPPING SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
31-Jan-20	12:25	M&A	0.5	Estimated	59.1	---	659	1.03	---	7.61	Yes	Water emerges in steep channel. Carbonate rocks present just up-channel from the spring emergence. Water is clear and odorless. Dug out embankment just upstream of spring that is covered with corrugated metal. Unable to access excavation, but it appears piping may be routed into the hole to supply stock water to Links ranch.
25-Mar-20	11:14	M&A, WRI	0.37	Measured	64.8	---	648.3	1.56	5.0	7.60	No	Water emerges from alluvial cover of channel. Excavated pit in southern hillslope is full of water. Various pipes and poly tubing is diverting water for stock use.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

DRIPPING SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Northeast	Center	-	Bedrock and alluvium

COMMENTS

The site is located along a desely vegetated drainage bottom approximately 0.3 miles southwest of Dripping Spring Wash. The site contains a sump that has been excavated into the river right hillslope. The sump excavation measures approximately 3.5' wide x 3.5' high x over 10' deep. Downstream from the sump, the drainage contains a sharp ledge and dropoff. Plastic water pipes are draped over the ledge.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/25/2020	Water is pooled in the sump. A small amount of seepy surface flow is present downstream of the ledge, with a linear extent of approximately 70'.	None observed	None observed	Maidenhair fern (Adiantum capillus-veneris), Goodding's willow (Salix gooddingii), Arizona walnut (Juglans major), rush (Juncus sp.), monkeyflower (Erythranthe cf. cardinalis)	Sugar sumac (Rhus ovata), shrub oak (Quercus turbinella), holly-leaf buckthorn (Rhamnus crocea), bedstraw (Galium aparine)	None observed	Dark-eyed junco (Junco hyemalis), flycatcher (Tyrannidae), Gambel's quail (Callipepla gambelii), raven (Corvus corax)	None observed

Photo 1. Dripping Spring, view of boarded up excavation in channel just upstream of spring source, January 2020

Photo 3. Dripping Spring, view of foliage surrounding channel that hosts spring, January 2020

Photo 2. Dripping Spring, view of spring source, March 2020

Photo 4. Canopy cover at the site includes sugar sumac (*Rhus ovata*) and Arizona walnut (*Juglans major*), March 2020

DRY SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Dry Spring	None	Dry Spring is located in an unnamed tributary channel approximately 1 miles west of the Dripping Springs Wash. Water flows from alluvial/colluvial cover over the Troy Quartzite outcrop. There is no indication of historical development or diverson of spring water. Local rancher does not believe the spring to be persistant.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-03-14)22dad		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
State Trust		No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
507487	3670139	3468 feet amsl	ALOS DEM

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Dripping Springs Wash	Unnamed tributary	Unknown
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Yt - Troy Quartite	Rheocrene	Fault; Yt - Troy Quartzite
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	No	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	None		No
ACTIVELY USED?	**USE?**		
Unknown	Unknown	N/A = Not applicable	

DRY SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
28-Feb-20	9:25	M&A	12	Estimated	45.5	---	124	---	---	7.62	No	Channel width 1-3 ft, continuous flow.
24-Mar-20	11:05	M&A, WRI	0.42	Measured	59.2	---	145.7	0.82	5.0	7.49	Yes	Emerges from alluvial/colluvial cover in channel center. Mostly continuous flow for 900 ft

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

DRY SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Northeast	Center	-	Bedrock, boulder, and alluvium

COMMENTS

The site is located along the drainage bottom of an unnamed tributary to Dripping Spring Wash. The opposing hillsides of the canyon are steep and vegetated predominantly with shrub oak (Quercus turbinella), oneseed juniper (Juniperus monosperma), prickly pear (Opuntia sp.), and sauaro (Carnegiea gigantea). The outer banks of the canyon bottom contain xeroriparian vegetation dominated by shrub oak in the shrub layer and red brome (Bromus rubens) in the understory. The low flow channel is more open, with substrate consisting of bedrock, boulders, and fine and course alluvium.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/24/2020	Contiguous surface flow (0.42 GPM) along the approximaely 700' reach of canyon that was surveyed.	None observed	Red brome (Bromus rubens), stork's bill (Erodium cicutarium)	None observed	Fiddleneck (Amsinckia sp.), miner's lettuce (Claytonia perfoliata), turpentine bush (Ericameria laricifolia), berberis (Berberis sp.), skunkbush sumac (Rhus trilobata), oneseed juniper (Juniperus monosperma), annual lupin (Lupinus bicolor), bedstraw (Galium aparine), pellitory (Parietaria hespera), crane's bill (Geranium sp.), shrub oak (Quercus turbinella), pepperweed (Lepidium sp.) hopbush (Dodonaea viscosa),	mosquito larvae (Culicidae), crane fly larvae (Tipulidae), predacious diving beetle (Dytiscidae)	White winged dove (Zenaida asiatica)	None observed

Photo 1. Dry Spring, spring discharge location, sandy bottom pool at the base of colluvial deposit, March 2020

Photo 3. Miner's lettuce (*Claytonia perfoliate*) growing underneath a boulder in the drainage bottom, March 2020

Photo 2. Dry Spring, continuous surface flow for ~ approximately 600 feet, March 2020

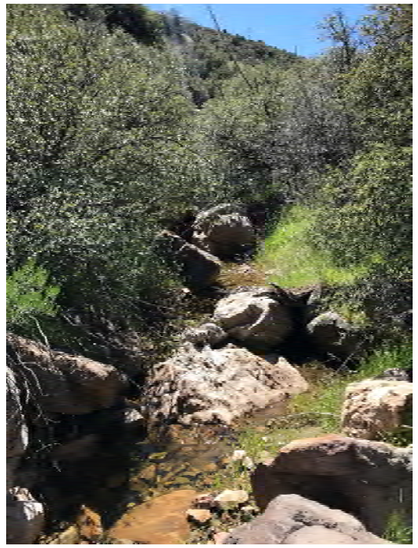

Photo 4. The outer banks of the canyon bottom contain xeroriparian vegetation dominated by shrub oak (*Quercus turbinella*) and red brome (*Bromus rubens*), March 2020

ELKINS SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Elkins Spring	None	Elkins Spring is a complex of springs that occur in a Gila Conglomerate drainage ~1000 feet south of the main channel of the Dripping Springs Wash. Water flows from younger alluvium atop Gila Conglomerate and flows through several tinajas into a dammed sandy reservoir. The masonry dam is ~ 5 feet tall and has steel pipe plumbing indicative of historic use. Several seeps emanate along the walls of the channel from bedding planes in the Gila Conglomerate. Small caves occur beneath the alcove overhang show indications of water seepage and persistent moisture. The spring location has historically been used for religious purposes, such as baptisms, evidenced by several dilapidated religious statues on site.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-03-14)29aac		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Didominicus, James F.	No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
514815	3667166	2600 feet amsl	ALOS DEM

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Well ?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Dripping Springs Wash	Unnamed tributary	Persistent/Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Tcg - Gila Conglomerate	Rheocrene/Hillslope	Bedding in Gila Conglomerate?
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
gravity	mixed runoff/spring dominated	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
concrete retaining wall	Steel pipe fixtures on dam		Several small pools/tinajas
ACTIVELY USED?	**USE?**		
Yes?	Wildlife	N/A = Not applicable	

ELKINS SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
24-Mar-20	14:33	M&A, WRI	1.04	Measured	63.6	---	696.6	0.96	7.0	8.47	Yes	Rheocrene/hillslope spring complex. Water emerges from alluvial cover atop Tcg channel. Water seeps from bedding planes in Tcg. Water drips from alcove overhang and seeps from void below. Collectively flows into alluvial retainment area behind masonry dam. Water discharges from pipe at the base of the dam and disappears into alluvium.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

ELKINS SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
North	Center and southern	-	Bedrock and alluvium

COMMENTS

The site is located in an unnamed tributary approximately 0.2 miles south of Dripping Spring Wash. The site consists of a drainage and an adjacent bedrock alcove. The substrate of the drainage is primarily bedrock, along with deposits of gravel and finer sediment. Approximately 100' downstream of the alcove is a masonry wall/springbox that besects the drainage. Three pipes protrude from the wall, the lowest of which conveys water through the wall.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/24/2020	Contiguous flow along an approximately 200' stretch of the drainage with ponding on bedrock in several areas along the stretch.	None observed	Red brome (Bromus rubens)	Algae, monkeyflower (Erythranthe sp.)	Desert broom (Baccharis sarothroides), moss (bryophyte), texas mulberry (Morus microphylla), oneseed juniper (Juniperus monosperma), desert hackberry (Celtis pallida), fiddleneck (Amsinckia sp.), desert tobacco (Nicotiana obtusifolia), fleabane (Erigeron sp.)	canyon tree frog vocalizations (Hyla arenicolor), amphibian eggs, predacious diving beetle (Dytiscidae)	Gambel's quail (Callipepla gambelii), white-winged dove (Zenaida asiatica), turkey vulture (Cathartes aura)	None observed

Photo 1. Elkins Spring, rheocrene spring discharge from Gila Conglomerate channel, March 2020

Photo 3. Elkins Spring, retaining wall with plumbing fixtures, March 2020

Photo 2. Elkins Spring, water seeping from bedding planes of Gila Conglomerate, small dripping fall from alcove overhang, March 2020

Photo 4. Elkins Spring, Amphibian eggs in tinaja pools, March 2020

FIG SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Fig Spring	None	The purported location of Fig Spring in the ALRIS database is in a drainage channel downstream from the Historic Iberri mine workings. No evidence of past or present persistent surface water was observed in this area. Steel piping and a rectangular steel tank were found along the floor channel of the wash, but no indication of a spring, or spring-like features were observed.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)14dad		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service (USFS)	Tonto National Forest	Superior, AZ / Yes	Superior, AZ 7.5' (2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
491263	3688948	3720 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
Yes	Yes	36-024053 (USFS)	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Silver King Wash	No flow observed
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
NA	NA	NA	NA
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
NA	NA	No	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
None	Steel pipe and trough apparent	NA	No
ACTIVELY USED?	**USE?**		
NA	NA	NA = Not applicable	

FIG SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
23-Jan-18	16:29	M&A	0	---	---	---	---	---	---	---	No	Steel piping observed coming from abandoned Iberri mine working. No spring-like features

M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

FIG SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SUBSTRATE
Northeast	Southwest	NA

COMMENTS:
Abandoned pipe and metal spring box. No sign of water.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
January 2018	None observed	None recorded	None recorded	None recorded	Brittlebush (Encelia farinosa), cholla (Cholla sp.), hopbush (Dodonaea viscosa), lovegrass (Eragrostis sp.) sideoats (Bouteloua curtipendula), spurge (Euphorbia sp), sotol (Dasylirion wheeleri), turpentine bush (Ericameria laricifolia)	None recorded	None recorded	None recorded

Photo 1. Fig Spring, view looking down from the Iberri mine workings into drainage of Fig Spring location, January 2018.

Photo 2. Fig Spring, steel pipe observed leading into old Iberri mine workings, January 2018.

Photo 3. Fig Spring, steel trough found in the channel down from the Iberri mine working, January 2018.

Photo 4. Fig Spring, burned tree in the drainage of Fig Spring, with hopbush turpentine bush, and sotol, January 2018.

Photo 5. Fig Spring, mine workings, with worker for scale, January 2018.

Photo 6. Fig Spring, hopbush, January 2018.

WestLand Resources, Inc.
Engineering and Environmental Consultants

FIG SPRING
Section 4: Photographs

MONTGOMERY & ASSOCIATES

GIBSON WELL SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Gibson Well Spring	Gibson Spring	Spring located in Oak Flat Wash immediately upstream of confluence with Queen Creek. injust south of old hand-dug well. Streambed with damp banks supports high density of herbaceous hydrophytic vegetation, suggesting shallow sub-surface water table. Extensive alluvial deposits upstream from confluence of Queen Creek and Oak Flat wash appears to capture, store and release water seasonally.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-13)29cb		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Superior, AZ / Yes	Superior AZ 7.5' (2004)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12Z	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
494442	3685746	3836 feet amsl	Handheld GPS

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	Yes	4A-486 (Integrity)	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle Gila	Queen Creek	Oak Flat Wash	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash-Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Alluvium	Rheocrene	Apache Leap Tuff
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring dominated	Hand dug well	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	Associated with Gibson well and upsream check dams only	Gibson hand-dug well nearby	No
ACTIVELY USED?	**USE?**		
Yes?	wildlife		

GIBSON WELL SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
03/04-2017	---	WRI	0	---	---	---	---	---	---	---	No	Water present in well and water flowing in nearby pool
22-Mar-17	9:15	M&A	3-4	Estimated	55	133.7	---	---	---	6.82	No	Water clear, algae growth
19-Apr-17	15:00	M&A	trace	---	66.4	135	---	---	---	6.45	No	small flow; pooled, flowing into another small pool
10-May-17	14:40	M&A	3	Estimated	57.7	148.7	---	---	14.6	6.58	No	
19-May-17	14:40	M&A	2-Jan	Estimated	55.7	175.3	---	---	14.6	6.88	No	
06-2017	---	WRI	0	---	---	---	---	---	---	---	No	Water was observed within the well approximately 1.5 meters below ground surface. No surface water present. Dampness and algae along channel suggest recent flow.
11-Jul-17	13:52	M&A	DRY	---	---	---	---	---	---	---	---	
3-Aug-17	15:55	M&A	25	Estimated	84.3	131	---	---	5.5	7.0	No	Oak Flat Wash is flowing into the spring - combined flow
25-Aug-17	11:01	M&A	0	---	80.4	186	---	---	3.6	6.7	No	No flow; surrounding area is damp upstream; vegetation very overgrown and green; water has slight red-brown color

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

WestLand Resources, Inc.
Engineering and Environmental Consultants

MONTGOMERY & ASSOCIATES

GIBSON WELL SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	Center	5	Gravel

COMMENTS

South of the old well structure a streambed with damp banks supports high density of herbaceous hydrophytic vegetation, suggesting shallow sub-surface water table. The stream is lined with coyote willow (Salix exigua), desert broom (Baccharis sarothroides), false indigobush (Amorpha fruticosa), and netleaf hackberry (Celtis reticulata). A few Fremont cottonwood (Populus fremontii) and Arizona sycamore (Platanus wrightii) occur along the stream.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
March/April 2017	Water present in well and water flowing in nearby pool	None Recorded	Bromus rubens, Sonchus sp., Horehound (Marrubium vulgare)	Elliott's rush (Juncus elliottii), yellow monkeyflower (Mimulus guttatus), pale spikerush (Eleocharis macrostachya)coyote willow (Salix exigua), Arizona sycamore (Platanus wrightii)	None Recorded	None Observed	None Observed	None Recorded
June 2017	No surface water/source was observed, but dampness and algae along channel as evidence of recent flow. Well had some water at the bottom.	None Recorded	Bromus rubens, Sonchus sp., Horehound (Marrubium vulgare)	algae, Elliott's rush (Juncus elliottii), yellow monkeyflower (Mimulus guttatus), pale spikerush (Eleocharis macrostachya)coyote willow (Salix exigua), Arizona sycamore (Platanus wrightii)	deergrass (Muhlenbergia emersleyi), dock (Rumex sp.), oats (Avena sativa), desert broom (Baccharis sarothroides), false indigobush (Amorpha fruticosa), netleaf hackberry (Celtis reticulata), Fremont cottonwood (Populus fremontii), Emory oak (Quercus emoryi), coffeeberry (Rhamnus californica), manzanita (Arctostaphylos pungens), locust (Robinia neomexicana)	None Observed	None Observed	None Recorded

Photo 1. Gibson Well Spring, discharging from alluvial materials with covered with mat of organic material, February 2017.

Photo 3. Gibson Well, view inside well showing water at near bottom, which is less than 10 feet deep, June 2017.

Photo 5. Channel near Gibson Well spring, view of high density of herbaceous vegetation along stream channel including deergrass, June 2017.

Photo 2. Gibson Well, view of well structure, June 2017.

Photo 4. Channel near Gibson Well, view of herbaceous vegetation along stream channel including deergrass and Elliott's rush, June 2017.

Photo 6. Stream channel near Gibson Well, evidence of recent flow along channel includes dampness and algae, June 2017.

Government Springs
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Government Springs	MC8.8C	Government Springs is a series of two hillslope springs located south of Mineral Creek and occurs in the brecciated zone of Apache Leap Tuff. The largest spring emanates from a concrete vault begind the Government Springs Ranch house. Water overflows from the spring box into a sump located outside the vault. Water is used by the local rancher to irrigate trees. The second spring is located ~80 feet north of the vault. Water seeps from the hillslope and is collected in a spring box and adjacent pond. This water is used by the rancher to water trees on property.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-14)18db		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Government Springs Ranch LLC	Pinal Ranch, AZ / Yes	Pinal Ranch, AZ 7.5' (1964, 2004)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
504463	3679397	2972 feet amsl	Trimble (M&A)

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	Yes	36-001790	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Mineral Creek		Perennial
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000206	Upper Mineral Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration; fracture control	Apache Leap Tuff (Tal)	Hillslope	N/A
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Spring Dominated	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	Yes	Powder magazine, spring box, sump	Yes
ACTIVELY USED?	**USE?**		
Yes	Domestic / irrigation / wildlife		

GOVERNMENT SPRINGS
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (° F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
16-Dec-09	10:30	RC	---	---	---	---	---	---	---	7.23	Yes	Spring #1 - No observations noted
18-Mar-10	12:00	RC	3	Estimated	71.4	---	---	---	4.9	6.94	Yes	Spring #1 - No observations noted
28-Feb-12	8:50	RC	---	---	69.8	---	742.7	5	4.18	7.09	No	Spring #1 - No observations noted
22-Aug-12	9:00	RC	---	---	72.1	---	719	7	3.93	7.25	Yes	Spring #1 - No observations noted
29-Aug-12	9:30	RC	---	---	71.4	---	612	4.92	8.22	7.23	No	Spring #1 - No observations noted
11-Jun-13	8:51	RC	---	---	o	---	557	1.46	---	7.01	Yes	Spring #1 - No observations noted
12-Aug-13	9:58	RC	---	---	70.9	653	689	0.48	2.71	7.6	Yes	Spring #1 - No observations noted
31-Oct-13	8:48	RC	---	---	70.4	637	---	0.46	2.7	7.59	No	Spring #1 - Clear water
23-Sep-14	8:15	RC	0.1	Estimated	73.4	737	---	1.04	6.1	7.56	No	Spring #1 - Clear
11-Nov-14	8:42	RC	0	---	69.3	694	---	---	5.8	7.55	No	Spring #1 - Clear
18-Nov-15	9:35	RC	---	---	70.0	632	---	---	6.85	7.21	Yes	Spring #1 - Clear water with no visible flow. Sampled by collecting in 2 gallon bucket tied to string.
25-Feb-16	9:00	RC	---	---	69.5	612	---	0.45	2.5	7.18	Yes	Spring #1 - Water is clear, still, with no visible inflow.
22-Jun-16	11:35	RC	0.1	Estimated	70.7	631	---	0.36	4.33	6.64	Yes	Spring #1 - Clear water. Minor insects crawling around enclosure. Water is substantially higher than last visit.
30-Sep-16	10:10	RC	---	---	71.0	629	---	---	5.3	6.67	Yes	Spring #1 - Clear with minor algae floating on surface. No visible inflow.
30-Apr-19	7:52	RC	1.22	Measured	70.2	---	690.2	---	---	7.14	No	Spring #1 - Water overflowing into outside spring box.
14-Aug-19	13:55	M&A	0.13	Measured	64.3	---	709	1.87	---	7.43	Yes	Spring #1 - Bomb shelter spring box. Overflows into sump outside of shelter. Siphoned from sump to water trees.
1-Oct-19	8:44	M&A	0	---	71	---	632	---	4	7.06	No	Spring #1 - Water pooled in tank in vault. Water likely coming from hillslope that vault is built into.
	8:56	M&A	0.53	Measured	70.2	---	619.8	---	4	7.11	No	Spring #2 - Water emerges from hill slope into spring box, then flows into small pond that leaks and reinfiltrates water.
15-Nov-19	10:00	M&A	0	---	68.7	---	668.1	0.48	---	7.24	Yes	Spring #1 - Clear water with particulates floating on top. Wood and metal shavings visible at the bottom of the vault.
	10:44	M&A	0	---	67.3	---	671	0.44	---	7.2	No	Spring #2 -Clear water in concrete spring box. Full pond, but no outflow.
18-Nov-19	9:57	M&A	0	---	69.9	---	---	---	5	7.19	No	Spring #1 - Water is clear and odorless. Pumped to house at 48 PSI.
	10:11	M&A	0	---	69.3	---	687.8	---	3.5	7.21	No	Spring #2 -Hillside seep with spring box adjacent to pond. Rancher was pumping water from spring box to fill large resevoir. No flow observed into or out from pond.

RC = Resolution Copper
M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

GOVERNMENT SPRINGS
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
North	West	< 5	Soil

COMMENTS

Hillside seep adjacent to a spring box near the Hagen Ranch. Water seeps/flows from the spring box and pools in a shallow depression.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
October 2019	Pooled with some spillover towards Mineral Creek	None Observed	Bermuda grass (Cynadon dactylon), dendelion (Taraxicum officionale), sweetclover (Melilotus sp.), prickly lettuce (Lactuca serriola)	Fremont cottonwood (Populus fremontii), Arizona sycamore (Platanus wrightii), watercress (Nasturtium officinale)	velvet mesquite (Prosopis velutina) desert broom (Baccharis sarothroides), netleaf hackberry (Celtis reticulata), one-seed juniper (Juniperus monosperma), Harrison's barberry (Berberis harrisoniana), buffpetal (Rhynchosida physocalyx)	None Observed	None Observed	None Observed
November 2019	Pooled water confined to the depression adjacent to the spring box	None Observed	Rabbitsfoot grass (Polypogon monspeliensis), ripgut brome (Bromus diandrus), red brome (Bromus rubens), Bermuda grass (Cynadon dactylon), sweetclover (Melilotus sp.), prickly lettuce (Lactuca serriola)	Fremont cottonwood (Populus fremontii), Arizona sycamore (Platanus wrightii), watercress (Nasturtium officinale), cattail (Typha sp.), water speedwell (Veronica anagallis-aquatica)	velvet mesquite (Prosopis velutina) desert broom (Baccharis sarothroides), netleaf hackberry (Celtis reticulata), one-seed juniper (Juniperus monosperma), Harrison's barberry (Berberis harrisoniana), buffpetal (Rhynchosida physocalyx), catclaw mimosa (Mimosa aculeaticarpa)	None Observed	None Observed	White-nosed coatis (Nasua narica) observed approximately 300 meters downstream

Photo 1. Government Springs, view of entrance to bunker that houses the spring box, September 2019

Photo 2. Government Springs, uncovered spring box in the back of the bunker. The box is plumbed into the nearby ranch house. September 2019

Photo 3. Government Springs. Hillside seep with adjacent spring box. Water fills small sandy bottom pool. March 2020.

Photo 4. Government Springs. October 2019. Bermuda grass (*Cynadon dactylon*) lines the perimeter of the pool.

Photo 5. Government Springs. October 2019. Watercress (*Nasturtium officinale*) is present in the wetted area of the pool.

Photo 6. Government Springs. October 2019. Canopy cover above the pool consists of Fremont cottonwood (*Populus fremontii*) and Arizona sycamore (*Platanus wrightii*).

Haley Spring
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Haley Spring		Haley Spring is a rheocrene spring located in an unnamed trubutary west of Dripping Spring Wash and occurs at the contact between younger Precambrian Dripping Spring Quartzite and underlying diabase. A depression in the sandy wash substrate appears to seep water intermittently during the year. A cement drinker is located just downstream from the spring, and appears to have been historically fed by the spring.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-03-14)08DA		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Hebbard & Webb	Sonora AZ / Yes	Ray AZ 15' (1910) Sonora AZ 7.5' (1964, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
506475	3671624	3540 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Dripping Springs Wash	Unnamed tributary	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Yds - Dripping Springs Quartzite	Rheocrene	Yd - Precambrian Diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	Yes	Cattle Drinkers Nearby	No
ACTIVELY USED?	**USE?**		
Yes	Stock watering/wildlife	N/A = Not applicable	

HALEY SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
24-May-18	10:00	M&A, RC	0	Observed	---	---	---	---	---	---	No	Muddy area at base of Dripping Springs Quartzite. Many sycamore, cottonwood, willow
4-Jun-18	8:42	M&A,WRI	0	Observed	---	---	---	---	---	---	No	Slightly muddy patch, no pooled water. Many bees.
11-Nov-19	14:40	M&A	0.25	Estimated	65.3	---	1043	1.92	---	7.74	Yes	Water is clear and odorless.
17-Mar-20	15:07	M&A,WRI	1.86	Measured	58.2	---	860.5	---	4.5	7.41	No	Intermittent flowing reach. In and out of alluvial cover. Increased flow measured about 200 ft downstream from source. Flow observed for 600 ft.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

HALEY SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East	Center	3	Bedrock - Dripping Springs Quartz

COMMENTS

Spring at contact between Diabase and Dripping Springs Quartz. There is a circular concrete drinker approximately 3m x 3m in size and a rectangular concrete drinker approximately 3.5m x 0.5m in size located near this spring. Spring empties into mountain drainage with limited surface flow resulting a small pool below a diabase rock ledge. Water when present is piped to the concrete drinker downstream from the spring.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
6/4/2018	Damp soil	None Observed	None Observed	Goodding's willow (Salix gooddingii), Arizona sycamore (Platanus wrightii), seepwillow (Baccharis salicifolia), skullcaps (Scutellaria sp.), Fremont cottonwood (Populus fremontii)	desert broom (Baccharis sarothroides), velvet mesquite (Prosopis velutina), net-leaf hackberry (Celtis reticulata), sugar sumac (Rhus ovata), barberry (Berberis sp.), hollyleaf buckhorn (Rhamnus illicifolia), Emory oak (Quercus emoryi), canyon grape (Vitis arizonica), one seed juniper (Juniperus monosperma)	None Observed	Dead redtailed hawk above springhead and empty hawk nest in cottonwood, zone-tailed hawk observed flying above site.	None Observed
3/17/2020	Surface flow consists of a heavy trickle over a diabase rock ledge into a shallow pool below the ledge. Pooled water is present in the rectangular concrete drinker.	None Observed	Rabbitsfoot grass (Polypogon monspeliensis), red brome (Bromus rubens), oats (Avena sp.)	Arizona sycamore (Platanus wrightii), Willow (Salix sp.), monkey flower (Erythranthe sp.), mosses (bryophyta), Fremont cottonwood (Populus fremontii)	one-seed juniper (Juniperus monosperma), sotol (Dasylirion wheeleri), thistle (Cirsium sp.), Poaceae, jojoba (Simmondsia chinensis), saguaro (Carnegiea gigantea), agave (Agave sp.), cholla (Cylindropuntia sp.), mountain mahogany (Cercocarpus montanus), sugar sumac (Rhus ovata), miner's lettuce (Claytonia perfoliata), bedstraw (Galium aparine), hoary bowlesia (Bowlesia incana)	Mosquito larvae	None observerd	None observed

Photo 1. Haley Spring, view of spring emergence at the contact between Dripping Springs Quartzite and diabase, March 2020

Photo 2. Pooled water is present in the rectangular concrete drinker. Moss (Bryophyta) grows at the base, March 2020

Photo 3. Haley Spring, view of flowing reach downstream from emergence, March 2020

Photo 4. Fremont cottonwood (*Populus fremontii*) in drainage near Haley Spring, June 2018

Photo 5. Haley Spring, damp. Arizona sycamore (*Platanus wrightii*) is located in the drainage bottom at the springhead, June 2018

Photo 6. Dead redtail hawk above Haley Spring, June 2018

HAPPY CAMP SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Happy Camp Spring		Happy Camp Spring is on the floor of Happy Camp Wash; concrete headwall/dam across the wash with alluvium behind the wall; seeps across the face and along the sides of the headwall; headwall is built on cemented Gila Conglomerate; large deposit of older alluvium with cobbles located on the west bank of the wash adjacent to and upstream from the headwall, but stream channel is cut to the Gila Conglomerate/Tertiary volcanics with intermittent pockets of modern alluvium	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)28cd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Picketpost, AZ / Yes	Superior AZ 15' (1948)Picketpost AZ 7.5' (2004, 2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12Z	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
486883	3685613	2680 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	Yes	36-24051 (USFS)	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle Gila	Queen Creek	Happy Camp Canyon	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash-Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Older and younger alluvium	Rheocrene	QTg - Gila Conglomerate/Tv - Tertiary volcanics
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	mixed runoff/spring	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
concrete headwall	Plastic piping from headwall to stock pond	Handdug well to west with pump and tubing	Stock pond at pipe outlet 200 meters downstream from headwall
ACTIVELY USED?	**USE?**		
Yes?	Stock watering/wildlife?		

HAPPY CAMP
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
18-Feb-13	12:30	M&A/RC	0.1	container & stop watch	74.3	---	800	0.0	3.5	7.3	Yes	No flow above concrete headwall; weeping at headwall and along sides. Filled sample containers at pipe outlet into stockpond downstream from headwall.
7-Aug-13	12:46	RC	0.1	---	93.2	1102	942	---	3.3	9.1	Yes	Small pools fed by very minor flow.
28-Oct-13	17:00	RC	---	---	---	---	---	---	---	---	No	Fingers of seepage out of a spring leading to a 20 gallon puddle. Clear pools of water with no flow (stagnant).
4-Mar-14	12:50	RC	<1	estimated	74.7	895	---	2.4	---	8.4	Yes	Very low flow; clear pool of water near center flow from west and north hills.
21-May-14	16:35	RC	0.1	---	60.4	796	---	4.6	7.3	8.9	No	Very low flow seeps. Not enough water to sample. Lots of algae.
8-Aug-14	8:30	RC	0.1	---	70.2	741	---	1.6	---	8.5	No	Several fingers of seepage from 3' wide area on weir. Not enough water to sample or take DO.
4-Nov-14	10:53	RC	0.1	---	---	---	---	---	---	---	No	5 distinct seeps (<0.1 gpm), clear, minor algae, not enough water present for parameters/sample.
3-Mar-15	9:18	RC	0.5	---	44.7	904	---	0.8	12.4	7.8	No	Clear small puddles of water - some run-off and some spring water.
13-May-15	9:05	RC	0.2	---	58.6	875	---	7.2	8.6	8.5	No	Clear with yellow tint; seep flow is < 0.5 gpm; parameters taken from spring-fed puddle. Not enough water to sample.
20-Oct-15	10:31	RC	---	---	---	---	---	---	---	---	No	Flow to low and pools too shallow to sample or measure parameters.
12-Feb-16	13:30	RC	1	---	77.1	644	---	3.2	13.0	9.1	Yes	Clear water; yellow tint; minor algae; atypical 'high' flow for spring (<1 gpm) with multiple seeps flowing; not enough water in pool for accurate DO measurement (not enough water to move sensor).
17-Mar-16	12:35	RC	---	---	73.6	799	---	3.7	12.5	8.5	Yes	Clear water with minor floating debris; multiple seeps.
28-Apr-16	11:30	RC	---	---	---	---	---	---	---	---	No	Water is clear to slightly murky, brown tint in places. Impacted by cattle - will not sample. Seeps are flowing but too much cow manure for representative sample. 11:38: checked out cattle tank downstream; discharge out of pipe too low to sample. Discharge was clear.
12-Jul-16	10:53	RC	0.5	---	---	---	---	---	---	---	No	Very minor seeps (<1gpm); too low flow to sample or take parameters.
11-Nov-16	13:30	RC	0.1	---	---	---	---	---	---	---	No	Very small pools; only 1-3 seeps active; total flow is <0.1gpm. Not enough water for parameters or sample.
30-Mar-17	12:00	RC	0.5	---	77.1	695	---	0.8	---	8.3	Yes	Multiple seeps flowing; clear water; moderate amount of algae. Samples and parameters were taken from a pool in the spring discharge path (~10 ft from spring itself). The downstream spigot (in cattle tank) was submerged. DO was omitted due to aeration in the sample bottle. ORP is 137mV.

HAPPY CAMP
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
05-2017	---	WRI	---	---	69.8	730	---	---	---	9.1	No	Flow starts in dense patch of vegetation just downstream from concrete dam, but there is damp sand upstream from this. Flows from stream banks converge into stream bed and flow downstream for approximately 50 meters.
27-Sep-17	11:40	M&A	0.1	---	73.3	---	630	49	---	8.5	Yes	Very minor seep/flow at check dam into small pools in the alluvium. Largest pool enlarged at base of flow to allow for sampling; slight tan tint and earthy odor.
4-Dec-17	---	M&A	---	---	65.2	---	1267	2	---	6.9	No	Very minor trickle of water from steel pipe decreasing over 20 minutes before stopping.
12-Mar-18	9:50	M&A	0.3	---	57.0	---	902	1	---	7.1	Yes	Ground in moist with several stagnate ponds (~150 gallons); strong odor of manure in area; sample collected from discharge pipe at connection; clear with slight yellow tint; odorless.
4-Jun-18	8:40	M&A	0	---	---	---	---	---	---	---	No	Rock face under check dam moist, but no observable flow; no flow through pipe at connection; too low flow to sample or take parameters.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

HAPPY CAMP SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Center	2	Alluvium over bedrock

COMMENTS

Several seeps that occur in the contact between the bedrock strata maintain a channel of water that supports herbaceous plants. A few Goodding's willow (Salix gooddingii) and velvet mesquite (Prosopis velutina) form the overstory with canyon ragweed (Ambrosia ambrosiodes) present along the banks. An impoundment below the road holds water.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
May 2017	Flow starts in dense patch of vegetation just downstream from concrete dam, but there is damp sand upstream from this. Flows from stream banks converge into stream bed and flow downstream for approximately 50 meters	None observed	Malta star thistle (Centaurea melitensis), Bermuda grass (Cynodon dactylon), sowthistle (Sonchus sp.), beardless rabbitsfoot grass (Polypogon monspeliensis)	toad rush (Juncus bufonius), grassleaf rush (Juncus marginatus), yellow monkeyflower (Mimulus guttatus), purple mat (Nama demisssa), beardless rabbitsfoot grass (Polypogon monspeliensis), speedwell (Veronica anagallis-aquatica)	false pennyroyal (Hedeoma sp.)	None Recorded	common raven (Corvus corax), Gambel's quail (Callipepla gambelii), greater roadrunner (Geococcyx californianus), white-winged dove (Zenaida asiatica)	None Recorded

Photo 1. Happy Camp view downstream from above dam showing Goodding's willow and velvet mesquite, May 2017.

Photo 3. Happy Camp view of seepage along bedrock with yellow monkeyflower and beardless rabbitsfoot grass in the background, May 2017.

Photo 5. Spring discharge pipe at stock pond 600 feet downstream from headwall/dam, August 2012.

Photo 2. Happy Camp view upstream showing Goodding's willow and dam, black poly tubing visible on right side of channel, May 2017.

Photo 4. Happy Camp view of saturated area by dam and herbaceous vegetation of beardless rabbitsfoot grass, May 2017.

Photo 6. View of stock pond below Happy Camp Spring headwall, May 2017.

HIDDEN SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Hidden Spring	May be same as "Bell Spring" from 1911-vintage GLO township map?	Hidden Spring discharges from Paleozoic carbonates west of the Apache Leap Tuff outcrop belt. Water collects in a buried vertical galvanized steel culvert at mouth of small grotto and is piped to a metal trough, which overflows and forms a shallow stream for approximately 5-meters. Travertine cave on slope to south may have been original spring.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-12)14cb		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Superior AZ / Yes	Superior AZ 7.5' (2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
491249	3679611	3040 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	Yes	36-24052 (USFS)	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Queen Creek	Arnett Creek	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000401	Arnett Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact and/or fracture spring	Martin Limestone (Dm) and Escabrosa Limestone (Me)	Rheocrene	Bolsa Quartzite (Cb)?
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring dominated	developed spring around a caisson	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Water collects in an underground galvanized steel culvert	Fenced; piping from culvert to metal trough	NA	NA
ACTIVELY USED?	**USE?**		
Yes?	Livestock/wildlife		

HIDDEN SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
11-2002	---	WRI	---	---	---	---	---	---	---	---	No	Water present in caisson but none in drinker
15-May-03	17:00	GAI	0	---	64.9	---	642	3.1	3.3	7.6	Yes	
20-Aug-03	8:45	GAI	0	---	73.6	---	710	2.1	0.2	7.4	Yes	
3-Nov-03	10:30	GAI	<0.1	estimated	64.4	---	767	3.2	0.5	7.4	Yes	
9-Feb-04	12:10	GAI	<0.1	estimated	52.7	---	485	1.2	7.3	8.0	Yes	
24-May-04	9:00	GAI	<0.1	estimated	63.7	---	716	1.0	17.8	7.4	Yes	
4-Aug-04	8:55	GAI	<0.1	estimated	73.9	---	342	5.2	0.1	7.8	Yes	
3-Nov-04	11:20	GAI	<0.1	estimated	60.1	---	694	1.4	0.6	7.4	Yes	
9-Feb-05	11:50	GAI	<0.1	estimated	58.8	---	709	4.1	5.6	7.5	Yes	
3-May-05	12:15	GAI	1	estimated	70.9	---	628	1.0	7.7	7.3	Yes	
3-Aug-05	---	GAI	2	estimated	73.0	---	663	0.6	4.0	7.1	Yes	
19-Aug-08	8:30	M&A	<0.1	estimated	76.1	---	678	1.6	4.4	7.2	Yes	
6-Nov-08	9:30	RC	<0.1	estimated	66.4	---	716	0.8	3.2	7.1	Yes	
10-Feb-09	13:00	RC	<0.1	estimated	66.9	---	637	0.3	5.5	7.4	Yes	
12-May-09	14:15	RC	<0.1	estimated	69.1	---	673	4.0	9.0	7.2	Yes	
4-Aug-09	9:00	RC	---	---	---	---	698	---	---	7.3	No	
12-Feb-10	9:30	RC	1.5	estimated	70.9	---	619	4.6	11.5	7.3	Yes	1-2 gpm coming right out of out crop
13-Jul-10	8:07	RC	2	---	74.1	---	638	---	10.2	9.8	No	Clear with brown muddy bottom
17-Jul-10	15:02	RC	---	---	78.4	---	667	---	---	6.8	Yes	Sample dipped from pool
9-Nov-10	10:45	RC	0.1	estimated	66.6	---	639	2.0	8.9	7.1	Yes	
14-Feb-11	10:55	RC	0.1	---	---	---	---	---	---	---	No	Trace Flow
05-2011	---	WRI	---	---	---	---	---	---	---	---	No	Water is present in caisson but none in drinker
13-May-11	10:25	RC	DRY	---	---	---	---	---	---	---	No	Dry

HIDDEN SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
9-Nov-11	10:45	RC	---	---	66.6	---	---	2.0	8.9	7.1	No	
7-May-12	12:00	RC	DRY	---	---	---	---	---	---	---	No	Dry
06-2012	---	WRI	---	---	---	---	---	---	---	---	No	Moisture evident in the soil but no standing or flowing water.
5-Jun-14	11:14	RC	0.1	---	70.5	739	---	1.1	6.2	8.0	No	Unknown point of origin; clear; algal mats on surface (in tank).
22-Aug-14	10:25	RC	0	---	72.0	605	---	13.9	2.6	8.4	No	Greenish-tint; no algae floating in tank. No visible flow.
16-Oct-15	13:36	RC	---	---	72.0	689	---	---	1.8	7.5	Yes	Slightly murky water; sampeld from well under old metal top. Approx .5 feet of water.
8-Mar-16	13:58	RC	---	---	61.7	586	---	5.4	2.0	7.4	Yes	Water is clear; covered by an old steel plate; sampled from hand dug well.
6-Jun-16	14:40	RC	<1	estimated	81.9	630	---	5.1	15.6	8.2	Yes	Murky; water dripping into trough from spiggot <1GPM.
4-Aug-16	11:00	RC	---	---	75.8	756	---	9.6	1.1	7.0	Yes	Water level in trough is very low - no flow to it. Upstream sump is filled approx. 1/2 way. Evidence of recent storm - everything is saturated; flow lines in mud. Took parameters and sample from sump. Syringed water from sump into bottles. Water is clear. No visible flow.
05-2017	---	WRI	---	---	69.4	733	---	---	---	7.7		Drinker is full and overflowing forming shallow stream for about 5 meters
24-Sep-19	16:44	M&A	---	---	70.8	---	920.2	---	1	7.82	No	Partly cloudy, partial shade. Water only inside 4-foot diam culvert. 8 inches deep. No flow out into drinker.
19-Nov-19	11:09	M&A	---	---	61.1	---	936	---	---	7.99	No	Stagnant water present in steel culvert spring box that is piped to a concrete drinker west of the spring. No flow present. Water is clear, slight fetid odor with oil film on surface.

WRI = WestLand Resources, Inc.
GAI = Golder Associates, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

NOTE: Results of hydrochemical analysis for this spring are presented in the following reports:

Montgomery & Associates, 2010, **Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds:** Final report prepared for Resolution Copper Mining LLC, February 17, 2010.

Montgomery & Associates, 2012, **Results of hydrochemical characterization, Upper Queen Creek/Devils Canyon study area:** Final report prepared for Resolution Copper Mining LLC, March 9, 2012.

Montgomery & Associates, 2013, **Surface water baseline report, Devils Canyon, Mineral Creek, and Queen Creek watersheds:** Final report prepared fro Resolution Copper Mining LLC, May 16, 2013.

Montgomery & Associates, 2016, **Hydrochemistry addendum, groundwater and surface water, Upper Queen Creek/Devils Canyon study area:** Final report prepared for Resolution Copper Mining LLC, August 11, 2016.

HIDDEN SPRING
Section 3: Bilogical Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	Center	5	Gravel

COMMENTS

A developed spring in a narrow canyon with a small riparian vegetation complex and one dominant netleaf hackberry around a caisson. The caisson occurs in a limestone cave, in which the limestone shows evidence of past water flow in the form of travertine deposits. Under a desert hackberry tree, a galvanized culvert forms a round spring box ~ 2 meters in diameter which is piped to a drinker. Where the drinker overflows herbaceous vegetation occurs along the streambed. A travertine cave across canyon from the springbox has no evident moisture. A patch of common garden Iris is present, probably a relict from when the area was homesteaded.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
November 2002	Water present in caisson but none in drinker	None Observed	None Recorded	None Recorded	jojoba (Simmondsia chinensis), velvet mesquite (Prosopis velutina)	None Observed	Gambel's quail (Callipepla gambelii)	None Recorded
May 2011	Water present in caisson but none in drinker	None Observed	common garden iris (Iris sp.), horehound (Marrubium vulgare), London rocket (Sisymbrium irio), red brome (Bromus rubens), rabbitsfoot grass (Polypogon monspeliensis)	Goodding's willow (Salix gooddingii), seepwillow (Baccharis salicifolia)	annual ragweed (Ambrosia artemisiifolia), netleaf hackberry (Celtis reticulata), catclaw acacia (Senegalia greggii), jojoba (Simmondsia chinensis), velvet mesquite (Prosopis velutina), wolfberry (Lycium sp.)	None Observed	None Observed	None Observed
May 2017	Drinker is full and overflowing forming shallow stream for ~ 5 meters.	None Observed	common garden iris (Iris sp.), red brome (Bromus rubens), rabbitsfoot grass (Polypogon monspeliensis), Johnson grass (Hordeum jubatum), London rocket (Sisymbrium irio)	yellow monkeyflower (Mimulus guttatus), dead Goodding's willow (Salix gooddingii)	globemallow (Sphaeralcea sp.), desert hackberry (Celtis pallida), catclaw acacia (Senegalia greggii), jojoba (Simmondsia chinensis), velvet mesquite (Prosopis velutina)	None Observed	None Observed	None Observed
September 2019	No data	Sonoran Desert tortoise (Gopherus morafkai)	Maltese star thistle (Centaurea melitensis)	None Observed	desert globemallow (Sphaeralcea ambigua), netleaf hackberry (Celtis reticulata), jojoba (Simmondsia chinensis), desert broom (Baccharis sarothroides), greythorn (Ziziphus obtusifolia)	None Observed	None Observed	None Observed
November 2019	No data	None Observed	Maltese star thistle (Centaurea melitensis), Meditteranean grass (Schismus sp.), London rocket (Sisymbrium irio), red brome (Bromus rubens), sweetclover (Melilotus sp.)	None Observed	desert globemallow (Sphaeralcea ambigua), netleaf hackberry (Celtis reticulata), jojoba (Simmondsia chinensis), desert broom (Baccharis sarothroides), greythorn (Ziziphus obtusifolia), broom snakeweed (Gutierrezia sarothrae), catclaw acacia (Senegalia greggii), velvet mesquite (Prosopis velutina), Berlandier's wolfberry (Lycium berlandieri)	None Observed	None Observed	None Observed

Photo 1. Hidden Spring, view of spring culvert with netleaf hackberry overstory, October 2002.

Photo 2. Hidden Spring, view of dry drinker with velvet mesquite and upland desert scrub in the background, October 2002.

Photo 3. Hidden Spring, view of spring box with netleaf hackberry overstory, May 2011.

Photo 4. Hidden Spring, view of nonnative common garden Iris, relict from when the spring was homesteaded, May 2011.

Photo 5. Hidden Spring, view of spring culvert with netleaf hackberry treetrunk visible in right foreground, May 2017.

Photo 6. Hidden Spring, view of drinker with herbaceous vegetation including rabbitsfoot grass, May 2017.

Photo 7. Hidden Spring. September 2019. A Sonoran Desert tortoise (*Gopherus morafkai*) observed within 10 m of the site.

Photo 9. Hidden Spring. November 2019. Netleaf hackberry (*Celtis reticulata*) surrounds the spring caisson. Jojoba (*Simmondsia chinensis*) is also present.

Photo 8. Hidden Spring. September 2019. Netleaf hackberry (*Celtis reticulata*) surrounds the spring caisson.

HOT ROD SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Hot Rod Spring	Links Spring	Hot Rod Spring discharges in a steep drainage in the Dripping Springs Mountains. The spring occurs at the contact of the Troy Quartzite and diabase. There is a hand dug tunnel on the southern side of the drainage with plastic hose used to divert water to a metal holding container approximately 200 feet downstream.	
COUNTY	**CADASTRAL (40-acre)**		
Gila	(D-03-15)30cbd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Bureau of Land Management		No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
513280	3666830	3260 feet amsl	Estimated from USGS 7.5' topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Dripping Springs Wash	Unnamed tributary	Persistent/Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Fracture/contact spring	Yt - Troy Quartzite	Rheocrene	Yd - Precambrian diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	Spring box	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Spring box at head of spring	Plastic hose	---	No
ACTIVELY USED?	**USE?**		
Yes	Livestock / wildlife	N/A = Not applicable	

HOT ROD SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
28-Jan-20	10:30	M&A	0.5	Estimated	61.5	---	738	6.4	---	7.16	Yes	Water is clear and odorless. Flow only appears in the man-made excavation in the bank of the channel. Some piping present around the spring, likely used for stock water. Excavated rock appears to be highly weathered diabase.
25-Mar-20	9:55	M&A, WRI	0.22	Measured	63.5	---	808.5	1.2	4.5	7.31	No	Water present in dugout sump on southern side of ravine. No flow into holding tank below.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

WestLand Resources, Inc.
Engineering and Environmental Consultants

MONTGOMERY & ASSOCIATES

HOT ROD SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Northeast	Center	-	Bedrock and alluvium

COMMENTS

The site is located along a desely vegetated drainage bottom approximately 0.5 miles south of Dripping Spring Wash. The site contains a sump that has been excavated into the river right hillslope. The sump excavation measures approximately 3.5' wide x 3.5' high x 6' deep. Approximately 100' downstream from the sump, an unpaved 4WD road crosses the drainage. Downstream from the 4WD road, plastic pipes are draped along the canyon bottom.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/25/2020	Water is pooled inside the sump. Upstream from the 4WD road, the drainage substrate is damp. Downstream from the 4WD road, approximately 30' of seepy surface flow is present.	None observed	red brome (Bromus rubens)	Fremont cottonwood (Populus fremontii), Arizona sycamore (Platanus wrightii)	Snapdragon penstemon (Keckiella antirrhinoides), miner's lettuce (Claytonia perfoliata), catclaw acacia (Senegalia gregii), sugar sumac (Rhus ovata), thistle (Cirsium sp.), fiddleneck (Amsinckia sp.), netleaf hackberry (Celtis reticulata), jojoba (Simmondsia chinensis), velvet mesquite (Prosopis velutnia), oneseed juniper (Juniperus monosperma), graythorn (Ziziphus obtusifolia), shrub oak (Quercus turbinella), Arizona white oak (Quercus arizoniuca), snakeweed (Gutierrezia sarothrae), white sagebrush (Artemesia ludoviciana), Gila manroot (Marah gilensis), hoary bowlesia (Bowlesia incana)	None observed	Gila woodpecker, dark-eyed junco (Junco hyemalis), cooper's hawk (Accipiter cooperii), unoccupied raptor nest	None observed

Photo 1. Hot Rod Spring, view of metal covering opening into excavated spring, January 2020

Photo 2. Hot Rod Spring, view of spring emergence with little flow, January 2020

Photo 3. Hot Rod Spring, view of nearby tank fed by spring, January 2020

Photo 4. A giant desert centipede (*Scolopendra heros*) observed at the site, March 2020

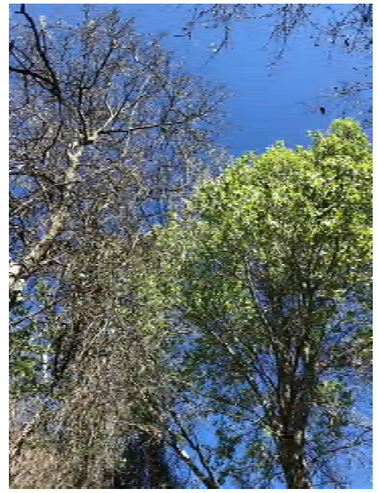

Photo 5. Canopy cover at the site includes Fremont cottonwood (*Populus fremontii*), Arizona sycamore (*Platanus wrightii*), March 2020

IBERRI SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Iberri Spring	Fig Spring, I Berry Spring	A well and drinker are present west of the road. Downstream from well and drinker, bedrock outcrops in stream channel and water seeps from several fractures and collects and flows. At the upper end of the seeps an open ended horizontal pipe is embedded in the bedrock and a 1.5 meter wide by 0.25 meter high concrete dam is constructed, evidence of former spring development.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)14dc		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	No	NA

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
490704	3688822	3610 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
No	No	NA	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Peachville Wash	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Fracture spring	Cretaceous quartz diorite	Rheocrene	Diorite
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	At the upper end of the seeps an open ended horizontal pipe is embedded in the bedrock	1.5 meter wide by 0.25 meter high concrete dam	No
ACTIVELY USED?	**USE?**		
Yes?	Stock watering / wildlife?	NA = Not applicable	

IBERRI SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
05-2017	---	WRI	---	---	---	---	---	---	---	---	No	Surface water present
23-Jan-18	17:05	M&A	---	---	---	---	---	---	---	---	No	No water presence at trough, pit, or channel. Dry conditions.
10-Apr-18	17:41	M&A, WRI	---	---	---	---	---	---	---	---	No	No water presence at trough, pit, or channel. Dry conditions.
24-Sep-19	12:48	M&A	0	---	---	---	---	---	---	---	No	No water presence at trough, pit, or channel. Dry conditions.
25-Nov-19	14:43	M&A	0	---	---	---	---	---	---	---	No	Channel surrounding spring emergence is saturated, likely from recent precipitation.

WRI = WestLand Resources, Inc.
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

IBERRI SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southeast	Northeast	10	Bedrock

COMMENTS

A well and galvanized drinker is present west of the road. Downstream of the well and drinker, bedrock intrudes across the streambed and water seeps from several cracks, collects and flows. The flows disappear downstream in sandy substrate. At the upper end of the seeps an open ended horizontal pipe is embedded in the bedrock and a 1.5 meter wide by 0.25 meter high concrete dam is constructed, evidence of former spring development. A disjunct lower reach is surrounded by herbaceous vegetation and flows and pools occur over 15 meters. Tadpoles are present in the pools. A large seepwillow is present between the reaches. No riparian vegetation overstory. Upland vegetation of desert scrub continues to edge of channel.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
May 2017	Surface water present	None Observed	None Observed	algae, yellow monkeyflower (Mimulus guttatus), seepwillow (Baccharis salicifolia)	oats (Avena sp.)	tadpoles	None Observed	None Observed
September 2019	No flow. Soil at the base of the bedrock intrusion is damp.	None Observed	red brome (Bromus rubens), Lehmann lovegrass (Eragrostit lehmanniana)	seepwillow (Baccharis salicifolia)	oats (Avena sp.), threeawn (Aristida sp.), catclaw acacia (Senegalia gregii), sotol (Dasylirion wheeleri)	None observed	None observed	None observed
November 2019	Dry.	None Observed	red brome (Bromus rubens), Lehmann lovegrass (Eragrostit lehmanniana)	seepwillow (Baccharis salicifolia)	oats (Avena sp.), threeawn (Aristida sp.), catclaw acacia (Senegalia gregii), desert honeysuckle (Anisacanthus thurberi), sotol (Dasylirion wheeleri), datura (Datura sp.), cane bluestem (Bothriochloa barbinodis)	None observed	None observed	None observed

Photo 1. Iberri Spring, view of well and drinker, May 2017.

Photo 3. Iberri Spring, view of open ended horizontal pipe embedded in the bedrock at the upper end of the seeps. Yellow monkeyflower, oats and algae are present around the water that drips from the pipe, May 2017.

Photo 5. Seepwillow (*Baccharis salicifolia*) is present in the channel at Iberri Spring. Sotol (*Dasylirion wheeleri*) is visible along the bank. September 2019.

Photo 2. Iberri Spring, view of bedrock intrusion across streambed and small concrete dam. Yellow monkeyflower and algae are present around the water collected around the dam, May 2017.

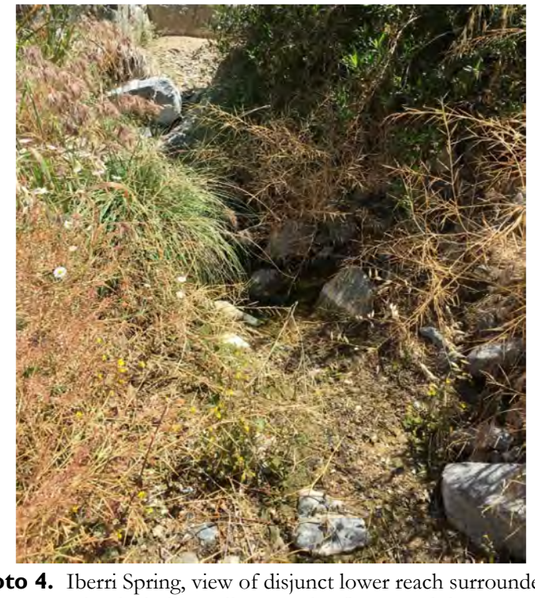

Photo 4. Iberri Spring, view of disjunct lower reach surrounded by herbaceous vegetation including yellow monkeyflower and deergrass, May 2017.

Photo 6. Iberri Spring, view of tadpoles in pool in disjunct lower reach, May 2017.

Indian Spring
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Indian Spring		Indian Spring is a rheocrene spring located in an unnamed tributary west of Dripping Spring Wash, approximately 0.5 miles downstream from Chimney Spring and occcurs at the contact between Dripping Springs Quartzite and Diabase. Spring water is retained by a concrete headwall about 10 feet wide by 2 feet high across the channel. A pipe near the base of the headwall discharges water stored behind the dam.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-14)32cbd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Hebbard & Webb	Sonora AZ / Yes	Sonora AZ 7.5' (1964, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
505861	3675091	3680 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Mineral Creek	Tributary to Walnut Creek	Pesistent/Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000206	Upper Mineral Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Yds - Dripping Springs Quartzite	Rheocrene	Yd - Precambrian Diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	Yes	Concrete dam	Dammed pond at mouth of spring
ACTIVELY USED?	**USE?**		
Yes	Stock watering/wildlife	N/A = Not applicable	

INDIAN SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
24-May-18	10:00	M&A, WRI	0.18	Measured	66.6	---	755	---	2.6	7.54	No	Large concrete dam (10' across, 2' high), water pooled behind dam up to 6" deep. Flowing reach approximately 30 ft
13-Jun-19	11:35	M&A	0.1	Measured	66.6	---	864	0.9	---	7.11	Yes	Water flows from discharge pipe in concrete retaining wall
13-Nov-19	11:30	M&A	0.25	Estimated	56.1	---	733.4	5.26	---	7.28	Yes	Slight yellow color, slight organic odor
10-Mar-02	13:06	M&A, WRI	1.26	Measured	58.1	---	746.0	---	6.8	7.55	No	Water emerges from stream channel approx. 20 ft above masonry dam. Water flows over dam due to excessive sand retained behind dam. Flows down diabase channel for ~700 ft.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

INDIAN SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Northeast	Center	-	Bedrock and alluvium

COMMENTS

The site is located in a canyon bottom amongst steep topography. A concrete springbox spans the drainage, with a spring pipe nested in the springbox approximately 6" above the ground surface. The canyon bottom is vegetated with large riparian trees including Arizona sycamore (Platanus wrightii) and Goodding's willow (Salix gooddingii) and Fremont cotonwood (Populus fremontii).

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
6/5/18	Surface water present (flowing)	None Observed	None Observed	Goodding's willow (Salix gooddingii), Arizona sycamore (Platanus wrightii), seepwillow (Baccharis salicifolia)	Fremont cottonwood (Populus fremontii), one seed juniper (Juniperus monosperma), mesquite (Prosopis sp.)	One (1) Lowland leopard frog (Lithobates yavapaiensis), giant water bug (Abedus sp.), damselfly and dragonfly nymphs (Odonata), sunburst beetle (Thermonectus marmoratus), water strider (Gerridae)	None Observed	None Observed; coyote/dog tracks and ungulate tracks noted
3/10/20	Flow out of spring pipe. Intermittent flow upstream of spring box. Steady trickle of flow downstream of spring box	None Observed	None Observed	Goodding's willow (Salix gooddingii), Arizona sycamore (Platanus wrightii), seepwillow (Baccharis salicifolia), Fremont cottonwood (Populus fremontii), algae, Narrowleaf willow (Salix exigua)	sugar sumac (Rhus ovata), oneseed juniper (Juniperus monosperma), shrub oak (Quercus turbinella), moss (Bryophyte sp.), berberis (Berberis sp.), jojoba (simmondsia chinensis), hopbush (Dodonaea viscosa), honeysuckle (Lonicera sp.)	None observed	Several unoccupied raptor nests	None observed

Photo 1. Indian Spring, view of concrete dam at spring emergence, June 2019

Photo 2. Indian Spring, view of pipe with flow at base of concrete dam, June 2019

Photo 3. Indian Spring, looking downstream, water flowing over diabase channel, March 2020

Photo 4. One adult lowland leopard frog (*Lithobates yavapaiensis*) was observed at Indian Spring, June 2018

Photo 5. Riparian overstory near Indian Spring is primarily dominated by Arizona sycamore (*Platanus wrightii*) and a few Goodding's willow (*Salix gooddingii*), June 2018

Photo 6. Fremont cottonwood (*Populus fremontii*) canopy cover at the site. An unoccupied raptor nest is circled in red, June 2018

KANES SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Kanes Spring	Kane Spring	Kanes Spring discharges from Paleozoic carbonates west of the Apache Leap Escarpment. Spring flows from contact between limestone strata. Some flow is captured in small tinajas below the seeps, and some flow continues down the bedrock before disappearing in sandy alluvium in streambed. Spring box with several generations of outlet piping evident.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-12)24bc		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Teapot Mountain, AZ / Yes	Teapot Mountain AZ 7.5' (2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
493036	3678400	3160 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	Yes	36-24048 (USFS)	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Queen Creek	Arnett Creek	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000401	Arnett Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact and/or fracture spring	Paleozoic limestone	Rheocrene	Limestone
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring dominated	small pool and springbox	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Spring box at head of spring	Several generations of pipeline from spring box leading down canyon	---	Flow is retained in a series of small rock pools in bedrock below the spring
ACTIVELY USED?	**USE?**		
Yes	Stock and wildlife		

KANES SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
10-2002	---	WRI	---	---	---	---	---	---	---	---	No	Water present in 2.5 meter x 1 meter pool on bedrock below steep travertine drops
15-May-03	15:00	GAI	0	---	81.9	---	397	4.7	11.5	8.5	Yes	
20-Aug-03	8:00	GAI	0	---	72.9	---	790	4.0	3.0	8.1	Yes	
3-Nov-03	8:50	GAI	<0.1	---	58.3	---	903	5.3	3.8	8.1	Yes	
9-Feb-04	10:00	GAI	<0.1	---	39.6	---	771	0.7	7.0	7.6	Yes	
4-Aug-04	---	GAI	---	---	76.1	---	785	10.4	---	8.1	No	
3-Nov-04	8:50	GAI	---	---	44.4	---	757	0.8	6.7	8.2	Yes	
9-Feb-05	10:02	GAI	<0.1	---	44.4	---	698	5.3	10.4	8.3	Yes	
3-May-05	10:05	GAI	0.5	estimated	60.4	---	752	0.5	12.5	8.1	Yes	
3-Aug-05	8:05	GAI	0.1	estimated	72.9	---	1019	18.8	5.9	7.8	Yes	
29-Aug-08	10:00	M&A	<0.1	---	74.7	---	707	0.0	7.2	7.9	Yes	
5-Nov-08	16:15	RC	0.1	---	69.3	---	654	0.6	5.8	7.0	Yes	
10-Feb-09	15:30	RC	0.6	---	69.3	---	613	0.3	6.6	7.4	Yes	
13-May-09	9:30	RC	0.4	---	71.2	---	650	3.2	7.0	7.3	Yes	
4-Aug-09	7:48	RC	---	---	83.1	---	668	---	---	8.1	No	~12ft of ground saturation in a line trending down hill
12-Feb-10	11:15	RC	0.5	Bucket & Stop Watch	65.5	---	653	11.0	9.0	7.5	Yes	clean but site in shade ~60 degrees
13-Jul-10	9:40	RC	0.01	Bucket & Stop Watch	76.8	---	761	---	6.4	7.5	No	
17-Jul-10	17:08	RC	---	---	75.9	---	730	---	---	7.4	No	Dipped out of pool
9-Nov-10	9:23	RC	0.2	Bucket & Stop Watch	68.5	---	318	0.5	12.1	6.7	Yes	
14-Feb-11	9:30	RC	1	Bucket & Stop Watch	68.4	---	700	---	---	7.5	No	SC parameter taken from spring box
13-May-11	8:40	RC	0.03	Bucket & Stop Watch	69.1	---	667	---	---	7.3	No	
7-May-12	10:10	RC	0	---	68.2	---	562	7.8	7.1	7.4	Yes	New pipe connected
2-Jun-14	10:00	RC	0.1	---	77.5	630	---	3.9	9.8	9.0	No	Very low flow from predominantly two seeps in wall.

KANES SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
22-Aug-14	9:21	RC	0.1	---	72.0	690	---	10.4	10.6	8.7	No	Green tint; 4 distinct seeps that flow into small pool (~5 gal); flow is <0.1 GPM.
24-Nov-14	12:34	RC	0.1	---	44.2	662	---	0.9	---	8.3	No	Very low flow; multiple seeps flowing into pool; minor algae.
16-Oct-15	12:18	RC	<0.1	---	71.5	446	---	---	26.3	9.2	Yes	Clear water; very low flow; lots of algae; 3 small seeps flowing into a pool that flows out into alluvium; <0.1 gpm; very trace flow.
8-Mar-16	12:30	RC	---	---	54.0	508	---	2.7	15.6	8.6	Yes	Minor algae; multiple seeps along face of waterfall; sampled from pool (seeps too low flow <<1 gpm).
6-Jun-16	12:57	RC	<1	estimated	88.9	744	---	6.2	3.1	8.0	Yes	<1GPM; ~3 active seeps
28-Jul-16	11:30	RC	0.5	---	95.3	433	---	4.7	---	9.0	Yes	Multiple seeps flowing; minor amount of bright green algae; <1GPM of flow. Not enough water to collect for DO measurement
05-2017	---	WRI	---	---	68.5	---	---	---	---	7.7	No	Flows, seeps, and pools present
26-Sep-19	12:18	M&A	0.01	estimated	69.8	---	836	---	9.0	8.6	No	Water emerges from limestone through void or from between bedding planes
4-Dec-19	15:09	M&A	0.05	Measured	57.9	---	868	---	---	8.5	No	Water emerges from between bedding planes and through small orifices. Flow follows limestone chute before repenetrating the channel alluvium. Water is also captured in a nearby spring box that is piped down canyon, but the destination is unknown. Flow thorough pipe is audible. Water in spring box measured at 64 cm below lip of spring box. Water is clear and odorless.

WRI = WestLand Resources, Inc.
GAI = Golder Associates, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

NOTE: Results of hydrochemical analysis for this spring are presented in the following reports:

Montgomery & Associates, 2010, **Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds:** Final report prepared for Resolution Copper Mining LLC, February 17, 2010.

Montgomery & Associates, 2012, **Results of hydrochemical characterization, Upper Queen Creek/Devils Canyon study area:** Final report prepared for Resolution Copper Mining LLC, March 9, 2012.

Montgomery & Associates, 2013, **Surface water baseline report, Devils Canyon, Mineral Creek, and Queen Creek watersheds:** Final report prepared fro Resolution Copper Mining LLC, May 16, 2013.

Montgomery & Associates, 2016, **Hydrochemistry addendum, groundwater and surface water, Upper Queen Creek/Devils Canyon study area:** Final report prepared for Resolution Copper Mining LLC, August 11, 2016.

KANES SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East	West	20	Limestone bedrock

COMMENTS

Kanes Spring in the steep terrain of Kanes Canyon consists of a small pool of water, and a springbox with a pipe leading down the canyon. Seeps occur between the limestone strata. Flow is retained in a series of small rock pools in the bedrock below the spring. A thicket of desert hackberry (Celtis pallida) and canyon grape (Vitis arizonica) covers the slope above the spring.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
October 2002	Approximately 2.5m x 1m pool on bedrock below steep travertine drops	None Observed	None Observed	rush (Juncus sp.), seep willow (Baccharis salicifolia)	netleaf hackberry (Celtis reticulata),desert broom (Baccharis sarothroides), brickelbush (Brickellia sp.)	Water boatman and unidentified aquatic beetle	Gambel's quail (Callipepla gambelii)	None Recorded
May 2017	Flows, seeps and pools present	None Observed	None Observed	yellow monkeyflower (Mimulus guttatus), grassleaf rush (Juncus marginatus)	globemallow (Sphaeralcea sp.), desert hackberry (Celtis pallida), catclaw acacia (Senegalia greggii), jojoba (Simmondsia chinensis), velvet mesquite (Prosopis velutina)	None Observed	Northern cardinal (Cardinalis cardinalis)	None Observed
September 2019	A small amount of seepage into the bedrock pools in the drainage bottom.	None Observed	beardless rabbitsfoot grass (Polypogon monspeliensis)	Rush (Juncus sp.), algae	Bladdermallow (Herissantia crispa),netleaf hackberry (Celtis reticulata),velvet mesquite (Prosopis velutina), Arizona grape (Vitis arizonica), brickellbush (Brickellia sp.), ragweed (Ambrosia sp.), Harrison's barberry (Berberis harrisoniana), jojoba (Simmondsia chinensis)	None Observed	None Observed	None Observed
December 2019	A small amount of seepage into the bedrock pools in the drainage bottom. A small amount of surface water within the spring box on the slope adjacent to the drainage bottom.	None Observed	beardless rabbitsfoot grass (Polypogon monspeliensis)	Rush (Juncus sp.), algae	Bladdermallow (Herissantia crispa),netleaf hackberry (Celtis reticulata),velvet mesquite (Prosopis velutina), Arizona grape (Vitis arizonica), brickellbush (Brickellia sp.), ragweed (Ambrosia sp.), Harrison's barberry (Berberis harrisoniana), hollyleaf buckthorn (Rhamnus ilicifolia), jojoba (Simmondsia chinensis), white sagebrush (Artemisia ludoviciana)	None Observed	None Observed	None Observed

Photo 1. Kanes Spring. December 2019. Overview of the densely vegetated hillslope adjacent to the drainage bottom. Species composition includes netleaf hackberry (*Celtis reticulata*) and Arizona grape (*Vitis arizonica*).

Photo 2. Kanes Spring, view of flow leading to pools in bedrock below. Wetland plant yellow monkeyflower is visible at lower left foreground, May 2017.

Photo 3. Kanes Spring, spring box, July 2010

Photo 4. Kanes Spring, view of pool in bedrock with canyon grape in the center of the background, November 2002.

Photo 5. Kanes Spring. September 2019. Pockets of sediment within the bedrock pools below the seep are vegetated with rush (*Juncus* sp.)

Photo 6. Kanes Spring, view of pool in bedrock with wetland plant swordleaf rush visible in the center of the background, May 2017.

SPRING QC 22.6 E (KARST SPRING)
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
QC 22.6 E	Karst Spring	Solution void in limestone on east bank of Queen Creek (about 3 meters from channel); immediately upstream from old US60 highway bridge; only flows during wet periods. First identified by RC (Golder) in April 2004.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)36cb		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	No	---

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
491659	3684231	2940 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Queen Creek	Canyon Reach	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash-Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Tubular Spring	Limestone	Cave	Limestone
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/ spring dominated	None	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	No	NA	No
ACTIVELY USED?	**USE?**		
Unknown	Unknown		

SPRING QC 22.6 E (KARST SPRING)
Section 2: Hydrologic Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
8-Feb-05	8:00	GAI	29.2	?	59.4	---	366	0.9	4.4	7.5	Yes	
16-Mar-05	10:03	GAI	8	estimated	54.7	---	288	---	---	8.1	No	
28-Aug-08	9:00	RC	30.8	---	66.9	---	570	1.1	4.1	7.1	Yes	
11-Feb-09	16:00	RC	52.0	---	62.6	---	392	1.4	3.5	7.3	Yes	
13-Feb-10	14:00	RC	10	---	---	---	---	---	---	---	No	
27-Feb-12	10:25	RC	3	estimated	63.7	---	445	7.3	6.7	7.9	Yes	
27-Nov-12	11:09	RC	0	---	---	---	---	---	---	---	No	
17-Dec-12	13:20	RC	5	estimated	65.5	---	376	---	6.6	7.3	Yes	
29-Jan-13	13:00	RC	40	estimated	59.5	---	310	---	---	7.4	Yes	
13-Mar-13	9:45	RC	30	estimated	58.5	---	357	---	2.9	7.7	Yes	
4-Mar-14	14:43	RC	0.1	---	---	---	---	---	---	---	No	<0.5 GPM; not enough water to sample (for opp. sampling). Photos and video taken.
5-Jun-14	10:15	RC	DRY	---	---	---	---	---	---	---	No	Dry
21-Aug-14	12:20	RC	DRY	---	---	---	---	---	---	---	No	Dry
3-Nov-14	12:24	RC	DRY	---	---	---	---	---	---	---	No	Dry
22-Oct-15	15:15	RC	DRY	---	---	---	---	---	---	---	No	Dry
12-Jan-16	11:50	RC	0.1	---	---	---	---	---	---	---	No	Flowing; very low discharge (0.1-0.5GPM). Too low flow for sample/parameters.
8-Jun-16	13:04	RC	DRY	---	---	---	---	---	---	---	No	Dry
14-Jul-16	13:52	RC	DRY	---	---	---	---	---	---	---	No	Dry
06-2017	---	WRI	DRY	---	---	---	---	---	---	---	No	No surface water present

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

WestLand Resources, Inc.
Engineering and Environmental Consultants

MONTGOMERY & ASSOCIATES

KARST SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Northeast	15	Limestone

COMMENTS

Solution void in limestone on east bank of Queen Creek. Density of wetland species, yellow monkeyflower, around cave entrance suggests increased moisture is present.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
June 2017	No surface water present	None Observed	fountain grass (Pennisetum setaceum)	yellow monkeyflower (Mimulus guttatus)	catclaw acacia (Senegalia greggii), brickell bush (Brickellia sp.)	None Observed	None Observed	None Observed

Photo 1. Spring QC22.6E (Karst Spring), view showing wetland plant yellow monkeyflower in the foreground and catclaw acacia obscuring the cave, June 2017.

Photo 2. View into solution cavity at Spring QC 22.6 E (Karst Spring), estimated flow 20 gpm, April 2004.

Photo 3. Karst Spring, view showing cave with wetland plant yellow monkeyflower in the foreground and invasive plant Fountain grass in the background, June 2017.

LAGUNA SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Laguna Spring	None	Laguna Spring occurs in the channel of an unnamed tributary of Walnut Canyon. Local rancher says there is an inaccessable spring box buried in the center of the channel with steel piping leading downstream. The spring is located at the contact between the Dripping Spring Quartzite and the diabase. No flow on the surface has been observed, however water has been observed dripping from the steel pipe.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-14)29bbb		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
State Land Trust		Sonora AZ / Yes	Sonora AZ 7.5' (1964, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
505075	3677269	3300 feet amsl	Estimated from USGS 7.5' topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Mineral Creek	Tributary to Walnut Creek	Ephemeral/Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000206	Upper Mineral Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Yds - Dripping Springs Quartzite	Rheocrene	Yd - Precambrian diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	Yes	Spring box dug into channel (inaccessable)	No
ACTIVELY USED?	**USE?**		
Yes	Wildlife	N/A = Not applicable	

LAGUNA SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
14-Aug-19	10:27	M&A	0.01	Estimated	---	---	---	---	---	---	No	Rheocrene spring. Inaccessible concrete spring box located in the middle of the drainage. 3-inch steel pipe extended from box approximately 40 feet. Very little dripping water from open fitting on pipe.
14-Nov-19	11:25	M&A	0.25	Estimated	58.8	---	1062	10.6	---	7.64	Yes	Bedrock seep
10-Mar-20	9:42	M&A, WRI	0.005	Measured	60.4	---	1053	---	6.8	7.04	No	Water only present dripping from steel pipe. Inaccessable buried spring box at the base of Yds outcrop at contact with diabase. No indication of recent surface flow.

M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

LAGUNA SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East and Northeast	Center	-	Alluvium and bedrock

COMMENTS

The site is located along a canyon bottom among steep hillsides with rugged toporgaphy. The site consists of an exposed bedrock outcrop that bisects the canyon bottom. At the base of the approximately 5' tall bedrock outcrop is a springbox that is been buried by sediment. Downstream from the springbox is a vertical metal standpipe and exposed portions of a horizontal springpipe. At one point along the exposed horizontal sprinpipe is a leaky pipe junction piece.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/10/20	Soil is damp from recent precipitation. The horizontal springpipe is actively dripping at the pipe junction piece. The water dripping from the pipe junction infiltrates into the alluvium with no ponding or downstream flow.	None Observed	Red brome (Bromus rubens), Bermuda grass (Cynadon dactylon)	Algae	Oneseed juniper (Juniperus monosperma), sugar sumac (Rhus ovata), shrub oak (Quercus turbinella), jojoba (Simmondsia chinensis), moss (Bryophyta sp.), netleaf hackberry (Celtis reticulata), wolfberry (Lycium sp.), miner's lettuce (Claytonia perfoliata), fiddleneck (Amsinckia sp.), velvet mesquite (Prosopis velutina), scorpion weed (Phacelia sp.), groundsel (Packera sp.), bedstraw (Galium aparine), Rusby's globemallow (Sphaeralcea rusbyi), penstemon (Penstemon sp.), desert bacharis (Baccharis sergiloides)	None Observed	Cactus wren (Campylorhynchus brunneicapillus), Gambel's quail (Callipepla gambelii), dark-eyed junco (Junco hyemalis)	None Observed

Photo 1. Laguna Spring, inaccessible, buried spring box in channel center at the base of the Dripping Springs Quartzite and diabase contact, March 2020

Photo 3. Laguna Spring, water dripping from steel pipe, leading downstream from spring box, March 2020

Photo 2. Laguna Spring, view of saturation at spring emergence, November 2019

Photo 4. Canopy cover at the site includes sugar sumac (*Rhus ovata*), shrub oak (*Quercus turbinella*), and velvet mesquite (*Prosopis velutina*), March 2020

Looney Spring
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Looney Spring	36-1878	Looney Spring is a rheocrene spring located in an unnamed tributary west of Dripping Spring Wash and occurs in a fault zone in Dripping Spring Quartzite and Mescal Limestone. A 10-foot wide by 4-foot long by 10-inch deep pool occurs on the floor of the stream channel. Steel and plastic piping is present downstream from the source leading to a small corral.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-03-14)05dcb		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Hebbard & Webb	Sonora AZ / Yes	Sonora AZ 7.5' (1964, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
505818	3672988	3750 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Dripping Springs Wash	Unnamed tributary	Persistent/Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Fault Zone	Yds - Dripping Springs Quartzite Ym - Mescal Limestone	Rheocrene	Yd - Precambrian diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring	No	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	Several generations of pipeline from spring box leading down canyon	---	Small pond at mouth of spring
ACTIVELY USED?	**USE?**		
Yes	Livestock / wildlife	N/A = Not applicable	

LOONEY SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
24-May-18	13:45	M&A, RC	0	Observed	69.1	--	831	9.7	5.91	7.15	Yes	Pool at base of Dripping Springs Quartzite and Mescal Limestone outcrop, many bees, inverts
4-Jun-18	11:00	M&A, WRI	0	Observed	66.9	---	844	---	10.48	7.4	No	Pool at base of Dripping Springs Quartzite and Mescal Limestone outcrop, lots of algae, red spotted toad
11-Nov-19	11:25	M&A	0	Observed	57.9	---	823	38.8	---	7.26	Yes	Water is slightly opaque white, no signs of flow. Strong organic and sulfur odor, film on water's surface.
17-Mar-20	10:38	M&A, WRI	0	Observed	67.0		848.7	---	4.5	7.0	No	Water present in sandy bottom pool in the middle of the channel, at base of Yds outcrop. Small section of saturated alluvium for 10 ft downstream.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

LOONEY SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Northeast	Center	2	Soil and Bedrock

COMMENTS

Water pools at the bedrock base. There is a circular metal drinker with an estimated diameter of 10' located on a terrace above the drainage bottom. A downstream 1" steel pipe drips water at the base of a dead Fremont cottonwood (Populus fremontii).

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
6/4/2018	Surface water present (Pooled), 2m x 1m and 0.3m deep	None Observed	Saltcedar (Tamarix sp.), Bermuda grass (Cynodon dactylon)	Goodding's willow (Salix gooddingii), Fremont cottonwood (Populus fremontii)	desert broom (Baccharis sarothroides), desert hackberry (Celtis pallida), barberry (berberis haematocarpa), one seed juniper (Juniperus monosperma), bentgrass (Agrostis sp.)	Dead red-spotted toad (Anaxyrus punctatus), Belostomatidae	None Observed	None Observed
3/17/2020	Surface water pools are present at several points along the drainage bottom. All of the ground surface is damp due to recent precipitation.	None observed	Red brome (Bromus rubens), Bermuda grass (Cynadon dactylon)	Fremont cottonwood (Populus fremontii), willow (Salix sp.), algae, rush (Juncus sp.)	Moss (bryophyta), netleaf hackberry (Celtis reticulata), oneseed juniper (Juniperus monosperma), desert broom (Baccharis sarothroides), sotol (Dasylirion wheeleri), globemallow (Sphaeralcea sp.), miner's lettuce (Claytonia perfoliata), sugar sumac (Rhus ovata), silktassel (Garrya sp.), jojoba (Simmondsia chinensis), berberis (Berberis haematocarpa)	predacious diving beetle (Dytiscidae), caddisfly larvae (Trichoptera)	None observed	None observed

Photo 1. Looney Spring, pooled water at the base of bedrock channel, March 2020

Photo 2. A circular metal drinker (dry) is located on a terrace downstream of Looney Spring, May 2018

Photo 3. An approximately 1-in steel pipe drips water at about 1-2 drips/second, downstream of Looney Spring, June 2018

Photo 4. A giant water bug (Belostomatidae) was observed clutching a dead red spotted toad (*Anaxyrus punctatus*) at Looney Spring, June 2018

Photo 5. A caddisfly larvae (Trichoptera), March 2020

Photo 6. Surface water pools are present at several point along the drainage bottom. Bermuda grass (*Cynadon dactylon*) lines the adjacent hillsides, March 2020

LOWER RAILROAD SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Lower Railroad Spring	None	Spring has not been located. First shown on 2011 7.5-minute USGS quadrangle; appears in ALRIS database; no evidence of spring or developed infrastructure found other than stock tank 350 feet to northwest.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-12)6bc		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
USFS	Tonto National Forest	Picketpost, AZ / Yes	Picketpost AZ 7.5' (2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
ALRIS/WestLand	NAD83	12Z	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
485172	3683210	2470	Estimated from topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	Yes	36-80840 (USFS) 36-390303 (Martin)	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle Gila	Queen Creek	Happy Camp Canyon	Unknown
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash-Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Unknown	Unknown; older alluvium (Qoa)present in bottom land; Gila conglomerate (QTg) in canyon walls	Unknown	Unknown
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Unknown	Unknown	No	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Unknown	No	NA	No
ACTIVELY USED?	**USE?**		
No	Unknown		

LOWER RAILROAD SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
05-2011	---	WRI	---	---	---	---	---	---	---	---	No	Dry; no standing water or flow observed
05-2017	---	WRI	---	---	---	---	---	---	---	---	No	No surface water present

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

WestLand Resources, Inc.
Engineering and Environmental Consultants

MONTGOMERY & ASSOCIATES

LOWER RAILROAD SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	East	5	Alluvium

COMMENTS

No evidence of spring or developed infrastructure observed, other than stock tank 300 feet to the northwest. Vegetation is xero-riparian with no herbaceous wetland species observed.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
May 2011	No surface water present	None observed		seepwillow (Baccharis salicifolia), saltcedar (Tamarix sp.)	None Recorded	N. A.	common raven (Corvus corax), Gambel's quail (Callipepla gambelii), greater roadrunner (Geococcyx californianus), white-winged dove (Zenaida asiatica)	None Observed
May 2017	No surface water present	None observed	Bermuda grass (Cynodon dactylon)	None Observed	catclaw acacia (Acacia greggii), beebush (Aloysia wrightii), canyon ragweed (Ambrosia ambrosiodes), desert broom (Baccharis sarothroides), sweetbush (Bebbia sp.), desert hackberry (Celtis pallida), desert willow (Chilopsis linearis), singlewhorl burrobush (Hymenoclea monogyra), wolfberry (Lycium sp.), velvet mesquite (Prosopis velutina), cliffrose (Purshia stansburiana), jojoba (Simmondsia chinensis)	N.A.	common raven (Corvus corax), Gambel's quail (Callipepla gambelii), white-winged dove (Zenaida asiatica)	None Observed

Photo 1. Lower Railroad, view downstream from reported spring location (as shown on topographic map) showing xero-riparian vegetation of singlewhorl burrobush and catclaw acacia, May 2011.

Photo 2. Lower Railroad, view upstream from reported spring location (as shown on topographic map) showing xero-riparian vegetation of catclaw acacia and velvet mesquite, May 2011

Photo 3. Lower Railroad, view downstream from reported spring location (as shown on topographic map) showing xero-riparian vegetation of single whorl burrobush in active channel, May 2017.

Photo 4. Lower Railroad, view around reported spring location (as shown on topographic map) showing xero-riparian vegetation of velvet mesquite, May 2017.

Photo 5. Lower Railroad, view around reported spring location (as shown on topographic map) showing xero-riparian vegetation, May 2017.

Photo 6. Lower Railroad, view upstream from reported spring location (as shown on topographic map) showing xero-riparian vegetation of catclaw acacia, velvet mesquite and singlewhorl burrobush, May 2017.

MCGINNEL MINE SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
McGinnel Mine Spring	None	McGinnel Mine Spring is a mine adit located along FS Road 2389, approximately 1.5 miles from the Cottonwood Well. Standing water was observed in the mine working, retained by a 2 foot tall wooden dam. Anthropogenic features including wooden dams, steel plumbing, and black polyethylene tubing indicate that the water is intentionally captured in the mine and conveyed to a pond adjacent to Cottonwood Well for use. The feature is supported by infiltration of surface runoff into mine working through the weathered schist surface.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)15dba		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service (USFS)	Tonto National Forest	Superior, AZ / no	None

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
489197	3689344	3880 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
No	Yes	33-094335 (USFS)	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Whitford Canyon	Intermittent?
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000403	Potts Canyon		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
NA	Weathered Pinal Schist	Anthropogenic	Pinal Schist
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	NA	Man-made mine working	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	Plastic hose diverting water to cattle tank near Cottonwood Well	NA	Yes - 1.5 miles from spring
ACTIVELY USED?	**USE?**		
Yes	Livestock / wildlife	NA = Not applicable	

MCGINNEL MINE SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
1-Mar-18	14:00	M&A	---	---	45.7	---	1017.0	---	---	8.5	No	Measured from pooled water at mine entrance.
25-Sep-19	12:48	M&A	0	---	67.8	---	985.3	---	5	7.83	No	Located along the bottom of mine shaft, saturation extends past visiblity
3-Dec-19	14:30	M&A	0	---	52.2	---	2934	---	---	8.21	No	Water is located in two stagnant pools in the base of the mine entrance. The entire area visible from the mine entrance is saturated, altough pools have significantly lower volume compared to previous visit. Water is predominantly clear and odorless, with oil film present.

M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

MCGINNEL MINE SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SUBSTRATE
Northwest	Southeast	Bedrock

COMMENTS:
Abandoned mine adit. Water pooled inside adit entrance.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
March 2018	Small pool inside abandoned mine adit	None recorded	None recorded	None recorded	Agave sp. (Agave), cholla (Cholla sp.) jojoba (Simmondsia chinensis), mesquite (Prosopis sp.), ocotillo (Fouquieria splendens), prickly pear (Opuntia engelmannii), Sotol (Dasylirion wheeleri)	None recorded	None recorded	None recorded

Photo 1. McGinnel Mine Spring entrance with prickly pear cactus above and below entrance, March 2018.

Photo 2. McGinnel Mine Spring, view of water with old tools, March 2018.

Photo 3. McGinnel Mine Spring entrance with standing water, March 2018.

Photo 4. McGinnel Mine Spring, view opposite the mind opening, with mesquite, cholla, ocotillo, and stool, March 2018.

Photo 5. McGinnel Mine Spring, testing water parameters, March 2018.

Photo 6. McGinnel Mine Spring, view of road (top right) leading to mine, March 2018.

MCGINNEL SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
McGinnel Spring	None	This spring/pit is located in a contributing wash to Whitford Canyon, approximately 0.7 miles east of the Cottonwood Well. The pit is dug in alluvium and weathered schist adjacent to the FS Road 2389. The pit is lined with a 3-foot diameter steel culvert down to 6.8 feet below stick up. This feature appears to be supported by runoff water stored in the shallow alluvium or shallow, weathered schist. Water from the pit is plumbed to a cement trough roughly 600 feet to the southwest.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)15cda		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service (USFS)	Tonto National Forest	Superior, AZ / yes	Superior, AZ 7.5' (2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
488741	3688808	3240 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
Yes	Yes	36-024049 (USFS)	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Whitford Canyon	Ephemeral
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000403	Potts Canyon		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Alluvium	Rheocrene	Pinal Schist
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Water collected in buried, vertical galvanized steel culvert	Piping from culvert to cement trough	NA	NA
ACTIVELY USED?	**USE?**		
Yes	Livestock / wildlife		

NA = Not applicable

MCGINNEL SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
1-Mar-18	13:15	M&A	0.1	est.	51.4	---	1069.0	---	---	7.3	No	Measured from valve flowing into cement trough
11-Apr-18	18:03	M&A	<0.01	est.	69.1	---	1010	---	---	6.9	No	Measured from culvert lined pit
25-Sep-19	13:59	M&A	0	---	---	---	---	---	---	---	No	No water present in culvert lined pit
3-Dec-19	15:19	M&A	0	---	---	---	---	---	---	---	No	Approximately two inches of water present at the bottom of culvert pit. Not enough water to produce flow through outlet pipe in pit. Water is murky, odorless. Parameters could not be obtained safely.

M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

MCGINNEL SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SUBSTRATE
Southwest	Center	Alluvium

COMMENTS:
Vertical culvert forming shallow well. Shaded, dry area with almost no understory vegetation. Sign of livestock use.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
April 2018	Water present in well; no surface water	None observed	None observed	Seepwillow (Baccharis salicifolia)	Giant saguaro (Carnegiea gigantea), brittlebush (Encelia farinosa), desert thorn (Lycium sp.), mesquite (Prosopis velutina), jojoba (Simmondsia chinensis), yucca (Yucca sp.)	None recorded	None recorded	None recorded

Photo 1. Culvert lined pit at McGinnel Spring, March 2018.

Photo 2. Water stored in culvert at McGinnel Spring (~6 inches), March 2018.

Photo 3. Steel pipe leading to cement water trough from steel culvert, March 2018.

Photo 4. Cement culvert being fed by water from McGinnel Spring (~0.1 gpm), March 2018.

Photo 5. McGinnel Spring, a view of the well, shaded by seepwillow and mesquite, April 2018

MINE SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Mine Spring	None	Mine Spring is located in an unnamed drainage in the Dripping Springs Mountains. At this location, there is a collapsed mine shaft with steel pipe leading to a cement drinking trough. There is no indication that this site has been used in a significant period of time. There are no natural spring-like features at this location.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-03-14)22dad		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
State Trust		No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
509553	3668394	3656 feet amsl	ALOS DEM

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	Yes	36-68754	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Dripping Springs Wash	Unnamed tributary	Unknown, no flow observed
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
N/A	N/A	N/A	N/A
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
N/A	N/A	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Yes	Steel pipe leads to cement drinker		No
ACTIVELY USED?	**USE?**		
No	N/A	N/A = Not applicable	

MINE SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
23-Jan-20	15:45	M&A	0	Observed	---	---	---	---	---	---	No	Retention wall with ~1" vertical pipe behind wall, volume behind wall was mostly filled in with saturated dirt. ~25 feet from wall is a mine shaft approx. 15 ft. deep with pipe running out of shaft to nearby drinker. Ground in immediate area is saturated.
23-Mar-20	14:22	M&A, WRI	0	Observed	---	---	---	---	---	---	No	No indication of spring like features. No signs of recent water. Collapsed in mine shaft, or windmill foundation, 10 x 10 ft, 10 ft deep. Vertical pipe extends to ground level and runs to cement drinker. Drinker is dry.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

MINE SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southeast	Center	-	Course alluvium

COMMENTS

The site is located adjacent to N Troy Ranch Road along the drainage bottom of an unnamed canyon. The site consists of an abandoned mine shaft and concrete cattle drinker on the river left side of the drainage and a concrete wall and associated metal standpipe on the river right side of the drainage. The abandoned mine shaft dimensions are approximately 10' wide x 10' long x 10' deep. The concrete cattle drinker measures approximately 13' long x 3' wide x 1.5' deep. The drainage bottom is sparsely vegetated with low canopy cover. The drainage substrate consists primarily of boulders, cobbles, and other course alluvium.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/23/2020	No surface water presence, no damp soil.	None observed	red brome (bromus rubens)	None observed	shrub oak (Quercus turbinella), turpentine bush (Ericameria laricifolia), catlaw acacia (Senegalia greggii), velvet mesquite (Prosopis velutnia), fishook barrel cactus (Ferocactus wislizeni), berberis (Berberis sp.), fiddleneck (Amsinckia sp.), New Mexico thistle (Cirsium neomexican), ragweed (Ambrosia sp.), penstemon (Penstemon sp.), broom deerweed (Acmispon rigidus), desert bacharis (Baccharis sergiloides), shrubby buckwheat (Eriogonum wrightii)	None observed	cactus wren (Campylorhynchus brunneicapillus), curve-billed thrasher (Toxostoma curvirostre), Gila woodpecker (Melanerpes uropygialis)	None observed

Photo 1. Mine Spring, collapsed mine working with support timbers and vertical steel pipe, March 2020

Photo 3. Mine Spring, more steel piping on the west side of the channel, January 2020

Photo 2. Vegetation surrounding the dry cattle drinker includes turpentine bush (*Ericameria laricifolia*), catclaw acacia (*Senegalia greggii*), velvet mesquite (*Prosopis velutina*), and fiddleneck (*Amsinckia* sp.), March 2020

Photo 4. Dominant vegetation at the site includes shrub oak (*Quercus turbinella*) and turpentine bush (*Ericameria laricifolia*), March 2020

NO NAME SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
No Name Spring	None	Several seeps occur at contacts along stream channel between quartzite and shale. Also evidence of seepage from banks where salt deposits are present. Flow disappears into stream channel in sandier areas and then reappears in gravelly, bedrock reaches. Some pooling.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)20dc		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
USFS	Tonto National Forest	Picketpost Mountain / NO	NA

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
Handheld GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
485964	3687153	2600 feel amsl	Estimated from USGS 7.5' topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	Yes	36-24039 (USFS)	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Queen Creek	Whitford Canyon	unknown
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000403	Potts Canyon		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact spring	pCy - Dripping Springs Quartzite; Qal - Alluvium	Rheocrene	pCy - Pioneer Shale
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring dominated	none observed	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
none observed	none observed	NA	none observed
ACTIVELY USED?	**USE?**		
unknown	unknown		

NO NAME SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
05-2017	---	WRI	---	---	75.0	---	---	---	---	8.0	No	Flow for approximately 500 meters
22-Jun-17	7:05	M&A	2-3 gpm	---	71.1	---	1131	0.0	2.5	7.5	Yes	Clear; flow for approximately 1000 feet below spring
26-Sep-17	17:12	M&A	1-2 gpm	---	73.4	---	1231	1.4	---	7.5	Yes	Clear; no odor; flow for approximately 400 meters
4-Dec-18	9:15	M&A	0.3	---	55.8	---	1319	0.5	---	7.5	Yes	Clear; no odor; flow for approximately 400 meters
13-Mar-18	12:40	M&A	0.3	---	66.5	---	1241	1.5	---	6.9	Yes	Clear, no odor; some rust colored moss/algae mats; flow for approximately 400 meters
26-Sep-19	8:53	M&A	0	---	71.4	---	1393	---	2.5	7.1	No	No surface flow observed and no natural pooling of water. Only water at site occurs in shallow pools, likely dug out by cows or wild animals.
3-Dec-19	9:41	M&A	2.1	Container	53.5	---	867	---	5.0	7.8	No	Recent rainfall has produced saturation and some flow above and below the emergence of the spring. Flow increases significantly at the emergence location and continues for approximately 150 feet before repenetrating the channel alluvium. Flow reemerges 500 feet downstream at a similar flow rate.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

NO NAME
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Center	2	Alluvium over bedrock

COMMENTS

Several seeps occur at contacts along the stream channel between sandstone and mudstone. Also evidence of seepage from banks where salt deposits are present. Flow disappears into stream channel in sandier areas and then reappears in gravelly, bedrock reaches. Strand vegetation includes canyon ragweed (Ambrosia ambrosioides), single whorl burrobush (Ambrosia monogyra), Fremont cottonwood (Populus fremontii),velvet mesquite (Prosopis velutina) and catclaw acacia (Senegalia greggii).

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
May 2017	Flow for approximately 500 meters	None observed	Bermuda grass (Cynodon dactylon), barnyard grass (Echinochloa crus-galli), clover (Melilotus sp.), beardless rabbitsfoot grass (Polypogon monspeliensis), saltcedar (Tamarix sp.)	Algae – filamentous and crustose, seepwillow (Baccharis salicifolia), toadrush (Juncus bufonius), purplemat (Nama demisssa), yellow monkeyflower (Mimulus guttatus), saltcedar (Tamarix sp.), cattail (Typha latifolia), centaury (Zeltnera calycosa)	oats (Avena sativa)	Aquatic invertebrates are present including water boatmen, water striders, starburst beetles. Tadpoles and metamorphs, are also present.	cactus wren (Campylorhynchus brunneicapillus), Gambel's quail (Callipepla gambelii), Gila woodpecker (Melanerpes uropygialis), greater roadrunner (Geococcyx californianus), mourning dove (Zenaida macroura),pyrrhuloxia (Cardinalis sinuatus), white-winged dove (Zenaida asiatica)*	cottontail (Sylvanus audubonii), coyote (Canis latrans), gray fox (Urocyon cinereoargenteus), hognosed skunk (Conepatus leuconotus), javelina (Tayassu tajacu), mule deer (Odocoileus hemionus), ringtail (Bassariscus astutus), rock squirrel (Spermophila variegatus), whitetail deer (Odocoileus virginianus)*
September 2019	Dry	None observed	Bermuda grass (Cynodon dactylon), tamarisk (Tamarix spp.)	seepwillow (Baccharis salicifolia), Fremont cottonwood (Populus fremontii), willow (Salix sp.), tamarisk (Tamarix spp.)	singlewhorl burrobush (Hymenoclea monogyra), canyon ragweed (Ambrosia ambrosiodes), pepperweed (Lepidium sp.)	None observed	None observed	None observed
December 2019	Small isolated pools in the channel, damp soil	None observed	Bermuda grass (Cynodon dactylon), tamarisk (Tamarix spp.), Lehmann lovegrass (Eragrostit lehmanniana)	seepwillow (Baccharis salicifolia), Fremont cottonwood (Populus fremontii), willow (Salix sp.), tamarisk (Tamarix spp.)	singlewhorl burrobush (Hymenoclea monogyra), canyon ragweed (Ambrosia ambrosiodes), pepperweed (Lepidium sp.), globemallow (Sphaeralcea sp.), pelotazo (Abutilon incanum)	None observed	None observed	None observed

*Incidental Observations on date of visit and wildlife camera observations May 2014 - March 2016

Photo 1. Willows (*Salix* sp.) lining the channel at No Name Spring. September 2019.

Photo 2. No Name Spring, view of riparian vegetation including Fremont cottonwood and saltcedar along channel, June 2017.

Photo 3. No Name Spring, view of surface water along channel with crustose algae, June 2017.

Photo 4. No Name Spring, view of contact between sandstone and mudstone bedrock strata, June 2017.

Photo 5. No Name Spring, view of surface water along channel with filamentous algae, June 2017.

Photo 6. No Name Spring, view of salt deposits along edge of channel, June 2017.

PERLITE SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Perlite Spring	None	Impoundment at the base of an excavated perlite quarry adjacent to unnamed tributary of Bear Tank Canyon Wash. No evidence of water source apparent other than runoff; reportedly local rancher occasionally deepens and cleans out a portion of the quarry. Several smaller excavated ponds and quarry workings upstream from main impoundment; no evidence of natural spring.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)19dd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service (USFS)	Tonto National Forest	Picketpost Mountain, AZ / Yes	Picketpost Mountain, AZ 7.5' (2004, 2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
484483	3686996	2620 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	Yes	36-024044 (USFS)	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Queen Creek	Bear Tank Canyon wash	No flow observed
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000405	Alamo Canyon - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
NA	Perlitic rhyolite	Anthropogenic	Perlitic rhyolite
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Runoff dominated	Man-made structure	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Excavated impoundment	Several impoundments maintained by rancher	NA	Yes, ephemeral
ACTIVELY USED?	**USE?**		
Yes	Livestock / wildlife	NA = Not applicable	

PERLITE SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
19-Feb-13	11:20	M&A/RC	0	---	49.6	---	268	---	---	7.2	No	Pool in manmade quarry; three pools in quarried areas upstream from main pool; no evidence of flow into pool; evidence of cattle; oily sheen on water surface at upper pools.
26-Jun-13	13:31	RC	0	---	90.9	---	1321	---	2.2	7.6	Yes	Stagnant
7-Aug-13	12:02	RC	0	---	82.8	209	200	---	2.4	8.3	Yes	Medium pool; rusty color
28-Oct-13	15:54	RC	<1	---	61.6	384	---	16.1	7.8	8.2	Yes	>2000 gallons in pool. Dark water.
4-Mar-14	12:45	RC	0	---	65.3	314	---	12.6	3.0	9.0	Yes	No flow detected; brown/murky
19-Mar-14	10:50	RC	0	---	---	---	---	---	---	---	No	No flow
21-May-14	10:57	RC	0	---	81.9	601	---	16.0	2.3	8.4	Yes	Murky; stagnant; no evidence of flow. Sample from pool.
14-Aug-14	7:53	RC	0	---	76.3	468	---	23.9	0.9	7.9	Yes	Murky; no visible flow.
4-Nov-14	11:30	RC	0	---	56.8	222	---	17.7	5.3	8.0	Yes	Murky; no visible flow; water level higher than usual - due to recent precipitation.
4-Mar-15	10:15	RC	0	---	51.3	204	---	22.2	8.9	6.0	Yes	Murky; no visible flow.
13-May-15	10:00	RC	0	---	60.4	337	---	36.0	4.3	7.9	Yes	No visible flow; greenish; murky
05-2017	---	WRI	---	---	75.4	355	---	---	---	9.0	No	Pool at base of rock overhang, approximately 15 by 20 meters and one meter deep.
26-Sep-17	13:44	M&A	0	---	72.8	---	279	44	---	8.3	Yes	Stagnate pool at base of Perlite cliff; ground near pool is moist but flow is immeasurable; collected sample from east side of pool below willow tree.
4-Dec-07	12:05	M&A	---	---	---	---	---	---	---	---	No	Located saturated, muddy basin at lower impoundment below the Perlite cliff; no standing water, ponding or flow observed.
13-Mar-18	---	M&A	---	---	---	---	---	---	---	---	No	Dry

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

PERLITE SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Center	2	Alluvium over bedrock

COMMENTS
Impoundment at base of rock outcrop holds water seasonally. No evidence of source apparent. A single Goodding's willow (Salix gooddingii) is present with desert hackberry (Celtis pallida) and canyon ragweed (Ambrosia ambrosiodes) present around the perimeter of the impoundment. North of the spring there are several manmade impoundments which hold water seasonally.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED*
May 2017	Pool at base of rock overhang, approximately 15 by 20 meters wide and one meter deep	None observed	Red brome (Bromus rubens), Bermuda grass (Cynodon dactylon), stinkgrass (Eragrostis cilianensis), canary grass (Phalaris canariensis), beardless rabbitsfoot grass (Polypogon monspeliensis)	Algae – filamentous and crustose, yellow monkeyflower (Mimulus guttatus)	Amaranthus palmeri, oats (Avena sativa), pepperweed (Descurainia sp.), rye (Elymus sp.), desert lavender (Hyptis emoryi), Gila rockdaisy (Perityle gilensis), London rocket (Sisymbrium irio), cocklebur (Xanthium strumarium)	Aquatic invertebrates, including boatmen, backswimmers, snails, water scorpion, and black-necked garter snake (Thamnophis cyrtopsis)	None observed	Coatimundi (Nasua narica), Western canyon bat (Parastrellus hesperus), cave myotis (Myotis velifer), big brown bat (Eptesicis fuscus), pallid bat (Antrozous pallidus), California leaf-nosed bat (Macrotus californicus), western mastiff bat (Eumops perotis)

Photo 1. Perlite Spring, view to north of pool at base of rock overhang, May 2017.

Photo 3. Perlite Tank, view of impoundment north of Perlite Spring, May 2017.

Photo 5. Perlite Tank, view of blacknecked gartersnake observed, May 2017.

Photo 2. Perlite Spring, view to west of pool showing Goodding's willow, May 2017.

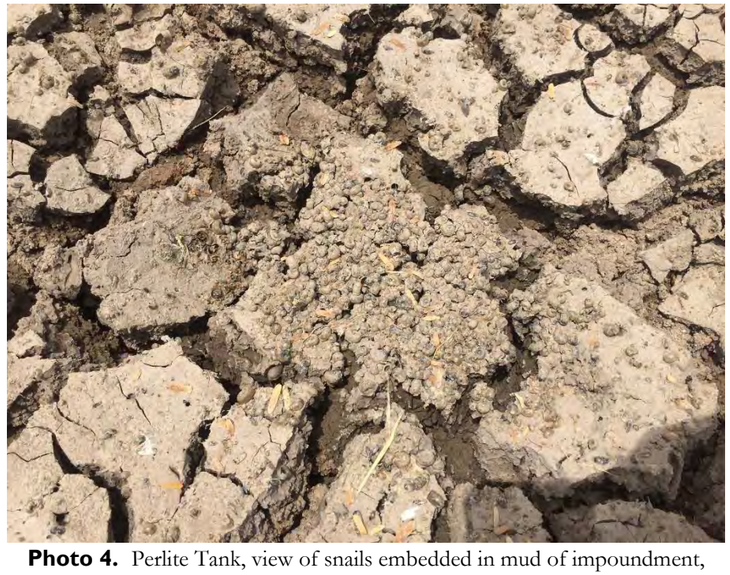

Photo 4. Perlite Tank, view of snails embedded in mud of impoundment, May 2017.

Photo 6. View of velvet mesquite and Gila rock daisy (Growing on bedrock at right of photo), May 2017.

PUMP STATION SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Pump Station Spring	QC30.7C	Pump Station Spring is located in Queen Creek channel at the downstream extent of a large deposit of alluvium resting on Tertiary rhyolite and Apache Leap Tuff. The most upstream water is the first of a string of five small pools along the stream channel. The most downstream surface water is a one by 10-meter rock tinaja.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-13)17dcb		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Superior, AZ / Yes	Superior AZ 15' (1948) Superior AZ 7.5' (1981, 2004, 2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12Z	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
494041	3689017	4390 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring/ADWR 55 Registry?
Yes	Yes	4A-493 (Integrity); 36-23982 (USFS)	No / 55-609674 (Integrity)

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle Gila	Queen Creek	Queen Creek Headwaters	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash-Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Alluvium (Qal)	Rheocrene	Tertiary Rhyolite (Tov)/Apache Leap Tuff(Tal)
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring dominated	No	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
None apparent	Stock trough and some piping evident	Vertical pipe near spring may have been a well	No
ACTIVELY USED?	**USE?**		
Yes?	Livestock/wildlife watering?		

PUMP STATION SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
10-2002	---	WRI	---	---	---	---	---	---	---	---	No	Water present in intermittent flow.
15-May-03	10:40	GAI	3.2	---	58.6	---	746	0.8	7.5	7.6	Yes	
11-Jun-03	9:35	GAI	---	---	64.4	858	---	---	---	7.5	No	
4-Sep-03	9:40	GAI	1.5	---	65.7	---	770	1.6	2.8	7.4	Yes	
3-Nov-03	14:00	GAI	1.5	---	56.5	---	872	1.3	6.9	7.5	Yes	
9-Feb-04	15:40	GAI	1.5	estimated	48.7	---	820	0.9	5.1	7.4	Yes	
25-May-04	10:10	GAI	1	estimated	62.2	---	845	2.0	5.7	7.3	Yes	
3-Aug-04	9:50	GAI	<0.1	---	64.4	---	830	0.0	2.9	7.7	Yes	
30-Nov-04	16:10	GAI	0.25	estimated	54.1	---	857	0.9	4.9	7.3	Yes	
8-Feb-05	10:30	GAI	46	1 " Flume	48.2	---	634	6.1	9.2	7.9	Yes	
16-Mar-05	9:57	GAI	---	---	47.8	---	595	---	---	8.1	No	
4-May-05	10:05	GAI	20.3	---	61.3	---	710	0.7	12.2	7.9	Yes	
8-Aug-05	8:05	GAI	5	estimated	70.3	---	832	0.9	6.6	7.5	Yes	
24-Sep-05	9:35	GAI	---	---	60.4	---	779	---	2.8	6.9	No	
5-Aug-08	9:00	RC	<0.1	---	68.9	---	851	1.5	3.6	7.5	Yes	
4-Nov-08	14:00	RC	<0.1	---	58.5	---	891	0.0	2.8	7.1	Yes	
17-Feb-09	11:00	RC	---	---	48.4	---	147	134.0	10.3	8.2	Yes	
19-Feb-09	9:53	RC	---	---	---	760	---	---	2.5	7.4	No	
12-May-09	10:45	RC	1	estimated	61.7	---	8.4	7.4	10.6	7.3	Yes	
11-Aug-09	9:00	RC	0	---	---	---	---	---	---	---	No	3 gallons (stagnant)
16-Feb-10	11:30	RC	15	estimated	52.9	---	375	0.7	6.8	7.7	Yes	
15-Jul-10	10:30	RC	10.42	1 " Flume	68.2	---	829	7.7	15.3	7.6	No	95% Capture
22-Feb-11	11:00	RC	---	---	10.1	---	705	---	---	7.1	No	
05-2011	---	WRI									No	Water present in pools and damp streambed.
17-May-11	10:30	RC	0	---	54.9	---	876	3.5	5.9	7.3	Yes	30 gallons (stagnant); some algae; no flow; muddy

PUMP STATION SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
9-May-12	11:15	RC	0	---	56.9	---	540	6.8	4.0	7.1	Yes	20 gallons (stagnant)
14-May-14	11:39	RC	DRY	---	---	---	---	---	---	---	No	Dry
26-Aug-14	11:20	RC	DRY	---	---	---	---	---	---	---	No	Dry
17-Nov-14	9:30	RC	DRY	---	---	---	---	---	---	---	No	Dry
27-Sep-16	9:35	RC	DRY	---	---	---	---	---	---	---	No	Still no clear evidence of exact location. Found old 3" steel stand pipe next to 3" black pvc pipe (marker?). Queen Creek is dry.
05-2017	---	WRI	---	---	66.6 74.5	838 861	---	---	---	7.6 8.0	No	Water present in pools and damp streambed.

WRI = WestLand Resources, Inc.
GAI = Golder Associates, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

NOTE: Results of hydrochemical analysis for this spring are presented in the following reports:

Montgomery & Associates, 2010, **Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds:** Final report prepared for Resolution Copper Mining LLC, February 17, 2010.

Montgomery & Associates, 2012, **Results of hydrochemical characterization, Upper Queen Creek/Devils Canyon study area:** Final report prepared for Resolution Copper Mining LLC, March 9, 2012.

Montgomery & Associates, 2013, **Surface water baseline report, Devils Canyon, Mineral Creek, and Queen Creek watersheds:** Final report prepared fro Resolution Copper Mining LLC, May 16, 2013.

Montgomery & Associates, 2016, **Hydrochemistry addendum, groundwater and surface water, Upper Queen Creek/Devils Canyon study area:** Final report prepared for Resolution Copper Mining LLC, August 11, 2016.

PUMP STATION SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southeast	Center	10	Boulders and Cobbles

COMMENTS

A canopy cover of riparian vegetation shades a narrow streambed with seeps present along the banks. Further downstream several tinajas are present. Riparian trees include Goodding's willow (Salix gooddingii), Arizona walnut (Juglans major), Arizona sycamore (Platanus wrightii), Fremont cottonwood (Populus fremontii), hoptree (Ptelea trifoliata), and netleaf hackberry (Celtis reticulata). Shrubs include jojoba (Simmondsia chinensis), velvet mesquite (Prosopis velutina),coffeeberry (Rhamnus californica), catclaw acacia (Senegalia greggii), manzanita (Arctostaphylos sp.), barberry (Berberis sp.), mountain mahogany (Cercocarpus montanum), oneseed juniper (Juniperus monosperma), sugar sumac (Rhus ovata), mulberry (Morus sp.), lemonade bush (Rhus trilobata), elderberry (Sambucus neomexicana)

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
November 2002	Water intermittent for about 100 meters	None Observed	None Observed	cattail (Typha sp.), seepwillow (Baccharis salicifolia), Arizona sycamore (Platanus wrightii),	deergrass (Muhlenbergia rigens)	None Observed	Hermit thrush (Catharus guttatus), Gila woodpecker (Melanerpes uropygialis),Mexican jay (Aphelocoma wollweberi)	Deer (Odocoileus sp.)
May 2011	Water present in pools and damp streambed	None Observed	None Observed	pale spikerush (Eleocharis macrostachya), yellow monkeyflower (Mimulus guttatus), Bonpland's willow (Salix bonplandiana)	deergrass (Muhlenbergia rigens), canyon grape (Vitis arizonica), western poison ivy (Toxicodendron rydbergii)	None Observed	None Observed	None Observed
May 2017	Five small pools are strung along the channel with patches of damp sand and algae in between. A 10 x 1 meter pool at the end of the reach holds water.	None Observed	None Observed	pale spike rush (Eleocharis macrostachya), red trumpet (Epilobium canum), mint (Mentha sp.), yellow monkeyflower (Mimulus guttatus), toadrush (Juncus bufonius), Elliott's rush (J. elliottii), swordleaf rush (J. ensifolius), speedwell (Veronica anagallis-aquatica)	geranium (Geranium caespitosum), deergrass (Muhlenbergia rigens), wood sorrel (Oxalis sp.), penstemon (Penstemon sp.), scarlet hedgenettle (Stachys coccinea), canyon grape (Vitis arizonica), western poison ivy (Toxicodendron rydbergii)	Water striders, boatmen	Hermit thrush (Catharus guttatus),Mexican jay (Aphelocoma wollweberi), Zone-tailed hawk (Buteo albonotatus)	Black-tailed rattlesnake (Crotalus molossus), Deer (Odocoileus sp.),

Photo 1. Pump Station Spring, view downstream showing canopy of riparian trees including Goodding's willow, Arizona walnut, Arizona sycamore, and Fremont cottonwood, October 2002.

Photo 2. Pump Station Spring, view of pool and associated herbaceous vegetation, October 2002.

Photo 3. Pump Station Spring, view downstream showing canopy of riparian trees including Goodding's willow, Arizona walnut, Arizona sycamore, and Fremont cottonwood, May 2011.

Photo 4. Pump Station Spring, view showing canopy of riparian trees including Goodding's willow, Arizona walnut, Arizona sycamore, and Fremont cottonwood. June 2011.

Photo 5. Pump Station Spring, view downstream showing canopy of riparian trees including Goodding's willow, Arizona walnut, Arizona sycamore, and Fremont cottonwood, June 2017.

Photo 6. Pump Station Spring, view of pool at end of reach. June 2017.

QUEEN SEEPS
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Queen Seeps	QC25.6E	Complex of seeps along south side of Queen Creek canyon below No.9 shaft; abundant riparian vegetation for ~300 meter reach. Majority of vegetation is within 50 meters of channel; no standing water observed; some flow observed on occasion; no measurable center; soil on the hillslope is moist.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-13)21cd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U. S. Forest Service	Tonto National Forest	Superior, AZ / No	None

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12Z	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
493857	3685619	3800 feet amsl	Estimated from U.S.G.S. Topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	None	NA	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle Gila	Queen Creek	Canyon Reach	Intermittent/ephemeral
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash-Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or infiltration	Apache Leap Tuff	Hillslope	Apache Leap Tuff
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Seep dominated	None	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
None	None	NA	No
ACTIVELY USED?	**USE?**		
Unknown	Unknown		

QUEEN SEEPS
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
10-2002	---	WRI	---	---	---	---	---	---	---	---	No	No water present; staining on south slope is evidence of water seepage
02-2009	---	WRI	---	---	---	---	---	---	---	---	No	No water present; staining on south slope is evidence of water seepage
05-2011	---	WRI	---	---	---	---	---	---	---	---	No	No water observed; north facing slope is saturated and has dense vegetation overgrowth
05-2017	---	WRI	---	---	---	---	---	---	---	---	No	No water observed; north facing slope is saturated and has dense vegetation overgrowth

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

QUEEN SEEPS
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
North	South	25	Soil and Bedrock

COMMENTS

A dense thicket of shrubbery blankets the south slope of Queen Creek below the No. 9 shaft. Surface water is not present but the soil on the hillslope is moist. Riparian trees shade the streambed below the hillslope and include Arizona walnut (Juglans major), Arizona sycamore (Platanus wrightii), Fremont cottonwood (Populus fremontii), velvet ash (Fraxinus velutina) and netleaf hackberry (Celtis reticulata). Shrubs include coffeeberry (Rhamnus californica), mulberry (Morus sp.), lemonade bush (Rhus trilobata), elderberry (Sambucus neomexicana), canyon grape (Vitis arizonica), and desert honeysuckle (Anisacanthus thurberi).

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
October 2002	No surface water observed, staining on south slope is evidence of water seepage	None Observed	None Recorded	Arizona sycamore (Platanus wrightii), Goodding's willow (Salix gooddingii)	None Recorded	None Observed	None Recorded	None Recorded
February 2009	No surface water observed, staining on south slope is evidence of water seepage	None Observed	None Recorded	Arizona sycamore (Platanus wrightii), Goodding's willow (Salix gooddingii)	coastal woodfern (Dryopteris arguta), California figwort (Scrophularia californica), Himalayan blackberry (Rubus discolor), bigtooth maple (Acer grandidentatum)	None Observed	None Recorded	None Recorded
May 2011	No surface water observed, north facing slope is saturated zone with dense overgrowth	None Observed	None Observed	Arizona sycamore (Platanus wrightii), Goodding's willow (Salix gooddingii)	coastal woodfern (Dryopteris arguta), Himalayan blackberry (Rubus discolor)	None Observed	None Observed	None Observed
May 2017	No surface water observed, north facing slope is saturated zone with dense overgrowth	None Observed	None Observed	yellow monkeyflower (Mimulus guttatus), Arizona sycamore (Platanus wrightii), Goodding's willow (Salix gooddingii), distant scorpionweed (Phacelia distans)	coastal woodfern (Dryopteris arguta), Himalayan blackberry (Rubus discolor), scarlet hedgenettle (Stachy coccinea)	None Observed	None Observed	None Observed

Photo 1. Queen Seeps, view of dense thicket of shrubbery, including canyon grape and blackberry, blanketing the south slope, October 2002.

Photo 2. Queen Seeps, view of coastal woodfern, February 2009.

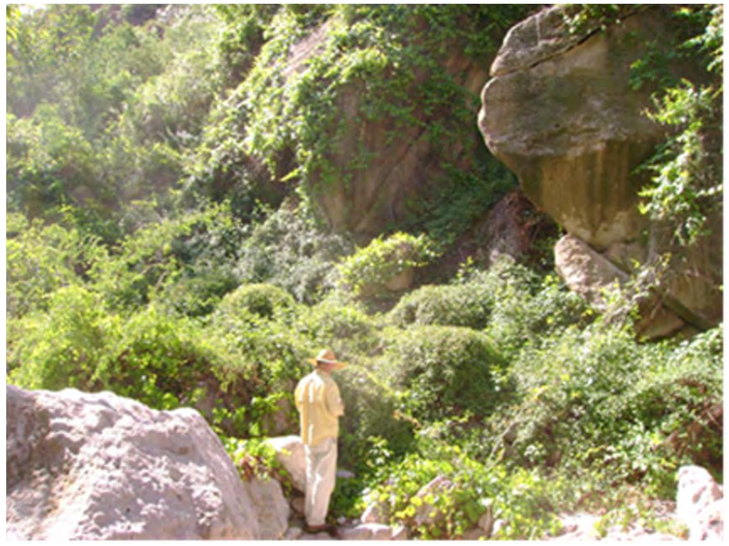

Photo 3. Queen Seeps, view of wild grape, elderberry, mulberry, coffeeberry and blackberry thicket on south slope, May 2011.

Photo 4. Queen Seeps, view of riparian trees shading the streambed below the hillslope including Arizona walnut, Arizona sycamore and velvet ash, June 2017.

Photo 5. Queen Seeps, view of wild grape, elderberry, mulberry, coffeeberry and blackberry thicket on south slope, June 2017.

Photo 6. Queen Seeps, view of coastal woodfern, June 2017.

RANCHO RIO SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Rancho Rio Spring	Upstream of RR1.0C	Rancho Rio Spring is located at the head of a bedrock-dominated reach of Rancho Rio creekabout 1 mile above the confluence with Devils Canyon. A series of tinajas below the spring may hold runoff water for most of the year. Spring represents discharge from alluvial deposits located west of the Rancho Rio fault. A stcck pond has been excavated from the alluvial deposits. No discreet discharge point evident. Spring flow occurs via disbursed discharge to bedrock channel below alluvium.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-13)5bd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Superior, AZ / No	---

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12Z	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
495955	3682970	3920 feet amsl	Estimated from USGS 7.5' topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	Yes	36-24139 (Integrity)	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle Gila	Devils Canyon	Rancho Rio	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000205	Devils Canyon		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Alluvium	Rheocrene	Apache Leap Tuff
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring dominated	Stock pond excavated into alluvial source	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Stock pond excavated into alluvium at head of bedrock reach of Rancho Rio	None evident	---	Pools
ACTIVELY USED?	**USE?**		
Yes?	Wildlife		

RANCHO RIO SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
19-Aug-08	17:00	GAI	<0.1	---	89.1	---	168	4.3	12.8	9.7	Yes	
5-Nov-08	16:00	GAI	0.1	estimated	58.6	---	1637	0.9	4.4	7.6	Yes	
26-Feb-09	9:30	GAI	29.2	---	59.2	---	89	5.0	9.5	6.8	Yes	
21-May-09	10:30	GAI	3	estimated	66.4	---	137	3.2	4.0	6.2	Yes	
10-Aug-09	13:38	RC	3	---	67.3	---	120	---	---	5.7	No	
18-Feb-10	14:00	RC	8.5	1-inch flume	59.7	---	89	2.3	12.6	6.9	Yes	90 percent capture for flow measurement; green algae present on stream bottom
2-Nov-10	17:00	RC	0	NA	62.8	---	115	8.1	10.0	7.6	Yes	
05-2011	---	WRI	---	---	---	---	---	---	---	---	No	A series of 17 pools with water
28-Jun-11	11:43	RC	3.4	1-inch flume	---	---	---	---	---	---	No	95 percent capture for flow measurement
9-Dec-11	8:30	RC	2.5	estimated	40.6	---	103	5.9	7.4	7.0	Yes	
5-Mar-12	12:05	RC	2.7	1-inch flume	---	---	---	---	---	---	No	100 percent capture for flow measurement
27-Apr-12	13:40	RC	5	estimated	72.0	---	139	8.8	5.7	6.5	Yes	
27-Aug-12	11:15	RC	0.1	estimated	90.1	---	---	34.0	8.3	6.8	Yes	
12-Nov-12	13:07	RC	0	---	---	---	---	---	---	---	No	
12-Feb-13	15:00	RC	15	estimated	---	---	---	---	---	---	No	
6-Jun-13	13:05	RC	0.3	---	86.4	---	127	---	---	7.1	No	
1-Nov-13	13:29	RC	0	---	---	---	---	---	---	---	No	Dry
20-Feb-14	15:20	RC	1	estimated	63.3	143	---		3.0	8.7	No	
22-May-14	12:35	RC	2	estimated	80.8	149	---	1.4	10.7	7.7	Yes*	*Sampled for low level Hg at 12:35
26-Sep-14	12:35	RC	1	estimated	84.6	147	---	2.1	10.9	8.1	No	Semi-clear; algal mats
19-Nov-14	13:35	RC	3	estimated	60.0	174	---	1.5	8.0	7.2	No	Clear with sections of stagnation and brown-orange algal mats
2-Mar-15	10:44	RC	2.5	estimated	55.9	129	---	0.7	8.9	7.0	No	Clear; abundant green algal mats
22-May-15	14:26	RC	1	estimated	77.5	149	---	---	8.3	6.6	No	Low flow; slightly murky; lots of algae
28-Oct-15	9:24	RC	Dry	NA	---	---	---	---	---	---	No	Dry
23-Feb-16	12:00	RC	4.7	1-inch flume	56.5	89	---	---	8.3	6.6	Yes	Clear; minor algae

RANCHO RIO SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
11-Apr-16	14:31	RC	2	estimated	72.1	114	---	1.3	11	5.9	Yes	Clear; low flow; moderate algae
13-Sep-16	13:17	RC	Dry	NA	---	---	---	---	---	---	No	Dry
20-Dec-16	8:54	RC	0	estimated	---	---	---	---	---	---	No	Pooled water following recent rain; water is slightly murky
05-2017	---	WRI	---	---	---	---	---	---	---	---	No	Water present in a series of pools for approximately 145 meters

WRI = WestLand Resources, Inc.
GAI = Golder Associates, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

RANCHO RIO SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East	West	7	Bedrock

COMMENTS

Rancho Rio Creek is a tributary that flows into Devils Canyon from the west. About 1.0 mile from the confluence is a series of tinajas that may hold runoff water for most of the year. At the head of the tinajas a small seep is present.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED*	MAMMAL FAUNA OBSERVED*
May 2011	A series of 17 pools held water.	None Observed	beardless rabbitsfoot grass (Polypogon monspeliensis)	buttonbush (Cephalanthus occidentalis), yellow monkeyflower (Mimulus guttatus), Goodding's willow (Salix gooddingi), pale spikerush (Eleocharis macrostachya), pondweed (Potamageton sp.), swordleaf rush (Juncus ensifolius), grassleaf rush (J. marginatus), false indigobush (Amorpha fruticosa)	deergrass (Muhlenbergia rigens), netleaf hackberry (Celtis reticulata)	Sonora mud turtle (Kinosternon sonoriense), macroinvertebrates, phytoplankton, periphyton, zoo plankton	American robin (Turdus migratorius), black-headed grosbeak (Pheucticus melanocephalus), canyon towhee (Melozone fusca), Bewick's wren (Thryomanes bewickii), Greater roadrunner (Geococcyx californianus), Western scrub jay (Aphelocoma californica), Gambel's quail (Callipepla gambelii), curve-billed thrasher (Toxostoma curvirostre), turkey vulture (Cathartes aura), cactus wren (Campylorhynchus brunneicapillus), whitewinged dove (Zenaida asiatica), mourning dove (Zenaida macroura), Gila woodpecker (Melanerpes uropygialis), Great blue heron (Ardea herodias)	bobcat (Lynx rufus), coatimundi (Nasua narica), coyote (Canis latrans), black bear (Ursus americanus), mountain lion (Puma concolor), rock squirrel (Spermophila variegatus), hognosed skunk (Conepatus mesoleucus), hooded skunk (Mephitis macroura), gray fox (Urocyon cinereoargenteus), rock squirrel (Spermophila variegatus), whitetailed deer (Odocoilus virginianus), cottontail (Sylvilagus audubonii), javelina (Tayassu tajacu), ringtail (Bassariscus astutus), cliff chipmunk (Tamias dorsalis), raccoon (Procyon lotor), white-throated woodrat (Neotoma albigula), striped skunk (Mephitis mephitis)
May 2017	Water present in a series of pools for approximately 145 meters	None Observed	beardless rabbitsfoot grass (Polypogon monspeliensis), saltcedar (Tamarix sp.	false indigobush (Amorpha fruticosa), cattail (Typha sp.), beardless rabbitsfoot grass (Polypogon monspeliensis)	netleaf hackberry (Celtis reticulata), Goodding's willow (Salix gooddingii), Fremont cottonwood (Populus fremontii)	Sonora mud turtle (Kinosternon sonoriense), canyon tree frog (Hyla arenicolor)	American robin (Turdus migratorius), black-headed grosbeak (Pheucticus melanocephalus), canyon towhee (Melozone fusca), Bewick's wren (Thryomanes bewickii), Greater roadrunner (Geococcyx californianus), Western scrub jay (Aphelocoma californica), Gambel's quail (Callipepla gambelii), curve-billed thrasher (Toxostoma curvirostre), turkey vulture (Cathartes aura), cactus wren (Campylorhynchus brunneicapillus), whitewinged dove (Zenaida asiatica), mourning dove (Zenaida macroura), Gila woodpecker (Melanerpes uropygialis), Great blue heron (Ardea herodias)	bobcat (Lynx rufus), coatimundi (Nasua narica), coyote (Canis latrans), black bear (Ursus americanus), mountain lion (Puma concolor), rock squirrel (Spermophila variegatus), hognosed skunk (Conepatus mesoleucus), hooded skunk (Mephitis macroura), gray fox (Urocyon cinereoargenteus), rock squirrel (Spermophila variegatus), whitetailed deer (Odocoilus virginianus), cottontail (Sylvilagus audubonii), javelina (Tayassu tajacu), ringtail (Bassariscus astutus), cliff chipmunk (Tamias dorsalis), raccoon (Procyon lotor), white-throated woodrat (Neotoma albigula), striped skunk (Mephitis mephitis)

*Incidental Observations on date of visit, from focused surveys, and wildlife camera observations July 2012, February 2014 - March 2016

Photo 1. View of stock pond at Rancho Rio Spring. Pond is excavated from alluvial deposit west of Rancho Rio fault, April 2017.

Photo 2. Rancho Rio, view of stream and upland desert scrub adjacent to the spring area below stock pond in Photo 1 and above tinajas in subsequent photos, May 2011.

Photo 3. Rancho Rio tinajas downstream from spring, view of bedrock strata and area that holds pool of water seasonally, May 2011.

Photo 4. Rancho Rio, view of bedrock tinaja with vegetation including saltcedar, Fremont cottonwood and willows, mid-July 2017.

Photo 5. Rancho Rio, view of tinajas where a Sonoran mud turtle was observed, May 2011.

Photo 6. Rancho Rio, view of same bedrock tinaja as Photo 4. Two weeks later the tinaja is full and overflowing, late July 2017.

ROCK HORIZONTAL SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Rock Horizontal Spring	None	Rock Horizontal Spring is located in a slot section of Reavis Trail Canyon. The spring was encountered 0.85 miles upstream from the Reavis Trailhead. Water stored in the alluvium is forced to surface when it reaches the scoured slot canyon in granite. Seepage of runoff water was observed through joints of the canyon wall. It appears the upstream alluvium retains enough water from runoff events to support some riparian vegetation.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)9baa		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service (USFS)	Tonto National Forest	Superior, AZ / no	NA

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
487268	3691300	3060 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
Yes	Yes	36-103348 (USFS)	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Reavis Trail Canyon	Intermittent / ephemeral
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000403	Potts Canyon		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Alluvium	Rheocrene	Granite
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	No	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	Plastic hose and steel pipe evident downstream	NA	Small pools / tinajas
ACTIVELY USED?	**USE?**		
Yes	Wildlife / livestock		

NA = Not applicable

ROCK HORIZONTAL SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
1-Mar-18	8:38	M&A	0.5	Estimated	40.3	---	1682.0	---	---	6.84	No	Measured from beginning of surface flow
11-Apr-18	9:00	M&A	<0.1	Estimated	59.0	---	659.0	---	---	7.52	No	Measured from beginning of surface flow
25-Sep-19	9:45	M&A	0.195	Measured	69.5	---	769.7	---	3.0	6.81	No	Spring emerges at the base of granite channel, few small, nearly stagnant pools form along canyon bottom. Water is clear and odorless.
3-Dec-19	12:42	M&A	60	Estimated	60.9	---	448.1	---	---	7.78	No	Recent rainfall has produced heavy flow in this channel both above and below spring emergence. No significant change in flow observed at spring location. Water is clear and odorless.

M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

ROCK HORIZONTAL SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SUBSTRATE
North-northeast	South-southwest	Bedrock

COMMENTS:
A shaded canyon, steep and rocky on each side, dominated by willows, cottonwoods, and seep willow, with a herd of cows drinking the slowly flowing, shallow water.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
April 2018	Shallow, slow flowing water	US Forest Service Sensitive: lowland leopard frog (lithobates yavapaiensis); Parish's Indian mallow (abutilon parishii)	Red brome (Bromus rubens), bermuda grass (Cynodon dactylon), sweet clover (Melilotus officinalis)	Deergrass (Muhlenbergia rigens), cottonwood (Populus fremontii), willows (Salix spp.)	Hibiscus (Hibiscus sp.), hopbush (Dodonaea viscosa), jojoba (Simmondsia chinensis), fiddleneck (Amsinkia sp.), mesquite (Prosopis velutina),	Lowland leopard frog (lithobates yavapaiensis)	None Recorded	Livestock

Photo 1. Rock Horizontal Spring, dominated by deergrass, willows, seepwillows, and cottonwoods; frequented by cows, April 2018.

Photo 3. Rock Horizontal Spring, with willows, hopbush, and a young calf, April 2018.

Photo 5. Rock Horizontal Spring, a view of the young leaves of Parish's Indian mallow (*Abutilon parishii*), a FS Sensitive species; this single individual was observed growing in the shaded canyon within 10 m of the standing water; note the discolorous leaves (dark green above, whitish beneath) and blade hairs over 1 mm, April 2018.

Photo 2. Rock Horizontal Spring, in habitat within 10 m of standing water in creek; prairie spiderwort and red brome, April 2018.

Photo 4. Rock Horizontal Spring, lowland leopard frog (*Lithobates yavapaiensis*), a Forest Service Sensitive species, April 2018.

Photo 6. Rock Horizontal Spring, hibiscus (*Hibiscus sp.*), April 2018.

WestLand Resources, Inc.
Engineering and Environmental Consultants

ROCK HORIZONTAL SPRING
Section 4: Photographs

MONTGOMERY & ASSOCIATES

SILVERADO RIDGE SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Silverado Ridge Spring	None	Silverado Ridge Spring is located in an unnamed tributary east of Fortuna Wash, approximately 0.3 miles upstream from the persistent reach of Bitter Spring. Standing water was observed in an abandoned mine working (decline), approximately 12 feet below the entrence. The decline is on the eastern side of the channel and is angled at approximately 30 degrees down to the east.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)13dca		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service (USFS)	Tonto National Forest	Superior, AZ / no	NA

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
492449	3688856	4090 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
No	Yes	36-103350 (USFS)	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Silver King Wash	No flow observed
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
NA	Diabase	Anthropogenic	Diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Runoff dominated	Man-made mine working	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	Steel pipe found downstream	NA	NA
ACTIVELY USED?	**USE?**		
No	None		

NA = Not applicable

SILVERADO RIDGE SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
10-Apr-18	10:49	M&A	---	---	63.5	---	872.0	---	---	7.6	No	Measured from pooled water at mine enterence

M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

SILVERADO RIDGE SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SUBSTRATE
Northeast	Center	Bedrock

COMMENTS:

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
January 2018	Pooled water inside abandoned mine adit	None recorded	None recorded	None recorded		None recorded	None recorded	None recorded

Photo 1. Silverado Ridge Spring, entrance to mine adit, shaft is full of water approximately 12 feet below entrance, April 2018.

Photo 3. Steel pipe downstream from Silverado Ridge Spring mine adit, April 2018.

Photo 2. Silverado Ridge wash, water staining in diabase channel, April 2018.

Skunk Spring
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Skunk Spring	Hill Spring	Skunk Spring, also known as Hill Spring, is a rheocrene spring located in an unnnamed tributary west of Dripping Spring Wash, approximately 0.3 miles downstream from Looney Spring. The spring occurs in a narrow channel with thin alluvium at the contact between Dripping Spring Quartzite and diabase. Water has been observed flowing over diabase outcrop.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-03-14)05DAC		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Hebbard & Webb		

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
506338	3673153	3620 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	Yes	36-1874	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Dripping Springs Wash	Unnamed tributary to Dripping Springs Wash	Ephemeral/Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Yds - Dripping Springs Quartzite	Rheocrene	Yd - Precambrian Diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	None	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	No		No
ACTIVELY USED?	**USE?**		
No	Unknown	N/A = Not applicable	

SKUNK SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
4-Jun-18	11:32	M&A, WRI	0	Observed	---	---	---	---	---	---	No	Contact at Dripping Springs Quartzite and diabase. No surface water, or saturated soil. Cottonwood trees.
12-Nov-19	11:45	M&A	0	Observed	---	---	---	---	---	---	No	No water present, no clear indication of historical pool presence.
17-Mar-20	11:36	M&A, WRI	0.13	Measured	64.5	---	950.6	1.2	6.0	8.48	Yes	Water flows from alluvial veneer over diabase bedrock channel, then disappears into alluvium. Algae growth indicative of semi-persistant water.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

SKUNK SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East	Center	-	Diabase - bedrock and coarse alluvium

COMMENTS

The site is located along the drainage bottom of an unnamed tributary to Dripping Spring Wash, approximately 0.3-mile downstream from Looney Spring. The drainage bottom is exposed and characterized by coarse rocky substrate and bedrock outcroppings. The opposing hillsides are steep and vegetated with oneseed juniper (Juniperus monosperma) and saguaro (Carnegiea gigantea). Approximately 100' upstream from the site is a small group of Fremont cottonwood (Populus fremontii) trees.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/17/2020	The drainage exhibits trickling surface flow and small pools are present in several areas, particularly on bedrock. Soil is damp due to recent rains.	None observed	Tamarisk (Tamarix sp.), red brome (Bromus rubens)	Algae, columbine (Aquilegia sp.), liverwort (Marchantiophyta), netleaf hackberry (Celtis reticulata), Fremont cottonwood (Populus fremontii) present approx. 100' upstream from site	Moss (bryophyta), sotol (Dasylirion wheeleri), miner's lettuce (Claytonia perfoliata), oneseed juniper (Juniperus monosperma), velvet mesquite (Prosopis velutina), thistle (Cirsium sp.)	None observed	One adult and one juvenile raven (Corvus corax) observed on a stick nest in a cottonwood tree approximately 100' upstream from the site	None observed

Photo 1. Skunk Spring, flowing reach atop diabase outcrop, March 2020

Photo 3. Skunk Spring, dry channel at the base of the Dripping Springs Quartzite and diabase outcrop, June 2018

Photo 2. Skunk Spring, end of flowing reach, water flows through several small tinajas before disappearing into alluvium, March 2020

Photo 4. Ravens (*Corvus corax*) were observed on a stick nest in small group of Fremont cottonwood (*Populus fremontii*) trees approximately 100' upstream from the site, March 2020

SK18-02 SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
SK18-02	None	SK18-02 Spring is located within an incised channel of an unnamed tributary of Comstock Wash. The spring appears to discharge from the Cambrian Bolsa Quartzite upstream and above the contact with the underlying poorly-permeable diabase.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)13ddd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Superior, AZ / no	NA

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
492922	3688539	4270 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
No	No	NA	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Silver King Wash	Persistant / intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Cambrian Bolsa Quartzite	Rheocrene	Diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	NA	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	No	NA	Small pools / tinajas
ACTIVELY USED?	**USE?**		
Yes	Wildlife	NA = Not applicable	

SK18-02 SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
23-Jan-18	11:15	M&A	0.5	estimated	51.5	---	729	---	---	7.79	No	The flowing reach was observed for greater than 200 feet. Many sycamore and cottonwood trees were present throughout the reach.
10-Apr-18	13:26	M&A	0.2	estimated	63.0	---	641.0	---	---	8.0	No	The flowing reach was observed for approximately 300 feet. Many sycamore and cottonwood trees were present throughout the reach.

M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

SK18-02
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SUBSTRATE
North	Center	Bedrock

COMMENTS:
A shaded slope with a population of horsetail (Equisetum hyemale)

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
April 2018	Shallow, slow flowing water	US Forest Service Sensitive: lowland leopard frog (lithobates yavapaiensis)	Wild oats (Avena sp.), red brome (Bromus rubens), alfilerillo (Erodium cicutarium), sow thistle (Sonchus sp.)	Columbine (Aquilegia sp.), miner's lettuce (Claytonia perfoliata), horsetail (Equisetum hyemale), Arizona walnut (Juglans major), rushes (Juncus sp.), monkey-flower (Mimulus guttatus), deergrass (Muhlenbergia rigens), Packera quercetorum (Oak Creek ragwort), Arizona sycamore (Platanus wrightii), cottonwood (Populus fremontii)	Mugwort (Artemisia sp.), desertbroom (Baccharis sarothroides), lipfern (Cheilanthes sp.), sotol (Dasylirion wheeleri), spurge (Euphorbia spp.), geranium (Geranium sp.), silktassel (Garrya wrightii), spiney cliffbrake (Pellaea truncata), beardtongue (Penstemon sp.), heliotrope (Phacelia sp.), honeysuckle (Lonicera sp.).	Lowland leopard frog (lithobates yavapaiensis); Beetles, Belostomatids/Abedus, Dragonflies/Damselflies; algea, coffee berry, equisetum, buckthorn, deer grass	None observed	None oberserved

Photo 1. View SK18-02 Spring drainage from opposite slope (note large cottonwood), January 2018.

Photo 2. SK18-02 Spring, giant water bug (*Abedus)* with eggs on back, April 2018.

Photo 3. SK18-02 Spring, with algae and mosses, April 2018.

Photo 4. SK18-02 Spring, small pool with horsetail, April 2018.

Photo 5. SK18-02 Spring, monkeyflower, sotol, and slowly moving water, April 2018.

Photo 6. SK18-02 Spring, view of shaded slope with large patch of horsetail, April 2018

SK18-03 SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
SK18-03	None	SK18-03 Spring is located within an incised channel of an unnamed tributary of Silver King Wash. The spring appears to discharge from the Cambrian Bolsa Quartzite upstream and above the contact with the underlying poorly-permeable diabase.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-13)18ddb		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Superior, AZ / no	NA

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
492968	3688740	4360 feet amsl	Estimated from USGS 7.5' Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
No	No	NA	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Silver King Wash	Intermittent/ephemeral
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Cambrian Bolsa Quartzite	Rheocrene	Precambrian diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	NA	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	No	NA	Small pools / tinajas
ACTIVELY USED?	**USE?**		
Yes	Wildlife	NA = Not applicable	

SK18-03 Spring
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
23-Jan-18	12:27	M&A	0.25	estimated	54.4	---	552.9	---	---	7.34	No	The flowing reach was observed for approximately 200 feet. Many sycamore trees were present throughout the reach.
10-Apr-18	12:27	M&A	0	estimated	66.6	---	528.0	---	---	7.61	No	No flow observed at reach. Several small pools connected by saturated alluvium.

M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

SK18-03
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SUBSTRATE
South	Central	Alluvium

COMMENTS:
Area contains a small pool dominated by deergrass (deergrass (Muhlenbergia rigens),) with emergent rushes (rushes (Juncus sp.),) and sedges (Eleocharis)

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
April 2018	Small pool; small saturated puddles	None observed	Red brome (Bromus rubens)	Spikerush (Eleocharis sp.), rushes (Juncus sp.), monkey-flower (Mimulus guttatus), deergrass (Muhlenbergia rigens), Arizona sycamore (Platanus wrightii), California coffeeberry (Frangula californica), willows (Salix spp.)	Mountain mahogany (Cerocarphus sp.), desertbroom (Baccharis sarothroides), sugar sumac (Rhus ovata), Mahonia (Berberis sp.), sotol (Dasylirion wheeleri)	None observed	None observed	None observed

*Incidental observations on date of visit and wildlife camera observations February 2014 - March 2016

Photo 1. SK18-03 Spring, Arizona walnut, April 2018

Photo 2. SK18-03 Spring, with coffeeberry, deergrass, and willows, April 2018

Photo 3. SK18-03 Spring, a small pool with spikerushes, rushes, and deergrass, April 2018

SPRING DC 4.1 E
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
DC 4.1 E	Monkey Spring	DC4.1E discharges from the Apache Leap Tuff on the east wall of Devils Canyon. Vertical fins in cliff face suggest fracture control on spring discharge. Spring drains to small pools at base. DC 4.1 E is part of a 200-meter long complex of springs emerging from 10-m high walls above canyon floor, quickly infiltrates unconsolidated materials. Spring DC 4.1 E identified during 2002 during Resolution spring and seep surveys.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-13)22ba		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
499211	3678638	2720 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Devils Canyon	Southern Reach	Perennial/intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000205	Devils Canyon		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration; fracture control	Apache Leap Tuff/surficial colluvium	hanging garden	Apache Leap Tuff
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Spring dominated	none	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
none	none	NA	no
ACTIVELY USED?	**USE?**		
Yes?	wildlife		

SPRING DC 4.1 E
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
11-2002	---	WRI	---	---	---	---	---	---	---	---	---	Water emerges from a rock wall on east side of canyon for approximately 10 meters to a 1m by 8m pool. At this point the water submerges and does not re-emerge until 40 meters downstream. A few scattered pools are present 200 meters downstream from where the water reemerges.
21-May-03	12:30	GAI	---	---	73.8	---	247	0.2	6.1	8.0	Yes	
26-Aug-03	11:00	GAI	---	---	76.6	---	264	0.3	6.1	7.6	Yes	
11-Nov-03	9:50	GAI	---	---	72.0	---	261	0.1	6.7	7.1	Yes	
10-Feb-04	11:10	GAI	1.5	estimated	68.0	---	243	0.6	6.8	7.1	Yes	
05-2011	---	WRI	---	---	---	---	---	---	---	---	---	Water is present for 70 m in a series of small pools and seeps.
20-May-14	13:12	RC	1.5	---	72.0	278	---	0.3	9.0	8.1	Yes	Clear; multiple seeps coming out of wall
28-Aug-14	12:27	RC	3	---	78.8	273	---	0.3	7.3	8.1	No	Very clear; minor algae.
25-Nov-14	12:54	RC	1	---	70.0	242	---	0.9	8.1	7.6	Yes	Clear; 1-2GPM.
16-Dec-15	13:45	RC	2	---	68.0	255	---	---	7.8	7.7	Yes	Very clear water; mineral deposits on wall.
24-May-16	11:20	RC	0.3	estimated	60.6	262	---	4.3	11.7	7.4	Yes	This location is not 4.1e; it was sampled approx. 0.9 km upstream; thus deemed 'DC 5.0' for this event. Could not find sample location at 4.1e. Site sampled near westland game cameras. Dry creek; constant flow in spring.
15-Dec-16	12:00	RC	0.8	---	68.7	241	---	0.3	7.4	7.6	Yes	Clear; 2 main seeps (each with a hanging garden); approx. 0.5-1 GPM; sampled upstream from 2 main seeps
31-Mar-17	12:00	RC	0.1	---	65.8	232	---	0.4	7.7	8.0	Yes	Clear; multiple seeps flowing with main seep discharging ~0.1 GPM.
14-Nov-19	15:33	M&A	0.75	Estimated	71.8	---	262	---	7.0	8.0	No	Clear and odorless. Spring flows from sries of fractures in outcrop of Apache Leap Tuff.

WRI = WestLand Resources, Inc.
GAI = Golder Associates
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

NOTE: Results of hydrochemical analysis for this spring are presented in the following reports:

Montgomery & Associates, 2010, Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds: Final report prepared for Resolution Copper Mining LLC, February 17, 2010.
Montgomery & Associates, 2010, Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds: Final report prepared for Resolution Copper Mining LLC, February 17, 2010.
Montgomery & Associates, 2010, Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds: Final report prepared for Resolution Copper Mining LLC, February 17, 2010.
Montgomery & Associates, 2016, Hydrochemistry addendum, groundwater and surface water, Upper Queen Creek/Devils Canyon study area: Final report prepared for Resolution Copper Mining LLC, August 11, 2016.

SPRING DC 4.1 E
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	East	25	Bedrock

COMMENTS

Issues from the east canyon wall of Devils Canyon,then travels down a narrow rock slot to a pool in the streambed. Water goes subsurface and reemerges downstream in flows and pools. Arizona sycamore (Platanus wrightii), Arizona alder (Alnus oblongifolia), burrobush (Hymenoclea salsola), and cottonwood (Populus fremontii) are present along the canyon floor.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
November 2002	Water emerges from a rock wall on east side of canyon for approximately 10 meters to a 1m by 8m pool. At this point the water submerges and does not re-emerge until 40 meters downstream. A few scattered pools are present 200 meters downstream from where the water reemerges.	None Recorded	None	Arizona alder (Alnus oblongifolia), Arizona sycamore (Platanus wrightii), Aravaipa woodfern (Thelypteris puberula var. sonorensis), watercress (Nasturtium officinale), scarlet monkeyflower (Mimulus cardinalis), cattail (Typha sp.)	None Recorded	None Recorded	None Recorded	None Recorded
May 2011	Water is present for 70 m in a series of small pools and seeps.	Aravaipa woodfern (Thelypteris puberula var. sonorensis)	None	chatterbox orchid (Epipactis gigantea), scarlet monkeyflower (Mimulus cardinalis), Aravaipa woodfern (Thelypteris puberula var. sonorensis), cardinal flower (Lobelia cardinalis), cattail (Typha sp.), sedge (Eleocharis sp.)	None Recorded	None Observed	None Recorded	None Recorded
November 2019	Water drips and seeps along the vertical bedrock wall and forms a pool at the base.	Aravaipa woodfern (Thelypteris puberula var. sonorensis)	Yellow bluestem (Bothriochloa ischaemum)	Sedge (Carex sp.), maidenhair fern (Adiantum capillus-veneris), scarlet monkeyflower (Mimulus cardinalis), Arizona sycamore (Platanus wrightii), velvet ash (Fraxinus velutina), false indigobush (Amorpha fruticosa)	Catclaw acacia (Senegalia greggii), velvet mesquite (Prosopis velutina), ragged rockflower (Crossosoma bigelovii), netleaf hackberry (Celtis reticulata), brittlebush (Encelia farinosa)	None Observed	None Observed	None Observed

Photo 1. DC 4.1 E, view of Aravaipa woodfern, scarlet monkeyflower and cattails growing in surface flow, November 2002.

Photo 3. DC 4.1 E, view of pool in the channel below the spring with wetland plant watercress growing in pool, May 2011.

Photo 5. DC 4.1 E, Closeup view of scarlet monkeyflower with dragonfly, May 2011.

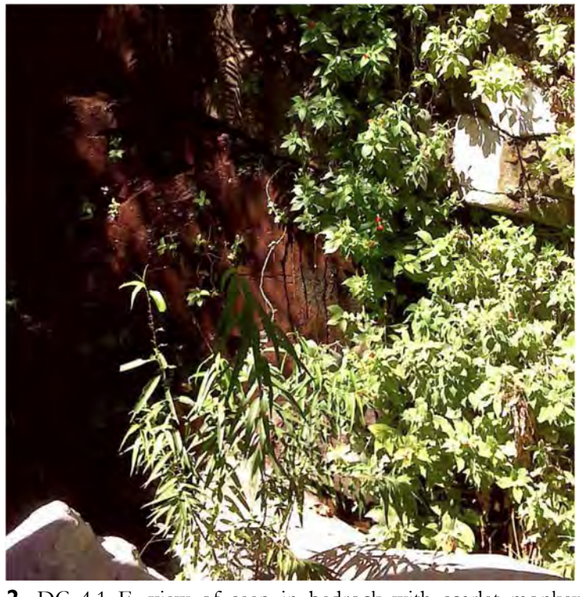

Photo 2. DC 4.1 E, view of seep in bedrock with scarlet monkey flower (*Mimulus cardinalis*) and cardinal flower, May 2011.

Photo 4. DC 4.1 E, view of sensitive, wetland plant Aravaipa woodfern growing on the canyon wall with cardinal flower growing below on the canyon floor, May 2011.

Photo 6. DC 4.1 E, view of wetland plants cattail, sedge, and scarlet monkeyflower with riparian overstory of velvet ash, May 2011.

Photo 7. DC 4.1E. November 2019. View from above. A pool forms at the base of the vertical bedrock wall.

Photo 9. Bitter Spring. November 2019. Tree and shrub species at the site include velvet ash (*Fraxinus velutina*), Arizona sycamore (*Platanus wrightii*), and catclaw acacia (*Senegalia greggii*).

Photo 8. DC 4.1E. November 2019. Water drips and seeps along the bedrock wall. Aravaipa woodfern (*Thelypteris puberula* var. *sonorensis*) and scarlet monkeyflower (*Mimulus cardinalis*) are visible.

SPRING DC 6.1 E
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
DC6.1E	Hanging Garden Spring	DC6.1E discharges from the Apache Leap Tuff on the east wall of Devils Canyon. Water seeps from megaspherulite zone above vitrophyre below the bottom pool of the Crater Tanks; boulder field at base of falls. Identified in 2002 during Resolution spring and seep surveys.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-13)16db		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	No	---

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
498067	3679738	3160 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Devils Canyon	Southern Reach	Perennial/intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000205	Devils Canyon		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Apache Leap Tuff	Hanging garden	Apache Leap Tuff - vitropphyre unit
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Spring dominated	None	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
None	---	---	No
ACTIVELY USED?	**USE?**		
Yes	Wildlife		

SPRING DC 6.1 E
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
11-2002	---	WRI	---	---	---	---	---	---	---	---	---	
5-Jun-03	8:44	GAI	---	---	71.4	309	---	---	---	7.8	---	
20-May-04	12:00	GAI	2	estimated	69.4	---	297	0.6	8.0	8.2	Yes	
23-Aug-04	10:05	GAI	0.8	---	70.7	---	296	0.0	7.6	8.0	Yes	
18-Nov-04	9:33	GAI	2	estimated	64.8	---	274	1.1	0.0	8.1	Yes	
28-Feb-05	10:31	GAI	0	---	66.0	---	374	0.4	---	7.8	Yes	
24-May-05	10:00	GAI	0.5	estimated	69.3	---	300	11.7	---	8.0	Yes	
23-Aug-05	12:30	GAI	0	---	76.5	---	302	163.5	6.3	---	Yes	
7-Aug-08	12:15	RC	1	estimated	72.7	---	299	1.9	<1.0	8.5	Yes	
6-Nov-08	11:30	RC	0	---	60.1	---	274	0.3	<1.0	8.2	Yes	
25-Feb-09	12:30	RC	---	---	68.9	---	291	0.9	<1.0	8.2	Yes	
20-May-09	12:00	RC	3	---	71.2	---	300	0.5	<1.0	8.0	Yes	
19-Mar-10	12:30	RC	1.5	estimated	62.4	---	287	0.5	8.4	8.2	Yes	Flowing more than usual.
19-Oct-10	14:00	RC	5	estimated	72.3	---	332	1.1	8.3	7.3	Yes	
10-Nov-10	13:00	RC	80	estimated	59.4	---	246	1.0	8.7	7.4	Yes	
15-Aug-12	8:50	RC	0	---	79.0	---	212	26.0	---	9.0	Yes	
26-Nov-12	11:55	RC	---	---	55.9	339	339	8.0	8.3	7.9	No	
16-Dec-15	10:04	RC	1.5	---	66.9	300	---	---	---	6.9	Yes	Clear water; hanging garden closest to waterfall; series of seeps
22-Mar-16	10:30	RC	---	---	70.2	291	---	0.3	7.0	7.4	Yes	Clear water with strong flow.
19-Jul-16	11:00	RC	6	estimated	74.1	289	---	0.5	7.5	7.7	Yes	Clear; ~5-7GPM

SPRING DC 6.1 E
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
23-Apr-19	13:45	M&A	12	estimated	67.5	---	300	---	---	7.9	No	Water flowing mostly from 2 main seeps. Seeps into boulder alluvium immediately.
14-Nov-19	10:57	M&A	5	estimated	58.9	---	315	---	7	8.6	No	Hanging garden spring flowing from fractures in tuff. Two prominent flow curtains and a series of horizantal seeps. Clear and odorless.

WRI = WestLand Resources, Inc.
GAI = Golder Associates, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

NOTE: Results of hydrochemical analysis for this spring are presented in the following reports:

Montgomery & Associates, 2010, Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds: Final report prepared for Resolution Copper Mining LLC, February 17, 2010.

Montgomery & Associates, 2010, Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds: Final report prepared for Resolution Copper Mining LLC, February 17, 2010.

Montgomery & Associates, 2010, Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds: Final report prepared for Resolution Copper Mining LLC, February 17, 2010.

Montgomery & Associates, 2016, Hydrochemistry addendum, groundwater and surface water, Upper Queen Creek/Devils Canyon study area: Final report prepared for Resolution Copper Mining LLC, August 11, 2016.

SPRING DC 6.1 E
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	East	15	Bedrock

COMMENTS

Issues from the east canyon wall of Devils Canyon and is a 200-meter-long complex of springs emerging from 10-meter-high walls above the canyon floor. Water from the springs flows down the exposedbedrock walls to the canyon floor and infiltrates unconsolidated subsurface materials, but reemerges near the end of the spring complex.Velvet ash (Fraxinus velutina) is the dominant tree with Fremont cottonwood (Populus fremontii) also occurring.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
November 2002	Intermittent surface flows for approximately 60 m before going subsurface, then re-emerges with minimal surface flow approximately 230 m downstream.	None Recorded	None Recorded	chatterbox orchid (Epipactis gigantea), maidenhair fern (Adiantum capillus-veneris)	None Recorded	None Recorded	None Recorded	None Recorded
Novermber 2019	Water dripping down to the base of the vertcial bedrock wall with contiguous flow continuing for a short stretch down Devils Canyon.	None Observed	None Observed	maidenhair fern (Adiantum capillus-veneris), scarlet monkeyflower (Mimulus cardinales), Arizona sycamore (Platanus wrightii), Arizona alder (Alnus oblongifolia), velvet ash (Fraxinus velutina)	creeper (Parthenocissus sp.), golden columbine (Aquilegia chrysantha), buttonbush (Cephalanthus sp.)	None Observed	None Observed	felled trees and chew marks on trunks suggest North American beaver (Castor canadensis) presence.

Photo 1. DC 6.1 E. November 2019. "Hanging garden" vegetation on the vertical bedrock wall includes creeper (*Parthenocissus* sp.), maidenhair fern (*Adiantum capillus-veneris*), and crimson monkeyflower (*Mimulus verbenaceus*).

Photo 2. DC 6.1 E, view of riparian overstory of velvet ash, Fremont cottonwood and willow below the vertical wall where the spring issues, June 2009.

Photo 3. DC 6.1 E, view of wetland plant chatterbox orchid growing along streambed below spring, May 2009.

Photo 4. DC 6.1 E, measuring water quality parameters, March 2004.

Photo 5. DC 6.1 E. November 2019. Chew marks on saplings suggest North American beaver (*Castor canadensis*) presence.

SPRING DC 6.6 W
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
DC 6.6 W	DCT 6.6 W; West Canyon	DCT6.6W is located in an unnamed tributary to the west of Devils Canyon, approximately 200 meters above main stem. Water is present in a series of small pools and seeps that emanate through the loamy substrate. Canyon bottom along contact between Apache Leap Tuff and Whitetail Conglomerate.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-13)16bd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
497395	3680077	3520 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Devils Canyon	Southern Reach	Perennial/intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000205	Devils Canyon		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Apache Leap Tuff (Tal)/WhitetailConglomerate	Rheocrene	Whitetail Conglomerate
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff/spring dominated	NA	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
NA	NA	NA	small pools
ACTIVELY USED?	**USE?**		
Yes?	wildlife		

SPRING DC6.6W
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
11-2002	---	WRI	---	---	---	---	---	---	---	---	No	Intermittent surface flows for approximately 60 meters before going subsurface, then re-emerges with minimal surface flow approximately 230 meters downstream.
29-May-03	9:21	RC	0.5	---	77.7	---	325	9.9	5.6	8.0	Yes	
3-Sep-03	9:22	RC	0.5	---	72.7	---	362	1.1	3.2	6.6	Yes	
4-Nov-03	9:23	RC	1.5	estimated	64.9	---	412	1.3	0.7	6.8	Yes	
18-Feb-04	14:20	RC	1.0	---	60.3	---	155	0.8	6.3	7.1	Yes	
5-May-04	8:30	RC	0.5	estimated	63.9		318	0.2	5.7	7.6	Yes	
19-Aug-04	7:20	RC	0.3	---	70.7		224	0.2	1.6	7.1	Yes	
29-May-03	14:30	RC	0.5	---	77.7	---	325	9.9	5.6	8.0	Yes	
3-Sep-03	8:30	GAI	0.5	---	72.7	---	362	1.1	3.2	6.6	Yes	
4-Nov-03	10:00	GAI	1.5	estimated	69.9	---	412	1.3	0.7	6.8	Yes	
18-Feb-04	14:20	GAI	1.0	---	60.3	---	155	0.8	6.3	7.1	Yes	
5-May-04	8:30	GAI	0.5	estimated	63.9	---	318	0.2	5.7	7.6	Yes	
19-Aug-04	7:20	GAI	0.3	---	70.7	---	224	0.2	1.6	7.1	Yes	
12-Nov-04	9:14	GAI	0.7	---	63.5	---	179	1.0	4.7	7.2	Yes	
16-Feb-05	10:15	GAI	32.5	1 " Flume	53.4	---	101	1.5	12.3	7.5	Yes	
17-May-05	8:20	GAI	0.5	estimated	64.6		303	0.5	2.4	7.3	Yes	
7-Sep-05	12:00	GAI	0	---	74.3		298	0.4	2.7	6.8	Yes	
05-2011	---	WRI	---	---	---	---	---	---	---	---	No	Water is present for 70 meters in a series of small pools and seeps.
4-May-12	11:30	RC	2	estimated	77.3	---	339	---	---	7.6	Yes	
27-Feb-14	13:15	RC	0.5	---	61.7	272	---	2.5	---	7.6	No	<1GPM; parameters taken in small pool on muddy ground.
25-Sep-14	12:36	RC	0.1	---	74.1	300	---	3.7	---	8.2	No	Small pools in soil; clear; very low flow; pools in soil too small to measure DO.
7-Nov-14	12:15	RC	1	estimated	64.0	267	---	2.2	---	7.9	No	Clear; muddy area; ~1GPM. Not enough water for DO measurement.
23-Nov-15	13:11	RC	---	---	60.6	221	---	---	8.5	7.1	Yes	Series of low flow puddles - some with clear water; some are stagnant looking. Had to dig out bigger pools and wait for water to settle before collecting sample.

SPRING DC6.6W
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
17-Feb-16	14:12	RC	0	---	65.2	204	---	2.0	1.9	6.5	Yes	Clear water; very little water (<<1gpm); series of seeps in muddy terrain; extracted
23-Aug-16	13:48	RC	---	---	75.2	267	---	2.2	---	6.9	Yes	Clear water; very little water (<<1gpm); small pools with low flow
27-Sep-19	13:15	M&A	0.38	measured	73.1	---	384	---	3.5	7.0	No	Emerges from hillslope and in bottom of channel along contact between conglomerate and tuff. Spring flow surfaces and resubmmerges multiple times along saturation length
12-Nov-19	14:57	M&A	0.375	measured	65.7	---	616	---	5.5	7.6	No	Emerges at conglomerate and tuff contact.

WRI = WestLand Resources, Inc.
GAI = Golder Associates, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

NOTE: Results of hydrochemical analysis for this spring are presented in the following reports:

Montgomery & Associates, 2010, **Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds:** Final report prepared for Resolution Copper Mining LLC, February 17, 2010.

Montgomery & Associates, 2012, **Results of hydrochemical characterization, Upper Queen Creek/Devils Canyon study area:** Final report prepared for Resolution Copper Mining LLC, March 9, 2012.

Montgomery & Associates, 2013, **Surface water baseline report, Devils Canyon, Mineral Creek, and Queen Creek watersheds:** Final report prepared fro Resolution Copper Mining LLC, May 16, 2013.

Montgomery & Associates, 2016, **Hydrochemistry addendum, groundwater and surface water, Upper Queen Creek/Devils Canyon study area:** Final report prepared for Resolution Copper Mining LLC, August 11, 2016.

SPRING DC 6.6 W
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East	West	15	Bedrock

COMMENTS

Issues from a side canyon to the west of Devils Canyon. Water is present in a series of small pools and seeps that emanate through the loamy substrate. A canopy of Arizona sycamore (Platanus wrightii), Arizona walnut (Juglans major) and Fremont cottonwood (Populus fremontii) provides approximately 75% cover over the spring area.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
November 2002	Intermittent surface flows for approximately 60 meters before going subsurface, then re-emerges with minimal surface flow approximately 230 meters downstream.	None Recorded	None	seepwillow (Baccharis salicifolia), Arizona sycamore (Platanus wrightii)	Not Recorded	Not Recorded	Not Recorded	Not Recorded
May 2011	Water is present for 70 meters in a series of small pools and seeps.	Thelypteris puberula var. sonorensis	None	maidenhair fern (Adiantum capillus-veneris), chatterbox orchid (Epipactis gigantea), swordleaf rush (Juncus ensifolius), grassleaf rush (J. marginatus), yellow monkeyflower (Mimulus guttatus), Arizona sycamore (Platanus wrightii), Aravaipa woodfern (Thelypteris puberula var. sonorensis)	hollyleaf buckthorn (Rhamnus crocea), canyon grape (Vitis arizonica)	None Observed	None Observed	None Observed
September 2019	Small amont of seepage on the hillside. Small pools present in channel depressions	Aravaipa woodfern (Thelypteris puberula var. sonorensis)	Red brome (Bromus rubens), rabbitsfoot grass (Polypogon monspeliensis)	Arizona sycamore (Platanus wrightii), Arizona walnut (Juglans major), rush (Juncus sp.), seepwillow (Baccharis salicifolia)	white oak (Quercus arizonica), hopbush (Dodonaea sp.), mistletoe (Phoradendron sp.), netleaf hackberry (Celtis reticulata)	None Observed	None Observed	None Observed
November 2019	Small amont of seepage on the hillside. Small pools present in channel depressions	Aravaipa woodfern (Thelypteris puberula var. sonorensis)	rabbitsfoot grass (Polypogon monspeliensis)	Arizona sycamore (Platanus wrightii), Arizona walnut (Juglans major), rush (Juncus sp.), seepwillow (Baccharis salicifolia), Oak Creek ragwort (Packera quercetorum), Bonpland's willow (Salix bonplandiana)	white oak (Quercus arizonica), hopbush (Dodonaea sp.), mistletoe (Phoradendron sp.), netleaf hackberry (Celtis reticulata), sugar sumac (Rhus ovata), canyon grape (Vitis arizonica)	None Observed	None Observed	None Observed

Photo 1. DC 6.6 W, view of pool of water with substantial amount of leaf litter from the overstory of wetland plants Arizona alder and Arizona sycamore, October 2002.

Photo 2. DC 6.6 W, view up side canyon that hosts spring, October 2003.

Photo 3. DC 6.6 W, view of sensitive wetland plant Aravaipa woodfern growing along surface water flow, May 2011

Photo 4. DC 6.6 W, view of sensitive wetland plant Aravaipa woodfern and common maidenhair fern growing at base of boulder, May 2011.

Photo 5. DC 6.6 W, view of pool along surface water flow, May 2011.

Photo 6. DC 6.6 W, view of wetland plant chatterbox orchid emerging from leaf litter, May 2011.

Photo 7. DC 6.6W. September 2019. The spring issues from a tributary to the west of Devils Canyon. The tributary is lined with Arizona sycamore (*Platanus wrightii*) and Fremont cottonwood (*Populus fremontii*) trees.

Photo 9. DC 6.6W. November 2019. Pooled water is present in the channel depressions. Canopy cover at this site includes Arizona sycamore (*Platanus wrightii*) and white oak (*Quercus arizonica*).

Photo 8. DC 6.6W. September 2019. An Aravaipa woodfern (*Thelypteris puberula* var. *sonorensis*) in the tributary containing the spring.

Photo 10. DC 6.6W. November 2019. Seepage along the hillslope. Vegetation at this site includes white oak (*Quercus arizonica*), Bonpland's willow (*Salix bonplandiana*), and sugar sumac (*Rhus ovata*).

SPRING DC 8.2 W
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
DC8.2W	Golder Spring 8.2	DC8.2W spring complex emanates from the west bank of Devils Canyon between Hackberry and Oak Canyons - largest single spring complex noted in the canyon. 2 springs approximately 20 meters apart, with flow connection to main channel. Spring emerges from under a large boulder and pools in several places as flow continues down to the main channel. Cutthroat flume installed for several years until destroyed by flood.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-13)9ca		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
497477	3681388	3540 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Devils Canyon	Middle Reach	Perennial/intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000205	Devils Canyon		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Fracture	Apache Leap Tuff	Hillslope	Apache Leap Tuff
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Spring dominated	No	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No (flume briefly installed)	No	---	No
ACTIVELY USED?	**USE?**		
Yes	Wildlife		

SPRING DC 8.2 W SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
11-2002	---	WRI	---	---	---	---	---	---	---	---	No	The spring forms a 1 x 1 meter pool with a substantial amount of leaf litter
20-May-03	14:00	GAI	10.9	Cut-throat Flume	74.5		266	0.5	5.9	7.6	Yes	
21-Aug-03	8:00	GAI	---	---	74.1	---	229	0.3	5.9	7.2	Yes	
12-Nov-03	9:42	GAI	8.1	Cut-throat Flume	72.9	---	274	0.5	5.2	7.1	Yes	
17-Feb-04	13:10	GAI	10.9	Cut-throat Flume	73.0	---	244	0.8	6.3	7.2	Yes	
21-May-04	9:30	GAI	11.9	Cut-throat Flume	73.6	---	276	1.1	5.5	7.6	Yes	
16-Aug-04	8:55	GAI	9.0	Cut-throat Flume	73.9	---	274	0.3	6.1	7.4	Yes	
16-Nov-04	10:50	GAI	2.2	Cut-throat Flume	59.9	---	311	1.3	3.7	7.3	Yes	
15-Dec-04	9:31	GAI	---	---	53.2	---	286	---	---	7.3	No	
25-Feb-05	10:25	GAI	3	estimated	72.3	---	274	0.5	6.7	7.5	Yes	
30-Mar-05	10:49	GAI	---	---	72.5	---	270	---	---	7.4	No	
11-May-05	11:45	GAI	10	estimated	72.9	---	206	0.0	7.4	7.4	Yes	
28-Jun-05	10:01	GAI	---	---	73.8	---	229	---	---	7.4	No	
16-Aug-05	8:45	GAI	1	estimated	74.1	---	268	0.8	6.9	7.4	Yes	
19-Feb-08	13:30	M&A	---	---	---	---	---	---	---	---	Yes	
27-May-08	16:30	M&A	---	---	---	---	275	---	---	6.8	Yes	Clear
6-Aug-08	9:30	M&A	---	---	74.3	---	264	0.2	6.2	7.6	Yes	
5-Nov-08	11:30	RC	1	estimated	70.9	---	282	0.0	3.1	7.3	Yes	
2-Dec-08	10:45	M&A	---	---	73.6	---	271	---	---	6.9	Yes	
24-Feb-09	15:30	RC	---	---	76.3	---	263	0.7	5.3	7.3	Yes	

SPRING DC 8.2 W SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
03-2009	---	WRI	---	---	---	---	---	---	---	---	No	Pool flows into main channel
19-May-09	13:00	RC	10.0	---	76.6	---	243	0.8	5.3	6.9	Yes	
10-Nov-10	9:45	GAI	<1	estimated	68.2	---	260	0.9	7.1	7.2	Yes	
05-2011	---	WRI	---	---	---	---	---	---	---	---	No	A series of four pools form from the source under a large boulder and flow 20 meters into the main channel.
20-May-11	9:45	RC	0.1	---	72.1	---	312	0.9	7.1	7.6	No	
3-May-12	11:30	RC	5	estimated	73.1	---	245	4.4	5.5	7.3	Yes	
14-Jun-13	14:18	RC	5	---	75.2	---	278	---	2.7	7.5	No	
5-Aug-13	9:32	RC	12	---	73.5	270	280	---	---	7.7	No	Clear
27-Feb-14	15:01	RC	2	---	73.4	272	---	0.1	---	7.7	No	Water bubbles up clear from spring (1-3GPM). Algae on surface of pool.
29-May-14	15:20	RC	2	---	74.3	289	---	0.2	---	8.0	No	Clear
3-Sep-14	12:27	RC	5	---	---	762	---	0.2	7.0	8.0	No	Clear; inflow sounds like 5-7 GPM (under boulder).
21-Nov-14	12:11	RC	5	---	72.9	254	---	1.5	7.5	7.5	No	Clear
14-Oct-15	12:03	RC	15	---	73.8	269	---	---	6.9	7.3	Yes	Clear water.
19-Feb-16	10:31	RC	---	---	72.2	259	---	0.3	6.5	7.3	Yes	Clear
21-Jun-16	11:12	RC	---	---	73.9	278	---	0.6	6.4	7.0	---	Clear; steady flow.
23-Sep-16	10:15	RC	5	estimated	73.7	269	---	0.8	6.6	7.4	---	Clear; approx. 5GPM.
26-Apr-19	13:20	M&A	2	estimated	74.6	---	278	---	---	7.19	No	Spring source is upwelling beneath boulder, downstream flow is braided, max depth of pool at pond center 0.8 feet. Deepest point 0.8 feet.

SPRING DC 8.2 W SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
27-Sep-19	9:34	M&A	2.1	Measured	73.9	---	251.4	---	4	6.77	No	Water emerges from hillslope, repenetrates under boulder, remerges and drains down into main channel.
12-Nov-19	10:56	M&A	3.5	Measured	72	---	272.7	---	4	7.48	No	Water emerges at bedrock contact, flows into 4 ft x 5 ft pool, discharges south down 2 ft x 10 ft channel to main Devil's Canyon channel. Water is clear and odorless.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
GAI = Golder Associates
--- = unknown

NOTE: Results of hydrochemical analysis for this spring are presented in the following reports:

Montgomery & Associates, 2010, **Interim results of groundwater monitoring, Upper Queen Creek and Devils Canyon watersheds:** Final report prepared for Resolution Copper Mining LLC, February 17, 2010.

Montgomery & Associates, 2012, **Results of hydrochemical characterization, Upper Queen Creek/Devils Canyon study area:** Final report prepared for Resolution Copper Mining LLC, March 9, 2012.

Montgomery & Associates, 2013, **Surface water baseline report, Devils Canyon, Mineral Creek, and Queen Creek watersheds:** Final report prepared fro Resolution Copper Mining LLC, May 16, 2013.

Montgomery & Associates, 2016, **Hydrochemistry addendum, groundwater and surface water, Upper Queen Creek/Devils Canyon study area:** Final report prepared for Resolution Copper Mining LLC, August 11, 2016.

SPRING DC 8.2 W
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East	West	15	Bedrock

COMMENTS

The source emerges from the west side of Devils Canyon from under a large boulder and pools in several places as flows continue down to the main channel under a large Arizona sycamore (Platanus wrightii). Arizona alder (Alnus oblongifolia),contributes to overstory cover and buttonbush (Cephalanthus occidentalis)is a common understory shrub.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
November 2002	The spring forms a 1 x 1 meter pool with a substantial amount of leaf litter	None Recorded	None	Arizona alder (Alnus oblongifolia), seepwillow (Baccharis salicifolia), Arizona sycamore (Platanus wrightii), Bonpland's willow (Salix bonplandiana)	velvet ash (Fraxinus velutina)	No Records	No Records	Coatimundi (Nasua narica)
March 2009	A pools flows into the main channel.	Aravaipa woodfern (Thelypteris puberula var. sonorensis)	None	Arizona alder (Alnus oblongifolia)	No Records	No Records	No Records	No Records
May 2011	A series of four pools form from the source under a large boulder and flow 20 meters into the main channel.	Aravaipa woodfern (Thelypteris puberula var. sonorensis)	None	Arizona alder (Alnus oblongifolia), buttonbush (Cephalanthus occidentalis), yellow monkeyflower (Mimulus guttatus), Arizona sycamore (Platanus wrightii), Bonpland's willow (Salix bonplandiana), Aravaipa woodfern (Thelypteris puberula var. sonorensis)	blackberry (Rubus sp.), western poison ivy (Toxicodendron rydbergii), Virginia creeper (Parthenocissus quinquefolia)	No Records	No Records	No Records
September 2019	Flow at spring source.	Aravaipa woodfern (Thelypteris puberula var. sonorensis)	None Observed	Arizona alder (Alnus oblongifolia), buttonbush (Cephalanthus occidentalis), Arizona sycamore (Platanus wrightii), Aravaipa woodfern (Thelypteris puberula var. sonorensis)	Velvet ash (Fraxinus velutina), Arizona walnut (Juglans major), Arizona grape (Vitis arizonicus), California buckthorn (Frangula californica)	None observed	None observed	None observed
November 2019	Flow at spring source.	Aravaipa woodfern (Thelypteris puberula var. sonorensis)	None Observed	Arizona alder (Alnus oblongifolia), buttonbush (Cephalanthus occidentalis), Arizona sycamore (Platanus wrightii), Aravaipa woodfern (Thelypteris puberula var. sonorensis), yellow monkeyflower (Mimulus guttatus)	Velvet ash (Fraxinus velutina), Arizona walnut (Juglans major), Arizona grape (Vitis arizonicus), oneseed juniper (Juniperus monosperma)	None observed	None observed	None observed

Photo 1. DC 8.2 W, view of pool of water with substantial amount of leaf litter from the overstory of wetland plant Arizona alder, October 2002.

Photo 3. DC 8.2W. September 2019. Aravaipa woodfern (*Thelypteris puberula* var. *sonorensis*).

Photo 5. DC 8.2 W, view of pool from source of spring. Riparian vegetation includes Arizona alder, Bonpland's willow and western poison ivy, May 2011.

Photo 2. DC 8.2W. November 2019. A pool approximately 10 m downslope from the spring source.

Photo 4. DC 8.2 W, closeup view of sensitive plant Aravaipa woodfern growing at base of boulder with blackberry in the foreground, May 2011.

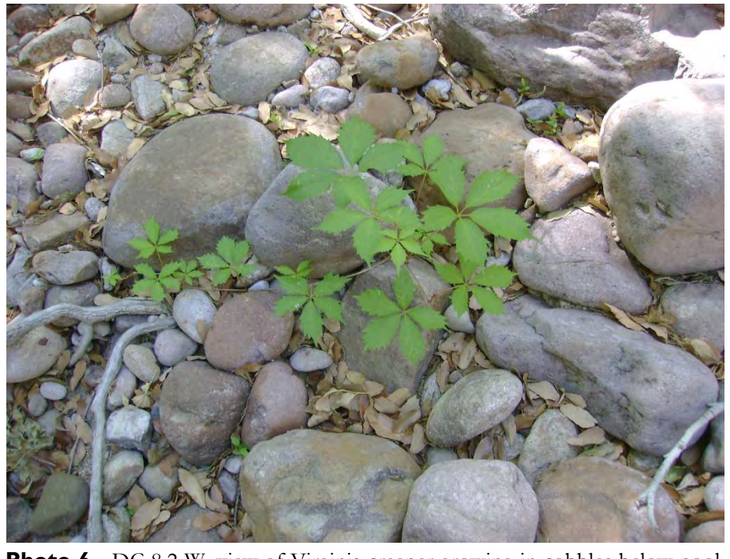

Photo 6. DC 8.2 W, view of Virginia creeper growing in cobbles below pool, May 2011.

Spring MC 3.4W
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
MC 3.4W		MC 3.4 W is a hillslope spring that discharges from the western slope of the Mineral Creek drainage. The spring's main source discharges approximately 200 feet from Mineral Creek, following a shallow channel down into the main drainage. Multiple diffuse seeps are also present in the immediate area surrounding the spring's primary source. The spring supports numerous large herbaceous wetland plants and trees.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-13)23db		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
State Trust		Sonora , AZ / No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
501204	3678064	2579 feet amsl	Trimble (M&A)

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Mineral Creek	Mineral Creek	Perennial / persistent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000206	Upper Mineral Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Hillslope; fracture control	Apache Leap Tuff (Tal)	Hillslope	N/A
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Spring Dominated	No	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	No	N/A	No
ACTIVELY USED?	**USE?**		
Yes	Wildlife		

SPRING MC 3.4 W
Section 2: Hydrologic Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
13-Nov-08	16:00	RC	---	---	---	---	---	---	---	---	Yes	No observations noted
5-Mar-09	15:30	RC	---	---	---	---	---	---	---	---	Yes	No observations noted
14-May-09	14:00	RC	---	---	---	---	---	---	---	---	Yes	No observations noted
6-Aug-09	13:30	RC	2	Estimated	77	---	233.4	1.55	9.21	7.68	Yes	No observations noted
15-Dec-09	13:10	RC	---	---	65.66	---	254.5	---	11.02	7.88	Yes	No observations noted
15-Feb-10	15:00	RC	1	Estimated	70.52	---	245	0.58	11.25	7.85	Yes	No observations noted
18-Mar-10	13:30	RC	5	Estimated	72.32	---	22.9	2.2	6.17	7.81	Yes	No observations noted
4-Nov-10	15:45	RC	7	Estimated	71.24	---	---	1.55	9.21	7.62	Yes	No observations noted
24-Feb-11	9:46	RC	---	---	20.3	---	230	0.29	7.75	8.11	Yes	No observations noted
12-Aug-13	12:05	RC	42	Estimated	81.59	---	403	0.78	2.48	7.83	No	Flood ~ 2 weeks ago. Clear water. Frogs and brown algae growth.
18-Feb-14	13:05	RC	0.5	Estimated	61.52	278	---	---	---	7.45	No	Clear. Very low flow. Parameters taken from small muddy pool. Dense, green vegetation.
27-May-14	12:39	RC	0.1	Estimated	73.94	348	---	23.5	---	8.11	No	Small puddles in soil below large amounts of vibrant vegetation. Soil is very saturated.
23-Sep-14	11:10	RC	0.1	Estimated	---	---	---	---	---	---	No	Clear water. Small muddy pools. Green vegetation. Not enough water for parameters.
11-Nov-14	11:33	RC	2	Estimated	63.68	272	---	8.27	---	6.8	No	Minor green vegetation on hillslope. Not enough water for DO measurement.
18-Nov-15	14:20	RC	2	Estimated	57.3	276.3	---	---	6.06	6.99	Yes	Water clear with green vegetation in area.
25-Feb-16	16:30	RC	1.5	Estimated	58.8	211.4	---	---	6.15	7.79	Yes	Water clear with bright green vegetation.
28-Jun-16	15:38	RC	0	---	---	---	---	---	---	---	No	No flow. It appears that the June 10th storm has destroyed the spring.
20-Sep-16	13:25	RC	0	---	---	---	---	---	---	---	No	Moist soil. Evidence of past flow.
23-Jan-18	14:42	RC	1	Estimated	---	---	---	---	---	---	No	Spring appears to be back to "normal conditions".
30-Apr-19	12:18	M&A	1	Estimated	76.9	---	251.5	---	---	7.14	No	Hillslope emergence west of Mineral Creek. Ash and sycamore trees.
1-Oct-19	11:35	M&A	1.75	Measured	69.3	---	255.7	---	0.5	6.91	No	Water emerges in side channel and flows into main Mineral Creek channel. Flow measured at long side channel, however multiple seeps exist in area surrounding the main spring source.
5-Dec-19	13:14	M&A	3.1	Measured	68	---	267.6	---	5	7.74	No	Spring flows from fractured apache leap tuff approximately 150 feet up the west slope of the main channel. Flow is clear and odorless. Hillslope shows diffuse saturation surrounding main channel that hosts flow. Water is clear and odorless.

RC = Resolution Copper
M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

SPRING MC 3.4W
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southeast	West	15	Soil

COMMENTS

Hillslope seep complex. Water discharges in multiple locations on the hillslope and pools in hillside depressions as well as in the channel tributary to Mineral Creek.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
October 2019	Soil saturation and some surface ponding on the hillslope and in the tributary to Mineral Creek.	None Observed	None Observed	Arizona sycamore (Platanus wrightii), velvet ash (Fraxinus velutina), willow (Salix sp.), Arizona walnut (Juglans major)	velvet mesquite (Prosopis velutina), netleaf hackberry (Celtis reticulata), Texas mulberry (Morus microphylla), sugar sumac (Rhus ovata), canyon grape (Vitis arizonica), graythorn (Ziziphus obtusifolia)	Black-necked gartersnake (Thamnophis cyrtopsis) observed in Mineral Creek approximately 800 meters upstream	None Observed	None Observed
November 2019	Soil saturation and some surface ponding on the hillslope and in the tributary to Mineral Creek.	Several lowland leopard frogs (Lithobates yavapaiensis) observed along Mineral Creek upstream and downstream from the site	None Observed	Arizona sycamore (Platanus wrightii), velvet ash (Fraxinus velutina), willow (Salix sp.), Arizona walnut (Juglans major)	netleaf hackberry (Celtis reticulata), Texas mulberry (Morus microphylla), sugar sumac (Rhus ovata), canyon grape (Vitis arizonica), graythorn (Ziziphus obtusifolia), hollyleaf buckthorn (Rhamnus crocea), mistletoe (Phoradendron sp.)	Several lowland leopard frogs (Lithobates yavapaiensis) observed along Mineral Creek upstream and downstream from the site	None Observed	None Observed

Photo 1. MC 3.4W Spring. Hillslope spring complex. Water flowing from fractured Apache Leap Tuff. March 2020.

Photo 2. MC 3.4W Spring. Overview of hillslope seepage. Water flows from soil cover of canyon wall and flows down to Mineral Creek. December 2019.

Photo 3. MC 3.4W Spring. Saturated organic substrate. Water discharging from several seeps along hillslope. April 2019.

Photo 4. MC 3.4W Spring. Seepage along the tributary below the hillslope. Velvet ash (*Fraxinus velutina*) is pictured. October 2019.

Photo 5. MC 3.4W Spring. Canopy cover at the site includes velvet ash (*Fraxinus velutina*) and Arizona sycamore (*Platanus wrightii*). October 2019.

Photo 6. MC 3.4W Spring. Saturated soil and an accumulation of leaf litter and woody debris on the hillslope. December 2019.

Stone Cabin Box Spring
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Stone Cabin Box Spring		Stone Cabin Box Spring is a rheocrene spring located in Stone Cabin Wash approximately 0.9 miles downstream from Stone Cabin Spring. The spring occurs in thick alluvium atop Bolsa quartzite. A small pool occurs at the base of the alluvial veneer. Water flows from the pool over the bedrock channel through a series of 2 tinajas, then disappears in alluvium further downstream.	
COUNTY	**CADASTRAL (40-acre)**		
Gila	(D-02-14)26CDB		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Hebbard & Webb	Sonora AZ / Yes	Sonora AZ 7.5' (1964, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
510334	3676130	3820 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Dripping Springs Wash	Stone Cabin Wash	Perennial
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Qal - Alluvium Cb - Bolsa Quartzite	Rheocrene	Cb - Bolsa Quartzite
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	None	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	No		Small pool at mouth of spring
ACTIVELY USED?	**USE?**		
Yes	Stock/wildlife	N/A = Not applicable	

STONE CABIN BOX SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
5-Jun-18	14:45	M&A, WRI	0	Observed	67.1	---	1384	7	0.2	7.42	Yes	Alluvium and Bolsa Quartzite; shaded beneath Arizona Walnut tree, many inverts
12-Nov-19	13:02	M&A	2	Estimated	68.5	---	1246	0.81	---	7.23	Yes	Clear water, slight organic odor.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

STONE CABIN BOX SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Center	10	Soil and Bedrock

COMMENTS

Water in series of bedrock bottom pools

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
6/5/2018	Surface water present (Pooled)	None Observed	Rabbitsfoot grass (Polypogon monspeliensis), annual yellow sweetclover (Melilotus indicus)	Seepwillow (Baccharis salicifolia), yellow monkeyflower (Mimulus guttatus), rush (Juncus sp.), Arizona centaury (Zeltnera calycosum), cattail (Typha sp.)	Fremont cottonwood (Populus fremontii), desert broom (Baccharis sarothroides), Arizona walnut (Juglans major), western poison ivy (Toxicodendron rydbergii), muhly grass (Muhlenbergia sp.), Thurber's desert honeysuckle (Anisacanthus thurberi), snapdragon vine (Maurandya antirrhiniflora), sacred thorn-apple (Datura wrightii), beardtongue (Penstemon sp.), bedstraw (Galium sp.)	Giant water bug (Abedus sp. and Belostomatidae), damselfly and dragonfly nymphs (Odonata), water strider (Gerridae), water boatmen (Corixidae), predaceous diving beetle (Dytiscidae), water scorpion (Ranatra sp.)	Canyon wren	None Observed

Photo 1. Upstream bedrock pool at Stone Cabin Box Spring. Shaded by large Arizona walnut (*Juglans major*), June 2018

Photo 2. Looking upstream in drainage at Stone Cabin Box Spring. Riparian overstory includes Arizona walnut (at upper pool) and Fremont cottonwood (*Populus fremontii*), June 2018

Photo 3. Looking downstream towards isolated bedrock pool. Water is over 4-5 feet deep, June 2018

Photo 4. Algae was present in lower bedrock pool, June 2018

Photo 5. Stone Cabin Box Spring, water seeping from the alluvium, flowing across the Bolsa Quartzite outcrop, October 2019

Photo 6. Stone Cabin Box Spring, hydrologist collecting water chemistry field parameters, October 2019

WestLand Resources, Inc.
Engineering and Environmental Consultants

STONE CABIN BOX SPRING
Section 4: Photographs

MONTGOMERY & ASSOCIATES

Stone Cabin Spring
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Stone Cabin Spring		Stone Cabin Spring is a rheocrene spring located in Stone Cabin Wash which is tributary to Dripping Springs Wash. The spring occurs at the contact between Mescal Limestone and diabase within the main channel with a shallow cover of alluvium. Old homestead and corral just downstream from spring site.	
COUNTY	**CADASTRAL (40-acre)**		
Gila	(D-02-14)26adb		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Hebbard & Webb	Sonora AZ / Yes	Sonora AZ 7.5' (1964, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
511150	3676909	4040 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	Yes	36-68745	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Dripping Springs Wash	Stone Cabin Wash	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Ym - Mescal Limestone	Rheocrene	Yd - Precambrian diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	None	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	No		No
ACTIVELY USED?	**USE?**		
Yes	Stock/wildlife	N/A = Not applicable	

STONE CABIN SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
13-Feb-19	14:00	M&A	2	Estimated	60.1	---	625.2	1	---	7.13	Yes	Occurs at contact of Mescal Limestone and diabase; flowing reach ~25 ft, before seeping into alluvial cover. Many large sycamore in area.
12-Nov-19	11:20	M&A	0	Observed	58.8	---	573	11.1	---	7.31	Yes	Small pond of approximately 3 gallons. Clear, organic odor. Near contact of diabase and quartzite.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

STONE CABIN SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Center	4	Soil and Bedrock

COMMENTS

Damp section of channel approximately 15 m in length.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
6/5/2018	Damp soil	None Observed	None Observed	Goodding's willow (Salix gooddingii), Arizona sycamore (Platanus wrightii)	Netleaf hackberry (Celtis reticulata), western poison ivy (Toxicodendron rydbergii), one seed juniper (Juniperus monosperma), Arizona walnut (Juglans major), catclaw acacia (Senegalia greggii), mesquite (Prosopis sp.), leather flower (Clematis sp.)	None Observed	Cooper's hawk, common raven, Bell's vireo, zone-tailed hawk	None Observed; ungulate tracks noted

Photo 1. Stone Cabin Spring, looking upstream, pool within flowing reach, February 2019

Photo 2. Stone Cabin Spring, flowing reach, observed flow of 2 gpm, February 2019

Photo 3. Looking downstream withing continuously saturated reach, February 2019

SUMP SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Sump Spring	None	Sump Spring occurs in the channel of an unnamed tributary of Walnut Canyon. At the location of the spring, there is an excavated empoundment with a 25 x 30 foot pond at the contact of the Dripping Springs Quartzite and diabase. The history of the spring is largely unknown, however current rancher explained that the location has been historically excavated due to its persistence. No evidence of inflow, or outflow to identify the spring source.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-14)29bcb		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Bureau of Land Management		No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12S	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
504926	3677029	3440 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Mineral Creek	Tributary to Walnut Creek	No flow observed
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000206	Upper Mineral Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
N/A	Yds - Dripping Springs Quartzite	Contact	Yd - Precambrian diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Runoff dominated	Man-made structure	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Excavated impoundment	Impoundment maintained by rancher		Yes
ACTIVELY USED?	**USE?**		
Yes	Livestock / wildlife	N/A = Not applicable	

SUMP SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
14-Aug-19	9:40	M&A	0	Observed	73.9	---	839.4	4.68	---	7.49	Yes	Hillslope/Anthropogenic Spring. Excavated hillslope near Dripping Springs Quartzite and Diabase contact. No visible inflow or outflow. Alluvial pond/sump.
14-Nov-19	10:10	M&A	0	Observed	50.3	---	853.3	9.58	---	7.43	Yes	
10-Mar-20	10:20	M&A, WRI	0	Observed	54.4	---	803	---	10.19	7.89	No	Stagnant pond with no visible inflow or outflow. Surrounding bank is about 5-6 ft above pond height.

M&A = Montgomery & Associates
WRI = WestLand Resources Inc.
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

SUMP SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East	West	-	Alluvium

COMMENTS

The site is located in an unnamed canyon approximately 875' southwest of Laguna Spring. The site consists of constructed earthen pond on the river-left side of the canyon a few feet upslope from the drainage bottom. Large Arizona sycamore (Platanus wrightii) trees line the perimeter of the pond.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/10/20	Pooled surface water measures approximately 26' x 33'	None observed	Red brome (Bromus rubens)	Cattail (Typha sp.), algae, Arizona sycamore (Platanus wrightii), Gooding's willow (Salix gooddingii)	Shrub oak (Quercus turbinella), Oneseed juniper (Juniperus monosperma), Seepwillow (Baccharis salicifolia), desert broom (Baccharis sarothroides), velvet mesquite (Prosopis velutina), sugar sumac (Rhus ovata), fiddleneck (Amsinckia sp.), Netleaf hackberry (Celtis reticulata), berberis (berberis sp.), miner's lettuce (Claytonia perfoliata), catclaw mimosa (Mimosa aculeaticarpa), mountain mahogany (Cercocarpus sp.), wire lettuce (Stephanomeria sp.) hopbush (Dodonaea viscosa), Rusby's globemallow (Sphaeralcea rusbyi), western wallflower (Erysimum capitatum)	giant water bug (Belostomatidae), mosquito larvae (Culicidae), predacious diving beetle (Dytiscidae)	Dark-eyed junco (Junco hyemalis), woodpecker (Picidae), raven (Corvus corax)	None observed

Photo 1. Sump Spring, excavated containment at the base of Dripping Springs Quartzite outcrop, March 2020

Photo 3. Sump Spring, surface and sub-surface algae growth, March 2020

Photo 2. Sump Spring, Cattail (*Typha sp.*) is present in the center of the pond, and the perimeter is lined with Arizona sycamore (*Platanus wrightii*). No observable inflow, or outflow, March 2020

THE GROTTO
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
The Grotto	Oak Flat Spring	Grotto formed in boulder breakdown at head of KP canyon west of former CCC camp in Oak Flat. Breakdown blocks and grotto walls comprised of Apache Leap Tuff blocks with alluvial veneers and bedrock pools upstream fro grotto. Surface water runoff is captured, stored and slowly released into grotto through ceiling fractures after rainy periods. Water seeps down the walls of grotto and collects on the floor in small pools. Highly seasonal presence of water, but protected, cool, and dark all year.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-13)33bc		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Superior, AZ / No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12Z	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
495254	3684717	3936 feet amsl	Handheld GPS

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
No	No	N/A	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle Gila	Queen Creek	Shaft 9 Wash	intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash-Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration seep	Alluvium	Hanging garden	Apache Leap Tuff
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Runoff dominated	None	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
None	None	---	Natural pools above grotto
ACTIVELY USED?	**USE?**		
Yes	Wildlife		

THE GROTTO
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
12-Apr-16	16:55	M&A	DRY	---	---	---	---	---	---	---	No	Dry walls and floor of cave
22-Mar-17	10:52	M&A	Flow, dripping	---	53	102.6	---	---	---	6.88	No	Dripping on main wall with 1 gallon in pool at base of wall
17-Apr-17	10:59	M&A	Minor flow	---	---	---	---	---	---	---	---	Not enough flow for parameters; slow drip in 3-4 places; moss has light green color; wall dry surrounding moss
26-Apr-17	10:38	M&A	Minor flow	---	---	---	---	---	---	---	---	One or two small drips from top of wall; moss has light green color, same as previous visit; not enough flow for parameters
5-May-17	12:15	M&A	Damp	---	---	---	---	---	---	---	---	Rattlesnake found, no flow
23-Jun-17	9:51	M&A	DRY	---	---	---	---	---	---	---	---	
14-Jul-17	10:00	M&A	DRY	---	---	---	---	---	---	---	---	
27-Jul-17	9:40	M&A	Flowing	---	72.3	60.7	---	---	---	7.61	No	Drips/flow from top opf wall and pooled at base
4-Aug-17	12:03	M&A	Flowing	---	72.3	139.7	---	---	---	7.5	No	Small pool at base of wall
24-Aug-17	9:45	M&A	Wet	---	---	---	---	---	---	---	---	4-5 drips; base of wall damp

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
--- = unknown

WestLand Resources, Inc.
Engineering and Environmental Consultants

MONTGOMERY & ASSOCIATES

THE GROTTO
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southeast	Northeast	10	Bedrock

COMMENTS

Water flows down the walls of a cave and collects on the floor in pools.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
March - June 2017	Surface water present	None Observed	Bermuda grass (Cynodon dactylon)	rush (Juncus sp.)	lip ferns (Cheilanthes sp.), Emory oak (Quercus emoryi)	tadpoles	None Observed	bat colony

Photo 1. The Grotto, view showing seeps along the wall of the cave, September 2017.

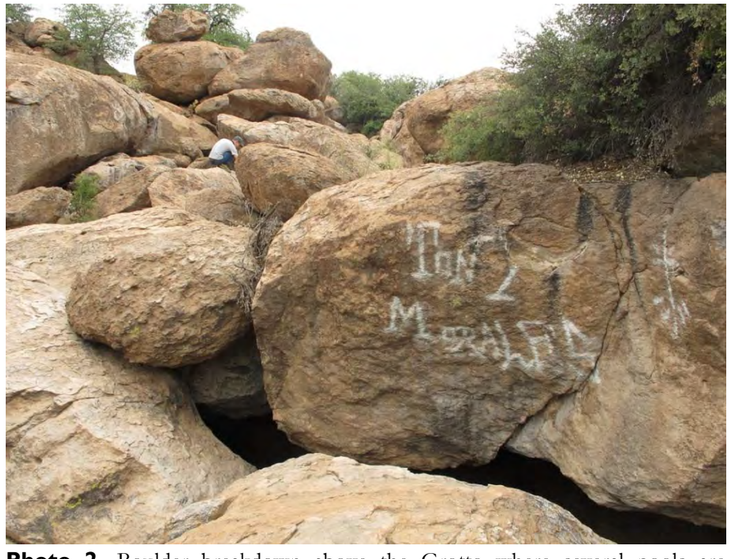

Photo 2. Boulder breakdown above the Grotto where several pools are located, with check dam further upstream, September 2017.

Photo 3. The Grotto, closeup view showing algae and moss growing on the seeps along the wall of the cave, July 2017.

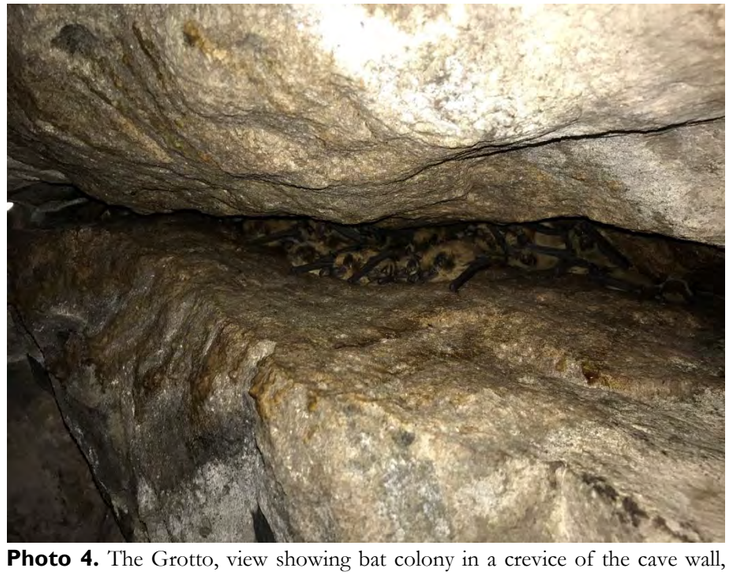

Photo 4. The Grotto, view showing bat colony in a crevice of the cave wall, July 2017.

Photo 5. The Grotto, view showing seeps flowing into pools on the floor of the cave, July 2017.

Photo 6. The Grotto, view showing pool of water on the floor of the cave, July 2017.

TUNNEL SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Tunnel Spring	None	No indication of past of present water was identified during reconnaissance of the ALRIS location for Tunnel Spring. A filled-in dig site was observed on the hillside near the Tunnel Spring location. The hole was dug in an oxidized knob of diabase on the south facing hillside.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)13caa		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Superior, AZ / Yes	Superior, AZ 7.5' (2011, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
491922	3689257	3820 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	ADWR 55 REGISTRY/NUMBER
Yes	No	NA	No

HYDROLOGY

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Silver King Wash	No flow observed
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
NA	NA	NA	NA
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
NA	NA	NA	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
No	No	NA	No
ACTIVELY USED?	**USE?**		
NA	NA	NA = Not applicable	

TUNNEL SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
23-Jan-18	15:13	M&A	0	---	---	---	---	---	---	---	No	No spring-like features; excavated pit in hillside.

M&A = Montgomery & Associates
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

TUNNEL SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SUBSTRATE
South	North	Bedrock

COMMENTS:
Hillside testpit; no water

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
January 2018	None	None recorded	None recorded	None recorded	Desert ironwood (Olneya tesota), Turpentine bush (Ericameria laricifolia),	None recorded	None recorded	None recorded

Photo 1. Tunnel Spring, a shallow excavation with turpentine bush and stunted ironwoods, January 2018

WALKER SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Walker Spring	None	Walker Spring occurs as seeps along the channel banks in a tributary to Happy Camp Canyon. Flow starts just below conglomerate ledge in streambed. Banks are saturated and seeping on both sides of the stream.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-01-12)32da		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
U.S. Forest Service	Tonto National Forest	Picketpost Mountain, AZ / No	---

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
486361	3684216	2565 feet amsl	Estimated from USGS Topo

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	None	NA	NA

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Queen Creek	Happy Camp Canyon	Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000402	Silver King Wash - Queen Creek		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Alluvium (Qal); may source in part from bedding planes in Gila conglomerate (QTg)	Rheocrene	Gila Conglomerate
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	None	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
None	None	---	No
ACTIVELY USED?	**USE?**		
unknown	unknown		

WALKER SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
1-May-17	---	WRI	---	---	78.8	1360	---	---	---	8.7	No	Flow starts just below conglomerate ledge in streambed. Banks are saturated and seeping on both sides of the stream. Seeps, flows and pools present for approximately 30 meters.
30-Aug-17	14:30	M&A	0.2	---	94.1	---	1243	44.0	---	7.9	Yes	Channel created to restrict water flow to small area for collection of sample; murky; very light yellow tinge.
4-Dec-17	10:25	M&A	---	---	---	---	---	---	---	---	No	Moist ground but no standing or flowing water
12-Mar-18	9:03	M&A	---	---	53.5	---	2740	12.2	---	8.3	No	Wash damp with two puddles; appear to be rain-related: larger puddle, approximately 3-4 gallons; yellow tinge; putrid odor; tadpoles; thin oily surface.
12-Mar-18	9:12	M&A	---	---	64.3	---	1582	19.1	---	8.0	No	Wash damp with two puddles; appear to be rain-related; smaller puddle, approximately 50 feet down stream from above puddle; 0.5 gallon; odorless.
4-Jun-18	9:05	M&A	---	---	---	---	---	---	---	---	No	Dry
25-Sep-19	15:25	M&A	---	---	---	---	---	---	---	---	No	Seepage and moist soil along alluvium terrace and beneath conglomerate ledge
13-Nov-19	12:13	M&A	---	---	---	---	---	---	---	---	No	No flow along alluvium/conglomerate contact.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

WALKER SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	Center	5	Alluvium over bedrock

COMMENTS

Occurs as seeps along banks in Happy Camp Canyon. One large dead Fremont cottonwood (Populus fremontii) occurs at upper end of wet area where conglomerate bedrock ledge intrudes across streambed.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
May 2017	Flow starts just below conglomerate ledge in streambed. Banks are saturated and seeping on both sides of the stream. Seeps, flows and pools present for approximately 30 meters.	None observed	red brome (Bromus rubens), Bermuda grass (Cynodon dactylon), clover (Melilotus sp.)	seepwillow (Baccharis salicifolia), purple mat (Nama demisssa), speedwell (Veronica anagallis-aquatica)	canyon ragweed (Ambrosia ambrosiodes)	Aquatic invertebrates are present including water boatmen, water striders, starburst beetles. Tadpoles and metamorphs, are also present.	None Observed	None Observed
September 2019	No flow. Area below conglomerate ledge contains a small amount of pooled liquid that appears to be primarily cattle urine. Soil below the conglomerate ledge is damp.	None observed	red brome (Bromus rubens), Bermuda grass (Cynodon dactylon), tree tobacco (Nicotiana sp.)	seepwillow (Baccharis salicifolia)	canyon ragweed (Ambrosia ambrosiodes), desert globemallow (Sphaeralcea ambigua), velvet mesquite (Prosopos velutina), singlewhorl burrobush (Hymenoclea monogyra)	None Observed	None Observed	None Observed
November 2019	Dry.	None observed	red brome (Bromus rubens), Bermuda grass (Cynodon dactylon), London rocket (Sisymbrium irio)	seepwillow (Baccharis salicifolia)	canyon ragweed (Ambrosia ambrosiodes), desert globemallow (Sphaeralcea ambigua), velvet mesquite (Prosopos velutina), singlewhorl burrobush (Hymenoclea monogyra)	None Observed	None Observed	None Observed

Photo 1. Walker Spring, view of conglomerate bedrock ledge across streambed, May 2017.

Photo 2. Walker Spring, view of wetland plant purple mat growing in wet area along channel, May 2017.

Photo 3. Seepwillow (*Baccharis salicifolia*) and velvet mesquite (*Prosopis velutina*) on a terrace adjacent to Walker Spring. November 2019.

Photo 4. Walker Spring, view of surface water along edge of channel, May 2017.

Photo 5. Walker Spring, view of previously moist channel that is now dry, June 2017.

Photo 6. Walker Spring, pocket of moisture along edge of channel excavated by wildlife, June 2017.

WALNUT SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Walnut Spring		Walnut Spring is a hillslope spring located in Walnut Canyon Creek which drains into Mineral Creek from the south. The spring occurs at the contact between the Dripping Springs Quartzite and diabase. Water discharges into a hillside spring box and is piped into a 10-foot by 10-foot cement storage tank with a cement drinker. The storage tank and drinker are maintained by a local cattle rancher. Walnut Spring is reported to be one of the more reliable springs in the area.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-02-14)29DCA		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Hebbard & Webb	Sonora AZ / Yes	Ray AZ 15' (1910) Sonora AZ 7.5' (1964, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
506042	3676170	3440 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Mineral Creek	Walnut Canyon Creek	Perennial
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Hillslope	Yds - Dripping Springs Quartzite	Hillslope	Yd - Precambrian diabase
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Spring Dominated	Yes	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Hillside spring box	Steel pipe	Cement storage tank and drinker	Cement tank
ACTIVELY USED?	**USE?**		
Yes	Livestock	N/A = Not applicable	

WALNUT SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (° F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
15-May-19	12:44	M&A	1.16	Measured	64.3	---	688.2	---	---	7.03	No	Flowing from hillslope pipe into cement container. Seeping from container flowing into wash (~20 ft). 2 ft of water in container.
29-Aug-19	10:40	M&A	1.01	Measured	64.7	---	688.1	---	5	7.17	No	Water flows into cement holding tank from steel pipe. Leaks from tank flow into Walnut Creek where it dissapears into the alluvium immediately.
14-Nov-19	16:00	M&A	1	Measured	62.1	---	690.7	0.39	---	7.05	Yes	
10-Mar-20	11:47	M&A, WRI	1.43	Measured	58.3	---	691	---	12.2	7.64	No	Water plumbed from hillslope spring box to cement drinker. Water seeps from cracks in drinker and flows along surface to alluvium of Walnut Canyon. 1.5 ft of water in tank.

M&A = Montgomery & Associates
WRI = WestLand Resources Inc.
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

WALNUT SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
North	South	-	Concrete and alluvium

COMMENTS

The site is located on the river-left floodplain terrace of Walnut Canyon, shortly upslope from the drainage bottom. The site consists of an approximately 11' long x 11' wide x 5' deep concrete reservoir. A concrete cattle drinker measuring approximately 11' long x 2' wide x 2' deep is connected to the base of the reservoir. The reservoir is filled by a springpipe, and the cattle drinker is filled by excess water in the reservoir. Water also seeps out of the base of the cattle drinker and pools on the floodplain terrace before eventually reporting to the Walnut Canyon drainage bottom.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/10/20	Water is flowing from the springpipe into the reservoir and from the reservoir to the cattle drinker. Water is also seeping through the concrete of the cattle drinker and onto the ground below, forming a seepy pool on the floodplain terrace of Walnut Canyon. The surface seepage reaches the main channel of Walnut Canyon and continues downstream for approximately 30' before infiltrating into the sediment.	None observed	horehound (Marrubium vulgare)	Arizona walnut (Juglans major), charophyte green alage (Chara sp.), green filamentous algae, monkeyflower (Erythranthe sp.)	Berberis (berberis sp.), oneseed juniper (Juniperus monosperma), fiddleneck (Amsinckia sp.), Emory oak (Quercus emoryi), netleaf hackberry (Celtis reticulata), miner's lettuce (Claytonia perfoliata), moss (Bryophyte sp.), velvet mesquite (Prosopis velutina)	Water boatman (Corixidae)	Unoccupied raptor nests (2), Cooper's hawk (Accipiter cooperii), Woodhouse's scrub jay (Aphelocoma woodhouseii)	None observed

Photo 1. Walnut Spring, hillslope spring box plumbed into a 10 x 10 ft concrete container, May 2019

Photo 3. Walnut Spring, water flowing from concrete container into Walnut Canyon wash. Grasses, forbs, and algae are visible. March 2020

Photo 2. Walnut Spring, drinker at the base of the concrete container, water seep from cracks and flows into Walnut Canyon wash, May 2019

Photo 4. Walnut Spring, one of two unoccupied raptor nests observed from the spring site, March 2020

WELL SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Well Spring	None	Well Spring occurs in a drainage of the Gila Conglomerate foothills west of the Dripping Springs Wash. A concrete foundation is built into the hillslope with a vertical cement mixer standing upright. Water appears to flow into the mixer from the north and disappear into the alluvium of the channel. The grassy channel downstream from the mixer was observed as damp to saturated.	
COUNTY	**CADASTRAL (40-acre)**		
Gila	(D-03-15)29bcd		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Jodsaas, Rick L	No	N/A

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
511022	3669193	3060 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
No	Yes	36-102480.1	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Dripping Springs Wash	Tributary to Dripping Springs Wash	Intermittent/Persistent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Seepage or filtration	Tcg - Gila Conglomerate	Hillslope/Anthropogenic	N/A
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Spring dominated	Developed hillslope	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Concrete foundation and cement mixer tank	Unknown		No
ACTIVELY USED?	**USE?**		
Unknown	Unknown	N/A = Not applicable	

WELL SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
31-Jan-20	13:43	M&A	>0	Estimated	---	---	---	---	---	---	No	Flow is visible from the top opening of the large metal container that houses the spring. Access to the water is not possible. Nearby soil down-channel from the container is saturated.
23-Mar-20	11:09	M&A, WRI	0.5	Estimated	---	---	---	---	---	---	No	Flowing into cement mixer from NW hillside. Unobtainable for water parameters or sampling.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

WELL SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East	Center	-	Fine and coarse alluvium

COMMENTS

The site is located in a small unnamed tributary to Dripping Spring Wash approximately 500' southwest of the Dripping Spring Wash main stem, amongst a dense patch of netleaf hackberry (Celtis reticulata) trees. The site consists of an upright cement mixer structure with a concrete footer which is nested in an excavation on the river left bank of the drainage. Seeage from the hillside collects inside the cement mixer and is also expressed on the ground surface of the drainage shortly downstream from the cement mixer.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
3/23/2020	Seepy surface flow inside the cement mixer. The soil in the drainage downstream from the cement mixture is fully saturated. Upturning rocks in the muddy drainage bottom below the cement mixer reveals small pockets of surface water.	None observed	red brome (Bromus rubens), chickweed (Stellaria media)	None observed	netleaf hackberry (Celtis reticulata), berberis (Berberis sp.), fiddleneck (Amsinckia sp.), shrub oak (Quercus turbinella), storksbill (Geranium sp.), bedstraw (Galium aparine)	None observed	cactus wren (Campylorhynchus brunneicapillus), greater roadrunner (Geococcyx californianus), dark-eyed junco (Junco hyemalis)	None observed

Photo 1. Well Spring, concrete foundation with vertical cement mixer built into hillslope seep , March 2020

Photo 3. Well Spring, saturated, grassy area just below cement mixer. Large netleaf hackberries (*Celtis reticulata*) surround the site, March 2020

Photo 2. Well Spring, observable inflow into cement mixer, March 2020

Photo 4. The drainage bottom is vegetated with red brome (*Bromus rubens*). Surface water is visible beneath upturned rocks, March 2020

WOODCHOPPER SPRING
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Woodchopper Spring		Woodchopper Spring is a rheocrene spring located in an unnamed tributary West of Dripping Springs Wash. The spring occurs in a bedrock channel within the Dripping Springs Quartzite and may be fault controlled. The spring discharges through a 1/2-inch steel pipe embedded into the quartzite and was historically plumbed to a corral approximately 1000 feet downstream.	
COUNTY	**CADASTRAL (40-acre)**		
Pinal	(D-03-14)05bab		
LAND OWNERSHIP	**LAND OWNERSHIP - DETAIL**	**7.5-minute USGS Quadrangle / Shown on quad?**	**LIST QUADS AND EDITIONS WHERE SHOWN**
Private	Hebbard & Webb	Sonora AZ / Yes	Sonora AZ 7.5' (1964, 2014)

GEOREFERENCE

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12N	
UTM Easting	**UTM Northing**	**ELEVATION**	**ELEVATION SOURCE**
505366	3674123	3910 feet amsl	Estimated from USGS topo map

ADMINISTRATIVE

INCLUDED IN ALRIS DATABASE?	ADWR SURFACE WATER RIGHT FILING?	ADWR SURFACE WATER RIGHT FILING NUMBER	GWSI Spring?
Yes	No	N/A	No

HYDROLOGY

ADWR BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Upper Gila	Dripping Springs Wash		Intermittent
HYDROLOGIC UNIT CODE (HUC)	**HUC Basin**		
150501000106	Upper Dripping Springs Wash		

GEOMORPHOLOGY

SOURCE GEOMORPHOLOGY	HOST GEOLOGIC UNIT	SPRING TYPE (Discharge Sphere)	PERCHING GEOLOGIC UNIT
Contact	Yds - Dripping Springs Quartzite	Rheocrene	N/A
FLOW FORCE MECHANISM	**CHANNEL DYNAMICS**	**ANTHROPOGENIC CONTROLS**	
Gravity	Mixed runoff / spring dominated	Yes, buried spring box in channel	

INFRASTRUCTURE

FLOW MODIFICATION?	PIPING or other DIVERSION?	OTHER	POND?
Spring box	Steel pipe, plastic hose		No
ACTIVELY USED?	**USE?**		
Yes	Stock/wildlife	N/A = Not applicable	

WOODCHOPPER SPRING
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (^{o} F)	Electrical Conductivity (µS/cm)	Specific Conductance (µS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
13-Nov-19	14:40	M&A	0.5	Estimated	50.2	---	941.1	1.59	---	7.86	Yes	Very slight yellow color and organic odor.

WRI = WestLand Resources, Inc.
M&A = Montgomery & Associates
RC = Resolution Copper
gpm = gallons per minute
µS/cm = microSiemens per centimeter
NTUs = nephelometric turbidity units
mg/L = milligrams per liter
--- = unknown

WOODCHOPPER SPRING
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
---	---	---	---

COMMENTS

WestLand has not surveyed this spring location.

BIOLOGICAL OBSERVATIONS

DATE	WATER PRESENCE	SPECIAL STATUS SPECIES	INVASIVE SPECIES	WETLAND SPECIES OBSERVED	OTHER PLANT SPECIES OBSERVED	AQUATIC FAUNA OBSERVED	BIRD FAUNA OBSERVED	MAMMAL FAUNA OBSERVED
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Photo 1. Woodchopper Spring, flowing reach downstream from discharge location, January 2019

Photo 2. Woodchopper Spring, view of saturation at spring emergence, January 2019

Photo 3. Woodchopper Spring, several generations of plumbing leading to corral with large metal drinker, January 2019

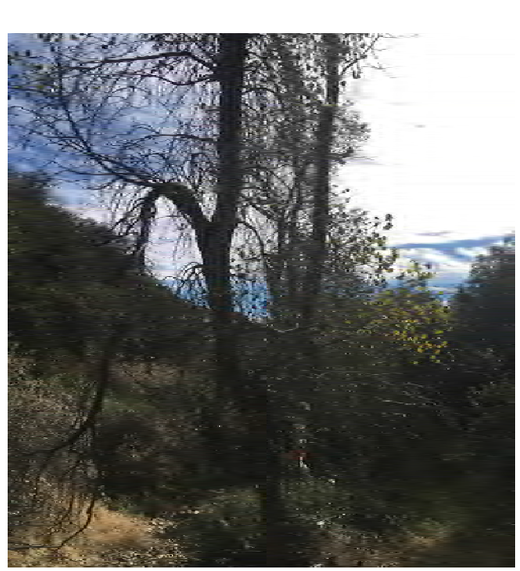

Photo 4. Woodchopper Spring, looking downstream, view of Fremont cottonwood (*Populus fremontii*) in drainage channel, January 2019

Victoria Boyne

From: ResolutionProjectRecord
Subject: FW: Response to Action item WR-9- Water Working Group - Spring Inventory 3.0

From: Peacey, Victoria (RC) <Victoria.Peacey@riotinto.com>
Sent: Wednesday, April 22, 2020 3:08 PM
To: Rasmussen, Mary C -FS <mary.rasmussen@usda.gov>
Cc: Donna Morey <dmorey@swca.com>; Chris Garrett <cgarrett@swca.com>; Ghidotti, Greg (G&I) <Gregory.Ghidotti@riotinto.com>; TIMOTHY BAYLEY <tbayley@elmontgomery.com>; Duarte, Janeen (RC) <Janeen.Duarte@riotinto.com>
Subject: Response to Action item WR-9- Water Working Group - Spring Inventory 3.0

Hello Mary,

An updated seeps and springs inventory has been completed by Montgomery and Associates in response to WR-9 *"Springs Inventory 3.0*." The report is 40MB and can be directly downloaded from the M&A cloud share site on the link below with the associated password.

https://cloudshare.elmontgomery.com/s/AQJd2HBTffyHgps

Password: Springs2020

Please contact Tim directly if you have any issues downloading the report.

Thanks,

Vicky Peacey
Senior Manager Permitting and Approvals

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