

Version 2.0  
June 15, 2018

Prepared for:

**RESOLUTION**  
C O P P E R  
Superior, Arizona

# Spring and Seep Catalog

## Resolution Copper Project Area

### Upper Queen Creek and Devils Canyon Watersheds



Prepared by:

  
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## **SPRING AND SEEP CATALOG**

### **Resolution Copper Project Area**

### **Upper Queen Creek and Devils Canyon Watersheds**

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**DATE:** June 14, 2018

**VERSION: 2.0**

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## **Introduction**

This catalog has been prepared to summarize available information for selected springs and seeps in the Upper Queen Creek and Devils Canyon watersheds (UQC/DC). 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 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.

Spring locations are shown on **Figure 1**. Springs and seeps included in this catalog are labeled in light blue. 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 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.

Version 2.0 of the Spring and Seep Catalog details springs in and around the proposed Silver King Tailings footprint (Option 4) and one spring in Roblas Canyon. Additional springs added to version 2.0 include: SK18-02, SK18-03, Tunnel, Fig, Silverado Ridge, McGinnel, McGinnel Mine, Rock Horizontal, and #5 springs.

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

The following corrections have been made to spring entries from version 1.0 of the Spring and Seep catalog:

<b>Spring Identifier</b>	<b>Corrective Measure</b>
Bitter Spring	Changed location coordinates for the spring
I Berry Spring	Changed name to Iberri Spring
Perlite Spring	Edit the description of the feature

## References

- 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  
UQC/DC – Upper Queen Creek and Devils Canyon watersheds  
USFS – United States Forest Service  
USGS – United States Geological Survey  
UTM – Universal Transverse Mercator  
WRI – WestLand Resources, Inc.

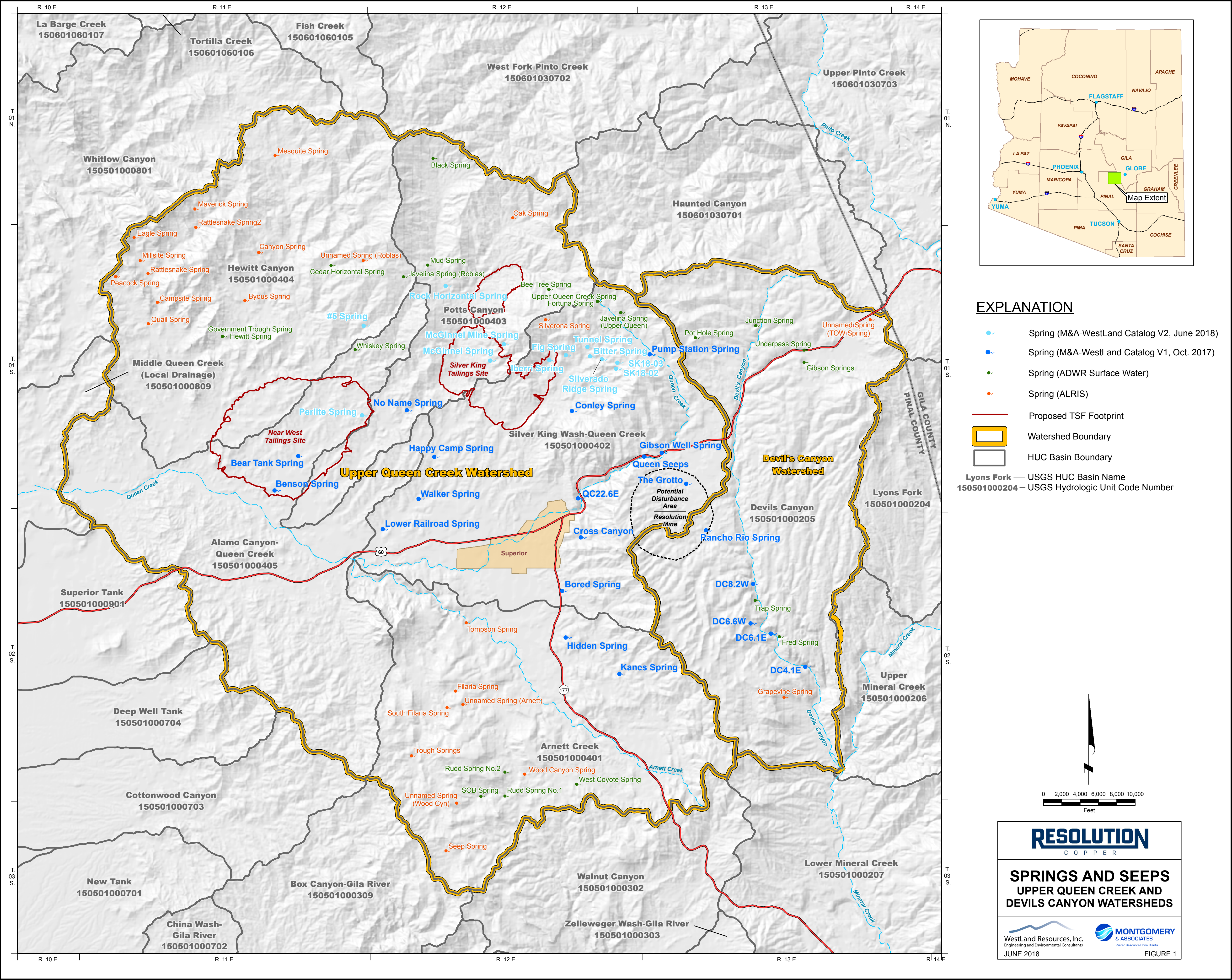
gpm – gallons per minute

m – meters

mg/L – milligrams per liter

μS/cm – microSiemens per centimeter







#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?	NA = Not applicable	
No	Unknown		



#5 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		
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



# BEAR TANK SPRING

## Section 1: General Information

### GENERAL INFORMATION

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b>	
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 downstream 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	
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-11)25cd		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service	Tonto National Forest	Picketpost, AZ / Yes	Superior AZ 15' (1948); Picketpost AZ 7.5' (2004, 2011, 2014)

### GEOREFERENCE

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

### ADMINISTRATIVE

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

### HYDROLOGY

<b>BASIN</b>	<b>SUB-BASIN</b>	<b>LOCAL DRAINAGE</b>	<b>FLOW PERSISTENCE</b>
Middle Gila	Queen Creek	Bear Tank Canyon	Intermittent
<b>HYDROLOGIC UNIT CODE (HUC)</b>	<b>HUC Basin</b>		
150501000405	Alamo Canyon - Queen Creek		

### GEOMORPHOLOGY

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

### INFRASTRUCTURE

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
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
<b>ACTIVELY USED?</b>	<b>USE?</b>		
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 (° 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 (° 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 downstream 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 ( <i>Cynodon dactylon</i> ), beardless rabbitsfoot grass ( <i>Polypogon monspeliensis</i> )	seepwillow ( <i>Baccharis salicifolia</i> ), yellow monkeyflower ( <i>Mimulus guttatus</i> ), watercress ( <i>Nasturtium officinale</i> )	canyon ragweed ( <i>Ambrosia ambrosioides</i> ), Bermuda grass ( <i>Cynodon dactylon</i> ), cocklebur ( <i>Xanthium strumarium</i> )	boatmen, backswimmers, beetles, belostomatids, toebiters, water scorpions, Sonoran desert toad ( <i>Incilius alvarius</i> ), Sonoran mud turtle ( <i>Kinosternon sonoriense</i> )	Abert's towhee ( <i>Pipilo aberti</i> ), barn owl ( <i>Tyto alba</i> ), common raven ( <i>Corvus corax</i> ), Gambel's quail ( <i>Callipepla gambelii</i> ), Gila woodpecker ( <i>Melanerpes uropygialis</i> ), greater roadrunner ( <i>Geococcyx californianus</i> ), house finch ( <i>Carpodacus mexicanus</i> ), unidentified owl, mourning dove ( <i>Zenaida macroura</i> ), Northern cardinal ( <i>Cardinalis cardinalis</i> ), redtailed hawk ( <i>Buteo jamaicensis</i> ), turkey vulture ( <i>Cathartes aura</i> ), white-winged dove ( <i>Zenaida asiatica</i> )	blacktailed jackrabbit ( <i>Lepus californicus</i> ), bobcat ( <i>Lynx rufus</i> ), cottontail ( <i>Sylvilagus audubonii</i> ), coyote ( <i>Canis latrans</i> ), gray fox ( <i>Urocyon cinereoargenteus</i> ), javelina ( <i>Tayassu tajacu</i> ), mule deer ( <i>Odocoileus hemionus</i> ), rock squirrel ( <i>Spermophila variegatus</i> ), whitetailed deer ( <i>Odocoileus virginianus</i> ), 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 3.** Bear Tank, view of seep around open-ended horizontal spring pipe, June 2017.



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



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



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



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

# **BEAR TANK SPRING** **Section 4: Photographs**



**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 enclosure; 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	12Z	
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**

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Middle 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 (° 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 (° 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
<b>COMMENTS</b> 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 ( <i>Populus fremontii</i> ), Goodding's willow ( <i>Salix gooddingii</i> ), desert willow ( <i>Chilopsis linearis</i> ) and netleaf hackberry ( <i>Celtis reticulata</i> ) 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 ( <i>Parkinsonia</i> spp.), saguaro ( <i>Carnegeia gigantea</i> ), and velvet mesquite ( <i>Prosopis velutina</i> ).			

**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 ( <i>Kinosternon sonoriense</i> )	Harris' hawk ( <i>Parabuteo unicinctus</i> ), Gambel's quail ( <i>Callipepla gambelii</i> ), Gila woodpecker ( <i>Melanerpes</i>	None Recorded
May 2012	Water present in three pools and channel	None observed	Bermuda grass ( <i>Cynodon dactylon</i> ), sowthistle ( <i>Sonchus</i> sp.), beardless rabbitsfoot grass ( <i>Polypogon monspeliensis</i> )	pale spikerush ( <i>Eleocharis macrostachya</i> ), cattail ( <i>Typha</i> sp.)	fleabane ( <i>Erigeron</i> sp.), flax ( <i>Linum</i> sp.), purslane ( <i>Portulaca suffrutescens</i> )	Sonoran mud turtle ( <i>Kinosternon sonoriense</i> )	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	<i>Cynodon dactylon</i> , <i>Sonchus</i> sp., <i>Polypogon monspeliensis</i>	<i>Eleocharis macrostachya</i> , toadrush ( <i>Juncus bufonius</i> ), yellow monkeyflower ( <i>Mimulus guttatus</i> ),pondweed ( <i>Potamageton</i> sp.), speedwell ( <i>Veronica anagallis-aquatica</i> )	<i>Portulaca suffrutescens</i>	Beetles, water striders, Sonoran desert toad ( <i>Incilius alvarius</i> ), red spotted toad ( <i>Anaxyrus punctatus</i> )	Harris' hawk ( <i>Parabuteo unicinctus</i> ), Gambel's quail ( <i>Callipepla gambelii</i> ), Gila woodpecker ( <i>Melanerpes uropygialis</i> ), greater roadrunner ( <i>Geococcyx californianus</i> ), great horned owl ( <i>Bubo virginianus</i> ), Western screech owl ( <i>Megascops kennicottii</i> ), white-winged dove ( <i>Zenaida asiatica</i> )	blacktailed jackrabbit ( <i>Lepus californicus</i> ), bobcat ( <i>Lynx rufus</i> ), coyote ( <i>Canis latrans</i> ), gray fox ( <i>Urocyon cinereoargenteus</i> ), javelina ( <i>Tayassu tajacu</i> ), mule deer ( <i>Odocoileus hemionus</i> ), rock squirrel ( <i>Spermophila variegatus</i> ), western canyon bat ( <i>Parastrellus hesperus</i> ), cave myotis ( <i>Myotis velifer</i> ), Yuma myotis ( <i>Myotis yumanensis</i> ), pallid bat ( <i>Antrozous pallidus</i> )

\*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.

## BENSON SPRING

### Section 4: Photographs



# BITTER SPRING

## Section 1: General Information

### GENERAL INFORMATION

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b>	
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.	
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-12)13dca		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service (USFS)	Tonto National Forest	Superior, AZ / yes	Superior, AZ 7.5' (2011, 2014)

### GEOREFERENCE

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

### ADMINISTRATIVE

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

### HYDROLOGY

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

### GEOMORPHOLOGY

<b>SOURCE GEOMORPHOLOGY</b>	<b>HOST GEOLOGIC UNIT</b>	<b>SPRING TYPE (Discharge Sphere)</b>	<b>PERCHING GEOLOGIC UNIT</b>
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
<b>FLOW FORCE MECHANISM</b>	<b>CHANNEL DYNAMICS</b>	<b>ANTHROPOGENIC CONTROLS</b>	
Gravity	Mixed runoff / spring dominated	Yes	

### INFRASTRUCTURE

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
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
<b>ACTIVELY USED?</b>	<b>USE?</b>		
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 (° F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/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	DO 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. DO measurement taken in 1L 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

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

BITTER SPRING  
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Northeast	15	Bedrock
<b>COMMENTS</b>  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





**Photo 1.** Bitter Spring sump, view downstream, dry conditions, August 2012.



**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, view of bedrock in streambed surrounded by herbaceous vegetation, May 2017.



**Photo 6.** Bitter Spring, view of surface water flow and dense patch of ragwort in upper right of photograph, May 2017.

## BITTER SPRING Section 4: Photographs



**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	12Z	
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**

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle 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 (° F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
1-Nov-02	---	WRI	---	---	---	---	---	---	---	---	No	No water present in 20-meter x 8-meter man-made spring with a cattle trough downstream
26-May-04	14:00	GAI	<0.1	estimated	80.1	---	446	4.5	>20.0	10.1	Yes	
3-Nov-04	12:40	GAI	<0.1	estimated	53.1	---	540	0.8	12.5	7.9	Yes	
9-Feb-05	10:07	GAI	1.1	Bucket & Stop Watch	65.3	---	598	7.7	6.4	7.7	Yes	
3-May-05	13:40	GAI	1.3	---	74.1	---	523	0.4	10.4	7.6	Yes	
3-Aug-05	---	GAI	0.5	estimated	76.3	---	609	1.9	3.6	7.1	Yes	
21-Aug-08	---	M&A	0	---	---	---	---	---	---	---	No	Dry
13-Nov-08	10:30	RC	<0.1	estimated	64.4	---	642	9.8	---	7.9	Yes	
12-Feb-09	8:15	RC	<0.1	estimated	52.7	---	592	4.8	6.2	7.5	Yes	
13-May-09	15:00	RC	<0.1	estimated	88.9	---	465	1.9	>20.0	9.6	Yes	
4-Aug-09	10:09	RC	DRY	---	---	---	---	---	---	---	No	Dry
12-Feb-10	13:30	RC	0.17	Bucket & Stop Watch	60.1	---	609	2.7	7.4	8.2	Yes	Abundant green algae
13-Jul-10	11:30	RC	0	---	---	---	---	---	0.6	7.6	No	10 gallons in trough (stagnant)
9-Nov-10	11:30	RC	0	---	60.8	---	580	1.9	8.7	7.4	Yes	No inflow to trough; water color brown
14-Feb-11	11:22	RC	0	---	52.3	---	682	---	---	8.8	No	Trough full but no flow into it
13-May-11	10:45	RC	1	estimated	73.9	---	719	---	---	8.4	No	Foul smelling water flowing over sides of through
7-May-12	13:00	RC	1	estimated	73.8	---	573	12.2	8	8.6	Yes	
2-Jun-14	11:45	RC	DRY	---	---	---	---	---	---	---	No	Dry
22-Aug-14	11:00	RC	---	---	---	---	---	---	---	---	No	Trough filled with 5-10 gallons of what appears to be rain water. Stagnant, murky, green tint.
9-Mar-16	8:30	RC	1	estimated	55.2	604	---	1.5	5.3	7.8	Yes	First time in 2 years seeing water in trough; approx 1 gpm flow into trough from 1" pipe, source unknown; plumbed into hillside?



BORED SPRING  
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (° F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
8-Jun-16	11:12	RC	0	---	---	---	---	---	---	---	No	No inflow; stagnant water (thought to be rain water) 6" deep. Lots of bright green algae.
28-Jul-16	12:55	RC	DRY	---	---	---	---	---	---	---	No	Dry
1-May-17	---	WRI	---	---	---	752	---	---	---	7.7	No	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 piped into a cement trough, which was overflowing.

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, 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.

BORED SPRING

Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Center	3	Soil
<b>COMMENTS</b> 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)





**Photo 1.** Bored Spring, view of Fremont cottonwood at edge of depression with the wetland plant cattail, November 2002.



**Photo 2.** Bored Spring, view east showing Fremont cottonwood in background and cement trough in midground, November 2002.



**Photo 3.** Bored Spring, view of Fremont cottonwood at edge of muddy depression, May 2017.



**Photo 4.** Bored Spring, closeup view of muddy depression with stagnant pool below Fremont cottonwood, May 2017.



**Photo 5.** Bored Spring view of cement trough and overflow creating small flow. AZ Highway 177 is visible in the background, May 2017.



**Photo 6.** Bored Spring, view east showing Fremont cottonwood in background and cement trough in midground. The invasive plant, Bermuda grass is visible in the foreground, May 2017.

# **BORED SPRING** **Section 4: Photographs**



**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 fault. 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	12Z	
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**

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle 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

[illegible]

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

CONLEY SPRING

Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Northwest	Center	10	Conglomerate
<b>COMMENTS</b> <div>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.</div>			

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



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



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



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



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

## CONLEY SPRING Section 4: Photographs



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 (° 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

CROSS CANYON SPRING  
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	Center	2	Bedrock
<b>COMMENTS</b>  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 ( <i>Carnegeia gigantea</i> ), cholla ( <i>Cylindropuntia</i> sp.), ocotillo ( <i>Fouquieria splendens</i> ), mimosa ( <i>Mimosa</i> sp.), palo verde ( <i>Parkinsonia</i> sp.), prickly pear ( <i>Opuntia</i> sp.), jojoba ( <i>Simmondsia chinensis</i> )	N.A.	No Records	No Records
May 2011	None	None observed		None Observed	cane cholla ( <i>Cylindropuntia spinosior</i> ), catclaw acacia ( <i>Senegalia greggii</i> ), chuparosa ( <i>Anisacanthus thurberi</i> ), whitethorn acacia ( <i>Vachellia constricta</i> ), mariola ( <i>Parthenium incanum</i> ), brittlebush ( <i>Encelia farinosa</i> ), golden agave ( <i>Agave chrysantha</i> ), beebush ( <i>Aloysia wrightii</i> ), jojoba ( <i>Simmondsia chinensis</i> )	N.A.	No Records	No Records

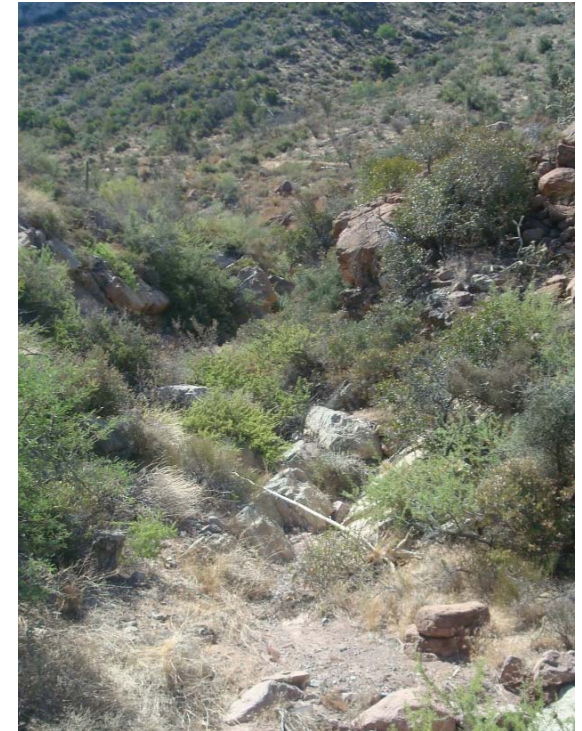




**Photo 1.** Cross Canyon, view upstream from west of travertine mound, July 2010.



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



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



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



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



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

## CROSS CANYON Section 4: Photographs



**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	12Z	
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**

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle 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/surfacial 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 (° 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
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 same as before. Dry creek, no test 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.

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 DC4.1E

Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	East	25	Bedrock
<b>COMMENTS</b>  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 ash (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





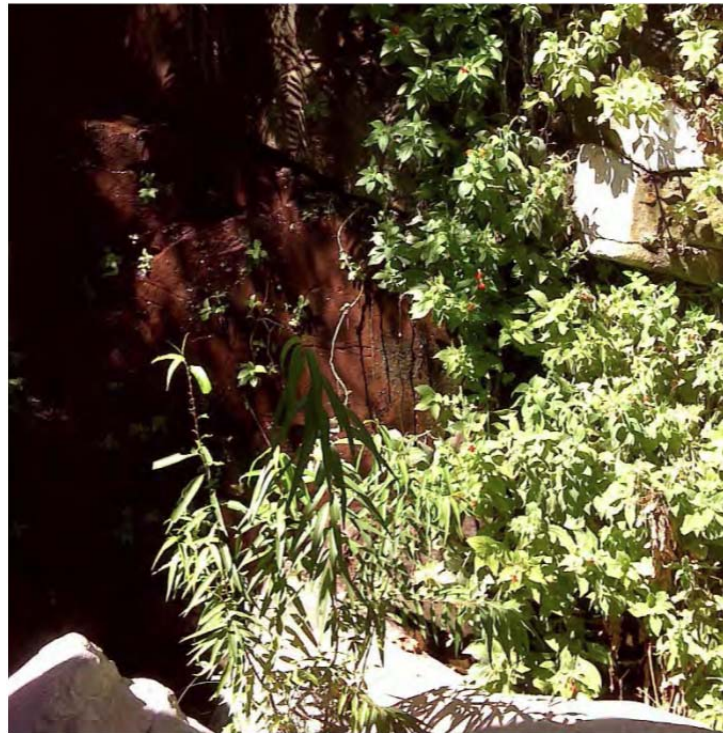
**Photo 1.** DC 4.1 E, view of Aravaipa woodfern, scarlet monkeyflower and cattails growing in surface flow, November 2002.



**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.

## **SPRING DC 4.1 E** **Section 4: Photographs**



**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	12Z	
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**

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle 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 - vitrophyre 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 (° 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

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 DC6.1E

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 ( <i>Epipactis gigantea</i> ), maidenhair fern ( <i>Adiantum capillus-veneris</i> )	None Recorded	None Recorded	None Recorded	None Recorded





**Photo 1.** DC 6.1 E, view of common maidenhair fern growing on wet vertical wall, June 2009.



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



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

## **SPRING DC 6.1 E** **Section 4: Photographs**

**SPRING DC 6.6 W**  
**Section 1: General Information**

**GENERAL INFORMATION**

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b>	
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.	
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-02-13)16bd		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service	Tonto National Forest	No	N/A

**GEOREFERENCE**

<b>SOURCE OF GEOREFERENCE DATA</b>	<b>DATUM</b>	<b>UTM ZONE</b>	
GPS	NAD83	12Z	
<b>UTM Easting</b>	<b>UTM Northing</b>	<b>ELEVATION</b>	<b>ELEVATION SOURCE</b>
497395	3680077	3520 feet amsl	Estimated from USGS topo map

**ADMINISTRATIVE**

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

**HYDROLOGY**

<b>BASIN</b>	<b>SUB-BASIN</b>	<b>LOCAL DRAINAGE</b>	<b>FLOW PERSISTENCE</b>
Middle Gila	Devils Canyon	Southern Reach	Perennial/intermittent
<b>HYDROLOGIC UNIT CODE (HUC)</b>	<b>HUC Basin</b>		
150501000205	Devils Canyon		

**GEOMORPHOLOGY**

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

**INFRASTRUCTURE**

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
NA	NA	NA	small pools
<b>ACTIVELY USED?</b>	<b>USE?</b>		
Yes?	wildlife		



# **SPRING DC6.6W** **Section 2: Hydrological Observations**

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (° 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.

SPRING DC6.6W

Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (° F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
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.
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

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 DC6.6W  
Section 3: Biological Observation

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
East	West	15	Bedrock
<b>COMMENTS</b>  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





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



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



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



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



**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	---

**GEOREFERENCE**

SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12Z	
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**

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle 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 (° 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	
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	



## 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 (° F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
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.

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 DC8.2W**  
**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 ( <i>Alnus oblongifolia</i> ), seepwillow ( <i>Baccharis salicifolia</i> ), Arizona sycamore ( <i>Platanus wrightii</i> ), Bonpland's willow ( <i>Salix bonplandiana</i> )	velvet ash ( <i>Fraxinus velutina</i> )	No Records	No Records	Coatimundi ( <i>Nasua narica</i> )
March 2009	A pools flows into the main channel.	Aravaipa woodfern ( <i>Thelypteris puberula</i> var. <i>sonorensis</i> )	None	Arizona alder ( <i>Alnus oblongifolia</i> )	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 ( <i>Thelypteris puberula</i> var. <i>sonorensis</i> )	None	Arizona alder ( <i>Alnus oblongifolia</i> ), buttonbush ( <i>Cephalanthus occidentalis</i> ), yellow monkeyflower ( <i>Mimulus guttatus</i> ), Arizona sycamore ( <i>Platanus wrightii</i> ), Bonpland's willow ( <i>Salix bonplandiana</i> ), Aravaipa woodfern ( <i>Thelypteris puberula</i> var. <i>sonorensis</i> )	blackberry ( <i>Rubus</i> sp.), western poison ivy ( <i>Toxicodendron rydbergii</i> ), Virginia creeper ( <i>Parthenocissus quinquefolia</i> )	No Records	No Records	No Records





**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 8.2 W, closeup view of sensitive plant Aravaipa woodfern growing at base of boulder, March 2009.



**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 8.2 W, sensitive plant Aravaipa woodfern growing at base of boulder, March 2009.



**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.

## DC 8.2 W Section 4: Photographs



**FIG SPRING**  
**Section 1: General Information**

**GENERAL INFORMATION**

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b> 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.	
Fig Spring	None		
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-12)14dad		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service (USFS)	Tonto National Forest	Superior, AZ / Yes	Superior, AZ 7.5' (2011, 2014)

**GEOREFERENCE**

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

**ADMINISTRATIVE**

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

**HYDROLOGY**

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

**GEOMORPHOLOGY**

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

**INFRASTRUCTURE**

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



FIG 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		
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
<b>COMMENTS:</b> 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 3.** Fig Spring, steel trough found in the channel down from the Iberri mine working, January 2018.



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



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



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



**Photo 6.** Fig Spring, hopbush, January 2018.



**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. in just 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 (° 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

**GIBSON WELL SPRING**  
**Section 3: Biological Observations**

**GENERAL DESCRIPTION**

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	Center	5	Gravel
<b>COMMENTS</b>  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 ( <i>Salix exigua</i> ), desert broom ( <i>Baccharis sarothroides</i> ), false indigobush ( <i>Amorpha fruticosa</i> ), and netleaf hackberry ( <i>Celtis reticulata</i> ). A few Fremont cottonwood ( <i>Populus fremontii</i> ) and Arizona sycamore ( <i>Platanus wrightii</i> ) 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 ( <i>Marrubium vulgare</i> )	Elliott's rush ( <i>Juncus elliotii</i> ), yellow monkeyflower ( <i>Mimulus guttatus</i> ), pale spikerush ( <i>Eleocharis macrostachya</i> )coyote willow ( <i>Salix exigua</i> ), Arizona sycamore ( <i>Platanus wrightii</i> )	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 ( <i>Marrubium vulgare</i> )	algae, Elliott's rush ( <i>Juncus elliotii</i> ), yellow monkeyflower ( <i>Mimulus guttatus</i> ), pale spikerush ( <i>Eleocharis macrostachya</i> )coyote willow ( <i>Salix exigua</i> ), Arizona sycamore ( <i>Platanus wrightii</i> )	deergrass ( <i>Muhlenbergia emersleyi</i> ), dock ( <i>Rumex</i> sp.), oats ( <i>Avena sativa</i> ), desert broom ( <i>Baccharis sarothroides</i> ), false indigobush ( <i>Amorpha fruticosa</i> ), netleaf hackberry ( <i>Celtis reticulata</i> ), Fremont cottonwood ( <i>Populus fremontii</i> ), Emory oak ( <i>Quercus emoryi</i> ), coffeeberry ( <i>Rhamnus californica</i> ), manzanita ( <i>Arctostaphylos pungens</i> ), locust ( <i>Robinia neomexicana</i> )	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.



**HAPPY CAMP SPRING**  
**Section 1: General Information**

**GENERAL INFORMATION**

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b> 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	
Happy Camp Spring			
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-12)28cd		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service	Tonto National Forest	Picketpost, AZ / Yes	Superior AZ 15' (1948)Picketpost AZ 7.5' (2004, 2011, 2014)

**GEOREFERENCE**

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

**ADMINISTRATIVE**

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

**HYDROLOGY**

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

**GEOMORPHOLOGY**

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

**INFRASTRUCTURE**

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
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
<b>ACTIVELY USED?</b>	<b>USE?</b>		
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 (° 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 (° 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
<b>COMMENTS</b> 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 ( <i>Salix gooddingii</i> ) and velvet mesquite ( <i>Prosopis velutina</i> ) form the overstory with canyon ragweed ( <i>Ambrosia ambrosioides</i> ) 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 ( <i>Centaurea melitensis</i> ), Bermuda grass ( <i>Cynodon dactylon</i> ), sowthistle ( <i>Sonchus</i> sp.), beardless rabbitsfoot grass ( <i>Polypogon monspeliensis</i> )	toad rush ( <i>Juncus bufonius</i> ), grassleaf rush ( <i>Juncus marginatus</i> ), yellow monkeyflower ( <i>Mimulus guttatus</i> ), purple mat ( <i>Nama demisssa</i> ), beardless rabbitsfoot grass ( <i>Polypogon monspeliensis</i> ), speedwell ( <i>Veronica anagallis-aquatica</i> )	false pennyroyal ( <i>Hedeoma</i> sp.)	None Recorded	common raven ( <i>Corvus corax</i> ), Gambel's quail ( <i>Callipepla gambelii</i> ), greater roadrunner ( <i>Geococcyx californianus</i> ), white-winged dove ( <i>Zenaida asiatica</i> )	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**

<b>SPRING IDENTIFIER</b>  Hidden Spring	<b>ALTERNATE IDENTIFIERS</b>  May be same as "Bell Spring" from 1911-vintage GLO township map?	<b>SITE DESCRIPTION</b>  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.	
<b>COUNTY</b>  Pinal	<b>CADASTRAL (40-acre)</b>  (D-02-12)14cb		
<b>LAND OWNERSHIP</b>  U.S. Forest Service	<b>LAND OWNERSHIP - DETAIL</b>  Tonto National Forest	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>  Superior AZ / Yes	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>  Superior AZ 7.5' (2011, 2014)

**GEOREFERENCE**

<b>SOURCE OF GEOREFERENCE DATA</b>  GPS	<b>DATUM</b>  NAD83	<b>UTM ZONE</b>  12Z	
<b>UTM Easting</b>  491249	<b>UTM Northing</b>  3679611	<b>ELEVATION</b>  3040 feet amsl	<b>ELEVATION SOURCE</b>  Estimated from USGS 7.5' Topo

**ADMINISTRATIVE**

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

**HYDROLOGY**

<b>BASIN</b>  Middle Gila	<b>SUB-BASIN</b>  Queen Creek	<b>LOCAL DRAINAGE</b>  Arnett Creek	<b>FLOW PERSISTENCE</b>  Intermittent
<b>HYDROLOGIC UNIT CODE (HUC)</b>  150501000401	<b>HUC Basin</b>  Arnett Creek		

**GEOMORPHOLOGY**

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

**INFRASTRUCTURE**

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

# HIDDEN SPRING

## Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (° 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 (° 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

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: Biological Observations**

**GENERAL DESCRIPTION**

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	Center	5	Gravel
<b>COMMENTS</b> 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)	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





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



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



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



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



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



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

## HIDDEN SPRING Section 4: Photographs



**IBERRI SPRING**  
**Section 1: General Information**

**GENERAL INFORMATION**

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b> 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.	
Iberri Spring	Fig Spring, I Berry Spring		
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-12)14dc		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service	Tonto National Forest	No	NA

**GEOREFERENCE**

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

**ADMINISTRATIVE**

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

**HYDROLOGY**

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

**GEOMORPHOLOGY**

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

**INFRASTRUCTURE**

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
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
<b>ACTIVELY USED?</b>	<b>USE?</b>		
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 (° 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.

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
<b>COMMENTS</b> <p>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.</p>			

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





**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.** Iberri Spring, view of large seepwillow present between the reaches, May 2017.



**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.

## IBERRI SPRING Section 4: Photographs



**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	12Z	
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**

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle 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 springs 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 (° 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.
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.

**KANES SPRING**  
**Section 2: Hydrological Observations**

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (° F)	Electrical Conductivity (uS/cm)	Specific Conductance (uS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	pH		
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

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:**

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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
<b>COMMENTS</b> Kane's Spring in the steep terrain of Kane's 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





**Photo 1.** Kanes Spring, view from upstream of spring box, July 2010.



**Photo 3.** Kanes Spring, spring box, July 2010



**Photo 5.** Kanes Spring, view of south wall, May 2017.



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



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

## KANES SPRING Section 4: Photographs



LOWER RAILROAD SPRING  
Section 1: General Information

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION 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.	
Lower Railroad Spring	None		
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 (° 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



LOWER RAILROAD SPRING  
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
West	East	5	Alluvium
<b>COMMENTS</b>			
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 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 5.** Lower Railroad, view around reported spring location (as shown on topographic map) showing xero-riparian vegetation, May 2017.



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

## LOWER RAILROAD SPRING Section 4: Photographs



MCGINNEL MINE SPRING

Section 1: General Information

GENERAL INFORMATION			
SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
McGinnel Mine Spring	None	McGinnel Mine Spring is 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 hose indicate that the water is intentionally stored in the mine and transported down toward Cottonwood Well for use. The feature is supported by infiltration of runoff water into the 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	NA

GEOREFERENCE			
SOURCE OF GEOREFERENCE DATA	DATUM	UTM ZONE	
GPS	NAD83	12	
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			
BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW CONSISTENCY
Upper Gila	Queen Creek	Whitford 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
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	NA
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 (° 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.

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
<b>COMMENTS:</b> 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 3.** McGinnel Mine Spring entrance with standing water, March 2018.



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



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



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

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b> 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.	
McGinnel Spring	None		
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-12)15cda		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service (USFS)	Tonto National Forest	Superior, AZ / yes	Superior, AZ 7.5' (2011, 2014)

GEOREFERENCE

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

ADMINISTRATIVE

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

HYDROLOGY

<b>BASIN</b>	<b>SUB-BASIN</b>	<b>LOCAL DRAINAGE</b>	<b>FLOW CONSISTENCY</b>
Upper Gila	Queen Creek	Whitford Canyon	Ephemeral
<b>HYDROLOGIC UNIT CODE (HUC)</b>	<b>HUC Basin</b>		
150501000403	Potts Canyon		

GEOMORPHOLOGY

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

INFRASTRUCTURE

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
Water collected in buried, vertical galvanized steel culvert	Piping from culvert to cement trough	NA	NA
<b>ACTIVELY USED?</b>	<b>USE?</b>		
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 (° 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

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



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



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



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



**NO NAME SPRING**  
**Section 1: General Information**

**GENERAL INFORMATION**

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b> 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.	
No Name Spring	None		
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-12)20dc		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
USFS	Tonto National Forest	Picketpost Mountain / NO	NA

**GEOREFERENCE**

<b>SOURCE OF GEOREFERENCE DATA</b>	<b>DATUM</b>	<b>UTM ZONE</b>	
Handheld GPS	NAD83	12Z	
<b>UTM Easting</b>	<b>UTM Northing</b>	<b>ELEVATION</b>	<b>ELEVATION SOURCE</b>
485964	3687153	2600 feet amsl	Estimated from USGS 7.5' topo

**ADMINISTRATIVE**

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

**HYDROLOGY**

<b>BASIN</b>	<b>SUB-BASIN</b>	<b>LOCAL DRAINAGE</b>	<b>FLOW PERSISTENCE</b>
Middle Gila	Queen Creek	Whitford Canyon	unknown
<b>HYDROLOGIC UNIT CODE (HUC)</b>	<b>HUC Basin</b>		
150501000403	Potts Canyon		

**GEOMORPHOLOGY**

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

**INFRASTRUCTURE**

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
none observed	none observed	NA	none observed
<b>ACTIVELY USED?</b>	<b>USE?</b>		
unknown	unknown		

NO NAME SPRING  
Section 2: Hydrological Observations

Date	Time	Team	Spring Flow		Water Quality Parameters						Sample Collected?	OBSERVATIONS
			Flow (gpm)	Method	Temperature (° 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

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 SPRING

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)	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	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),

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





**Photo 1.** No Name Spring, view of contact between sandstone and mudstone bedrock strata, June 2017.



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



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



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



**Photo 4.** No Name Spring, view of seepage along edge of channel, June 2017.



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

## NO NAME SPRING Section 4: Photographs



# PERLITE SPRING

## Section 1: General Information

### GENERAL INFORMATION

<b>SPRING IDENTIFIER</b>  Perlite Spring	<b>ALTERNATE IDENTIFIERS</b>  None	<b>SITE DESCRIPTION</b> 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.	
<b>COUNTY</b>  Pinal	<b>CADASTRAL (40-acre)</b>  (D-01-12)19dd		
<b>LAND OWNERSHIP</b>  U.S. Forest Service (USFS)	<b>LAND OWNERSHIP - DETAIL</b>  Tonto National Forest	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>  Picketpost Mountain, AZ / Yes	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>  Picketpost Mountain, AZ 7.5' (2004, 2011, 2014)

### GEOREFERENCE

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

### ADMINISTRATIVE

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

### HYDROLOGY

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

### GEOMORPHOLOGY

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

### INFRASTRUCTURE

<b>FLOW MODIFICATION?</b>  Excavated impoundment	<b>PIPING or other DIVERSION?</b>  Several impoundments maintained by rancher	<b>OTHER</b>  NA	<b>POND?</b>  Yes, ephemeral
<b>ACTIVELY USED?</b>  Yes	<b>USE?</b>  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 (° 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
<b>COMMENTS</b> Impoundment at base of rock outcrop holds water seasonally. No evidence of source apparent. A single Goodding's willow ( <i>Salix gooddingii</i> ) is present with desert hackberry ( <i>Celtis pallida</i> ) and canyon ragweed ( <i>Ambrosia ambrosiodes</i> ) 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 ( <i>Bromus rubens</i> ), Bermuda grass ( <i>Cynodon dactylon</i> ), stinkgrass ( <i>Eragrostis cilianensis</i> ), canary grass ( <i>Phalaris canariensis</i> ), beardless rabbitsfoot grass ( <i>Polypogon monspeliensis</i> )	Algae – filamentous and crustose, yellow monkeyflower ( <i>Mimulus guttatus</i> )	<i>Amaranthus palmeri</i> , oats ( <i>Avena sativa</i> ), pepperweed ( <i>Descurainia</i> sp.), rye ( <i>Elymus</i> sp.), desert lavender ( <i>Hyptis emoryi</i> ), Gila rockdaisy ( <i>Perityle gilensis</i> ), London rocket ( <i>Sisymbrium irio</i> ), cocklebur ( <i>Xanthium strumarium</i> )	Aquatic invertebrates, including boatmen, backswimmers, snails, water scorpion, and black-necked garter snake ( <i>Thamnophis cyrtopsis</i> )	None observed	Coatimundi ( <i>Nasua narica</i> ), Western canyon bat ( <i>Parastrellus hesperus</i> ), cave myotis ( <i>Myotis velifer</i> ), big brown bat ( <i>Eptesicis fuscus</i> ), pallid bat ( <i>Antrozous pallidus</i> ), California leaf-nosed bat ( <i>Macrotus californicus</i> ), western mastiff bat ( <i>Eumops perotis</i> )





**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.

# **PERLITE SPRING** **Section 4: Photographs**



**PUMP STATION SPRING**  
**Section 1: General Information**

**GENERAL INFORMATION**

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b>	
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.	
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-13)17dcb		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service	Tonto National Forest	Superior, AZ / Yes	Superior AZ 15' (1948) Superior AZ 7.5' (1981, 2004, 2011, 2014)

**GEOREFERENCE**

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

**ADMINISTRATIVE**

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

**HYDROLOGY**

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

**GEOMORPHOLOGY**

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

**INFRASTRUCTURE**

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
None apparent	Stock trough and some piping evident	Vertical pipe near spring may have been a well	No
<b>ACTIVELY USED?</b>	<b>USE?</b>		
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 (° 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 (° 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
<b>COMMENTS</b>  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 ( <i>Salix gooddingii</i> ), Arizona walnut ( <i>Juglans major</i> ), Arizona sycamore ( <i>Platanus wrightii</i> ), Fremont cottonwood ( <i>Populus fremontii</i> ), hoptree ( <i>Ptelea trifoliata</i> ), and netleaf hackberry ( <i>Celtis reticulata</i> ). Shrubs include jojoba ( <i>Simmondsia chinensis</i> ), velvet mesquite ( <i>Prosopis velutina</i> ), coffeeberry ( <i>Rhamnus californica</i> ), catclaw acacia ( <i>Senegalia greggii</i> ), manzanita ( <i>Arctostaphylos</i> sp.), barberry ( <i>Berberis</i> sp.), mountain mahogany ( <i>Cercocarpus montanum</i> ), oneseed juniper ( <i>Juniperus monosperma</i> ), sugar sumac ( <i>Rhus ovata</i> ), mulberry ( <i>Morus</i> sp.), lemonade bush ( <i>Rhus trilobata</i> ), elderberry ( <i>Sambucus neomexicana</i> )			

**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 ( <i>Typha</i> sp.), seepwillow ( <i>Baccharis salicifolia</i> ), Arizona sycamore ( <i>Platanus wrightii</i> ),	deergrass ( <i>Muhlenbergia rigens</i> )	None Observed	Hermit thrush ( <i>Catharus guttatus</i> ), Gila woodpecker ( <i>Melanerpes uropygialis</i> ), Mexican jay ( <i>Aphelocoma wollweberi</i> )	Deer ( <i>Odocoileus</i> sp.)
May 2011	Water present in pools and damp streambed	None Observed	None Observed	pale spikerush ( <i>Eleocharis macrostachya</i> ), yellow monkeyflower ( <i>Mimulus guttatus</i> ), Bonpland's willow ( <i>Salix bonplandiana</i> )	deergrass ( <i>Muhlenbergia rigens</i> ), canyon grape ( <i>Vitis arizonica</i> ), western poison ivy ( <i>Toxicodendron rydbergii</i> )	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 ( <i>Eleocharis macrostachya</i> ), red trumpet ( <i>Epilobium canum</i> ), mint ( <i>Mentha</i> sp.), yellow monkeyflower ( <i>Mimulus guttatus</i> ), toadrush ( <i>Juncus bufonius</i> ), Elliott's rush ( <i>J. elliotii</i> ), swordleaf rush ( <i>J. ensifolius</i> ), speedwell ( <i>Veronica anagallis-aquatica</i> )	geranium ( <i>Geranium caespitosum</i> ), deergrass ( <i>Muhlenbergia rigens</i> ), wood sorrel ( <i>Oxalis</i> sp.), penstemon ( <i>Penstemon</i> sp.), scarlet hedgenettle ( <i>Stachys coccinea</i> ), canyon grape ( <i>Vitis arizonica</i> ), western poison ivy ( <i>Toxicodendron rydbergii</i> )	Water striders, boatmen	Hermit thrush ( <i>Catharus guttatus</i> ), Mexican jay ( <i>Aphelocoma wollweberi</i> ), Zone-tailed hawk ( <i>Buteo albonotatus</i> )	Black-tailed rattlesnake ( <i>Crotalus molossus</i> ), Deer ( <i>Odocoileus</i> 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 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 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 2.** Pump Station Spring, view of pool and associated herbaceous vegetation, October 2002.



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

## PUMP STATION SPRING Section 4: Photographs



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	12Z	
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

BASIN	SUB-BASIN	LOCAL DRAINAGE	FLOW PERSISTENCE
Middle 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 (° 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

QC 22.6E (KARST SPRING)  
Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southwest	Northeast	15	Limestone
<b>COMMENTS</b> 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), brickel 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.

**SPRING QC22.6E (KARST SPRING)**  
**Section 4: Photographs**

**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 (° 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
<b>COMMENTS</b>  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 ( <i>Juglans major</i> ), Arizona sycamore ( <i>Platanus wrightii</i> ), Fremont cottonwood ( <i>Populus fremontii</i> ), velvet ash ( <i>Fraxinus velutina</i> ) and netleaf hackberry ( <i>Celtis reticulata</i> ). Shrubs include coffeeberry ( <i>Rhamnus californica</i> ), mulberry ( <i>Morus</i> sp.), lemonade bush ( <i>Rhus trilobata</i> ), elderberry ( <i>Sambucus neomexicana</i> ), canyon grape ( <i>Vitis arizonica</i> ), and desert honeysuckle ( <i>Anisacanthus thurberi</i> ).			

**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 ( <i>Platanus wrightii</i> ), Goodding's willow ( <i>Salix gooddingii</i> )	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 ( <i>Platanus wrightii</i> ), Goodding's willow ( <i>Salix gooddingii</i> )	coastal woodfern ( <i>Dryopteris arguta</i> ), California figwort ( <i>Scrophularia californica</i> ), Himalayan blackberry ( <i>Rubus discolor</i> ), bigtooth maple ( <i>Acer grandidentatum</i> )	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 ( <i>Platanus wrightii</i> ), Goodding's willow ( <i>Salix gooddingii</i> )	coastal woodfern ( <i>Dryopteris arguta</i> ), Himalayan blackberry ( <i>Rubus discolor</i> )	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 ( <i>Mimulus guttatus</i> ), Arizona sycamore ( <i>Platanus wrightii</i> ), Goodding's willow ( <i>Salix gooddingii</i> ), distant scorpionweed ( <i>Phacelia distans</i> )	coastal woodfern ( <i>Dryopteris arguta</i> ), Himalayan blackberry ( <i>Rubus discolor</i> ), scarlet hedgenettle ( <i>Stachy coccinea</i> )	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 3.** Queen Seeps, view of wild grape, elderberry, mulberry, coffeeberry and blackberry thicket on south slope, May 2011.



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



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



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

## QUEEN SEEPS Section 4: Photographs



**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 creek about 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 stock 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 (° 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 (° 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
<b>COMMENTS</b>			
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 3.** Rancho Rio tinajas downstream from spring, view of bedrock strata and area that holds pool of water seasonally, May 2011.



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



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



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

## RANCHO RIO SPRING Section 4: Photographs



ROCK HORIZONTAL SPRING  
Section 1: General Information

GENERAL INFORMATION

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b> 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.	
Rock Horizontal Spring	None		
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-12)9baa		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service (USFS)	Tonto National Forest	Superior, AZ / no	NA

GEOREFERENCE

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

ADMINISTRATIVE

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

HYDROLOGY

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

GEOMORPHOLOGY

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

INFRASTRUCTURE

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
No	Plastic hose and steel pipe evident downstream	NA	Small pools / tinajas
<b>ACTIVELY USED?</b>	<b>USE?</b>	NA = Not applicable	
Yes	Wildlife / livestock		

ROCK HORIZONTAL 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		
1-Mar-18	8:38	M&A	0.5	est.	40.3	---	1682.0	---	---	6.84	No	Measured from beginning of surface flow
11-Apr-18	9:00	M&A	<0.1	est.	59.0	---	659.0	---	---	7.52	No	Measured from beginning of 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



ROCK HORIZONTAL SPRING  
Section 3: Biological Observations

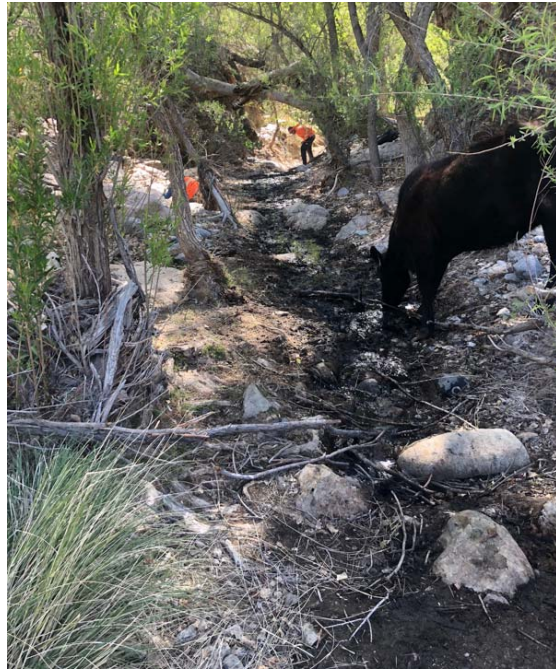
GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SUBSTRATE
North-northeast	South-southwest	Bedrock
<b>COMMENTS:</b> 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.



SILVERADO RIDGE SPRING  
Section 1: General Information

GENERAL INFORMATION			
SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION 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 entrance. The decline is on the eastern side of the channel and is angled at approximately 30 degrees down to the east.	
Silverado Ridge Spring	None		
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 (° 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 entrance

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.



SK18-02 SPRING

Section 1: General Information

GENERAL INFORMATION

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b> 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.	
SK18-02	None		
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-12)13ddd		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service	Tonto National Forest	Superior, AZ / no	NA

GEOREFERENCE

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

ADMINISTRATIVE

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

HYDROLOGY

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

GEOMORPHOLOGY

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

INFRASTRUCTURE

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
No	No	NA	Small pools / tinajas
<b>ACTIVELY USED?</b>	<b>USE?</b>		
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 (° 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
<b>COMMENTS:</b> 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 observed





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



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



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



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



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

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b> 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.	
SK18-03	None		
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-13)18ddb		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service	Tonto National Forest	Superior, AZ / no	NA

GEOREFERENCE

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

ADMINISTRATIVE

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

HYDROLOGY

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

GEOMORPHOLOGY

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

INFRASTRUCTURE

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
No	No	NA	Small pools / tinajas
<b>ACTIVELY USED?</b>	<b>USE?</b>		
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 (° 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
<b>COMMENTS:</b> 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 (Cercocarpus 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 3.** SK18-03 Spring, a small pool with spikerushes, rushes, and deergrass, April 2018



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



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 (° 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



THE GROTTO

Section 3: Biological Observations

GENERAL DESCRIPTION

ASPECT	SIDE OF CANYON	SLOPE %	SUBSTRATE
Southeast	Northeast	10	Bedrock
<b>COMMENTS</b>			
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 3.** The Grotto, closeup view showing algae and moss growing on the seeps along the wall of the cave, July 2017.



**Photo 5.** The Grotto, view showing seeps flowing into pools on the floor of the cave, July 2017.



**Photo 2.** Boulder breakdown above the Grotto where several pools are located, with check dam further upstream, September 2017.



**Photo 4.** The Grotto, view showing bat colony in a crevice of the cave wall, July 2017.



**Photo 6.** The Grotto, view showing pool of water on the floor of the cave, July 2017.

## THE GROTTO

### Section 4: Photographs



**TUNNEL SPRING**  
**Section 1: General Information**

GENERAL INFORMATION

SPRING IDENTIFIER	ALTERNATE IDENTIFIERS	SITE DESCRIPTION	
Tunnel Spring	None	No indication of past or 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 (° 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**

<b>SPRING IDENTIFIER</b>	<b>ALTERNATE IDENTIFIERS</b>	<b>SITE DESCRIPTION</b> 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.	
Walker Spring	None		
<b>COUNTY</b>	<b>CADASTRAL (40-acre)</b>		
Pinal	(D-01-12)32da		
<b>LAND OWNERSHIP</b>	<b>LAND OWNERSHIP - DETAIL</b>	<b>7.5-minute USGS Quadrangle / Shown on quad?</b>	<b>LIST QUADS AND EDITIONS WHERE SHOWN</b>
U.S. Forest Service	Tonto National Forest	Picketpost Mountain, AZ / No	---

**GEOREFERENCE**

<b>SOURCE OF GEOREFERENCE DATA</b>	<b>DATUM</b>	<b>UTM ZONE</b>	
GPS	NAD83	12Z	
<b>UTM Easting</b>	<b>UTM Northing</b>	<b>ELEVATION</b>	<b>ELEVATION SOURCE</b>
486361	3684216	2565 feet amsl	Estimated from USGS Topo

**ADMINISTRATIVE**

<b>INCLUDED IN ALRIS DATABASE?</b>	<b>ADWR SURFACE WATER RIGHT FILING?</b>	<b>ADWR SURFACE WATER RIGHT FILING NUMBER</b>	<b>ADWR 55 REGISTRY/NUMBER</b>
No	None	NA	NA

**HYDROLOGY**

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

**GEOMORPHOLOGY**

<b>SOURCE GEOMORPHOLOGY</b>	<b>HOST GEOLOGIC UNIT</b>	<b>SPRING TYPE (Discharge Sphere)</b>	<b>PERCHING GEOLOGIC UNIT</b>
Seepage or filtration	Alluvium (Qal); may source in part from bedding planes in Gila conglomerate (QTg)	Rheocrene	Gila Conglomerate
<b>FLOW FORCE MECHANISM</b>	<b>CHANNEL DYNAMICS</b>	<b>ANTHROPOGENIC CONTROLS</b>	
Gravity	Mixed runoff / spring dominated	None	

**INFRASTRUCTURE**

<b>FLOW MODIFICATION?</b>	<b>PIPING or other DIVERSION?</b>	<b>OTHER</b>	<b>POND?</b>
None	None	---	No
<b>ACTIVELY USED?</b>	<b>USE?</b>		
unknown	unknown		

WALKER 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		
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

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
<b>COMMENTS</b> Occurs as seeps along banks in tributary to 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





**Photo 1.** Walker Spring, view of conglomerate bedrock ledge across streambed, May 2017.



**Photo 3.** Walker Spring, view of seeps along banks, May 2017.



**Photo 5.** Walker Spring, view of previously moist channel that is now dry, June 2017.



**Photo 2.** Walker Spring, view of wetland plant purple mat growing in wet area along channel, May 2017.



**Photo 4.** Walker Spring, view of surface water along edge of channel, May 2017.



**Photo 6.** Walker Spring, pocket of moisture along edge of channel excavated by wildlife, June 2017.

## WALKER SPRING Section 4: Photographs



June 22, 2018

US Forest Service  
Supervisor's Office  
2324 East McDowell Road  
Phoenix, AZ 85006-2496

**Subject: Resolution Copper Mining, LLC – Mine Plan of Operations and Land Exchange – Baseline Information for MPO and Alternatives Reference Documentation**

Dear Ms. Rasmussen,

Enclosed for your review and consideration, please find copies of the following baseline reports for the Mine Plan of Operations and Alternatives:

Document Title	Document Date	Author (Organization)	File Key
<i>2016-2017 Wildlife Camera Monitoring Report</i>	JUN 2018	WestLand Resources	2016-17 Wildlife Monitoring Rpt.pdf
<i>Biological Evaluation for the Proposed Skunk Camp Tailings Storage Facility, Gila and Pinal Counties, Arizona</i>	JUN 2018	WestLand Resources	BE_SkunkCamp_TSF.pdf
<i>Spring &amp; Seep Catalog Resolution Copper Project Area Upper Queen Creek and Devils Canyon Watershed</i>	JUN 2018	Montgomery & Associates	RC_Spring Catalog V2.0.pdf

Additionally, please find the attached report titled “*Tailings Storage Facility DEIS Designs Tailings Geotechnical Characterization*” by Klohn Crippen Berger. This report was referenced in all alternative tailings site DEIS reports.

Should you have any questions or require further information please do not hesitate to contact me.

Sincerely,



*A Limited Liability Company*



402 W. Main Street  
Superior, Arizona  
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Vicky Peacey,  
Senior Manager, Permitting and Approvals; Resolution Copper Company, as Manager of Resolution Copper Mining, LLC

Cc: Ms. Mary Morissette; Senior Environmental Specialist; Resolution Copper Company

Enclosure(s): *2016-2017 Wildlife Camera Monitoring Report*

*Biological Evaluation for the Proposed Skunk Camp Tailings Storage Facility, Gila and Pinal Counties, Arizona*

*Spring & Seep Catalog Resolution Copper Project Area Upper Queen Creek and Devils Canyon Watershed*

*Tailings Storage Facility DEIS Designs Tailings Geotechnical Characterization*