

# 2017 FOREST SENSITIVE PLANT SPECIES SURVEY WITHIN THE RESOLUTION COPPER PROJECT AREA

Resolution Copper

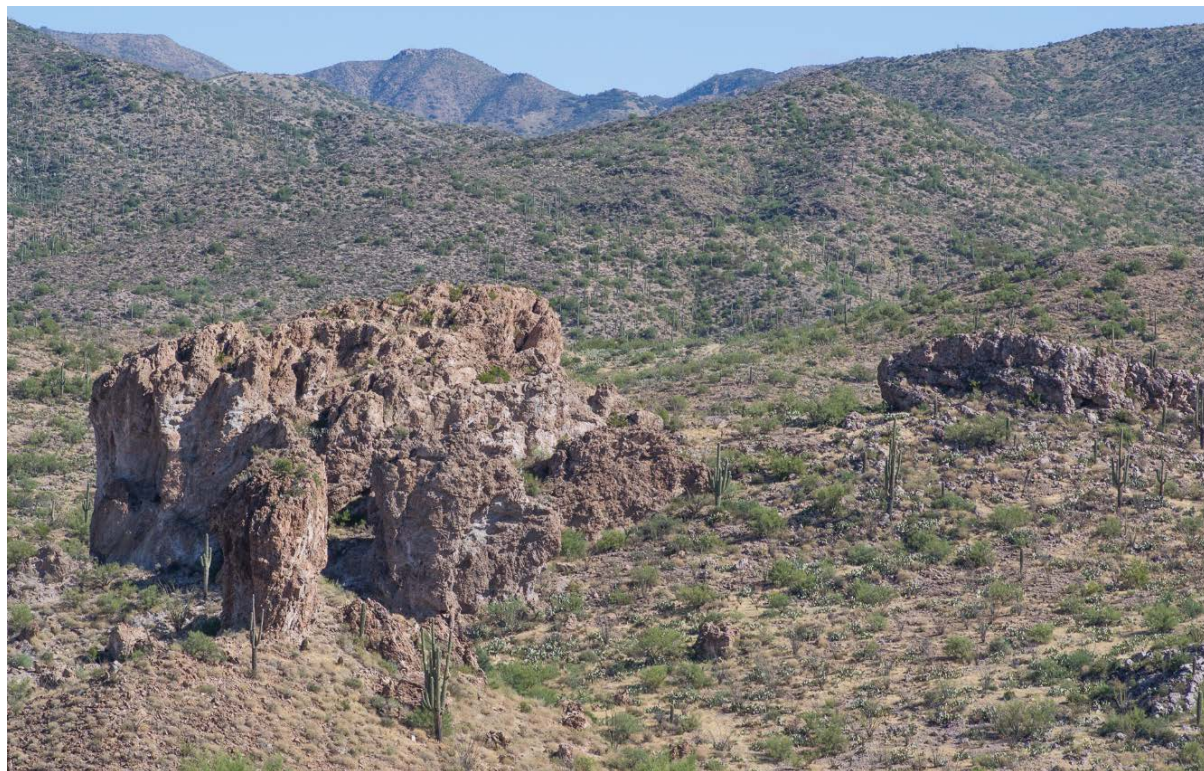
Prepared for:



102 Magma Heights – Superior, Arizona 85173

Project Number: 807.132 06

November 2017



WestLand Resources

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## I. INTRODUCTION

WestLand Resources, Inc. (WestLand) was requested to provide continuing biological resources support for Resolution Copper's (Resolution) Environmental Impact Statement (EIS). Issues to be analyzed in the EIS include potential impacts to biological resources as stated in the notice of intent to prepare an EIS for approval of a plan of operations for the Resolution Copper Project (the Project) and associated land exchange; request for comments; and notice of public scoping (Federal Register /Vol. 81, No. 53 / Friday, March 18, 2016). As part of this support WestLand conducted surveys in portions of the Project Area (**Figure 1**) for three plant species that are considered sensitive by Region 3 of United States Forest Service (USFS 2013).

Sensitive species of native plant and animal species must receive special management emphasis by U.S. Forest Service (USFS) to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing (USFS 2011). The objective of these surveys was to investigate the potential presence and distribution of sensitive plant species in the Project Area. Surveys were completed in areas of the Project where sensitive plant species have potential to occur, as determined by the General Plan of Operations and Legislative Land Exchange Screening Analysis for Special Status Species (WestLand Resources 2017).

This report discusses the natural history and distribution of the three species (**Section 2**), describes the methods used in the survey (**Section 3**), and provides a description of the results (**Section 4**). The references cited in the text are provided in **Section 5**. The photos referenced in this document are provided in **Appendix A**.

## 2. SURVEY FOR SPRING FLOWERING PLANT SPECIES

Surveys were conducted in the spring for two species, Mapleleaf false snapdragon and Hohokam agave, described in more detail in the following sections:

### 2.1. MAPLELEAF FALSE SNAPDRAGON

Mapleleaf false snapdragon (*Mabrya* [*Maurandya*] *acerifolia*) is a perennial flowering forb in the snapdragon family (Scrophulariaceae), the only species in the genus *Mabrya*. The plant inhabits volcanic rock crevices and overhangs on shaded cliffs and rock ledges, generally with north- to east-facing walls. Its stems hang down from moist, rock ledges in this habitat. The plant is a perennial prostrate, mat-forming dicot vine, with brittle stems. Its coarsely toothed, heart-shaped to kidney-shaped leaves are dark green, downy, and sticky. Its flowers are white to greenish white, five lobed and tubular (AGFD 2005; SEINet 2017).

Mapleleaf false snapdragon occurs in the Lower Sonoran Desert Zone of south-central Arizona, in Maricopa and Pinal counties, including the Superstition and Pinal mountains. There is a record of this

plant occurring in a location that is immediately adjacent and to the northwest of the Tailings Storage Facility area (TSF) in Hewitt Wash (AGFD 2005; SEINet 2017).

The General Plan of Operations and Legislative Land Exchange Screening Analysis for Special Status Species (WestLand Resources 2017) found this plant species to have some potential to occur in portions of the TSF.

## **2.2. HOHOKAM AGAVE AKA. MURPHEY AGAVE**

Hohokam agave (*Agave murpheyi*) is a succulent in the Agave family (Agavaceae). The plant occurs on alluvial terraces or hilly slopes above major drainages in desertscrub habitat, and is associated with pre-Columbian agricultural and settlement features. The origin of this agave is unknown; all of the populations are associated with pre-Columbian sites. It was extensively cultivated for food and fiber by the Hohokam Indians in the desert along low rock check-dams built on bajadas to slow runoff and increase water penetration. The check-dams and associated roasting pits, and in a few sites colonies of the agave survive to this day. All of the populations, from Caborca, Sonora Mexico to New River, Arizona are so similar that they may be one genetic clone (AGFD 2003; ARPC 2001; SEINet 2017). This agave is known to occur south of the TSF in Middle Queen Creek (SEINet 2017).

The General Plan of Operations and Legislative Land Exchange Screening Analysis for Special Status Species (WestLand Resources 2017) found this plant species to have some potential to occur in portions of the TSF.

## **3. SURVEY FOR SUMMER FLOWERING PLANT SPECIES**

### **3.1. PARISH'S INDIAN MALLOW**

Parish's Indian mallow (*Abutilon parishii*) is a shrubby perennial herb in the mallow family (Malvaceae). This plant species inhabits steep rocky slopes and hillsides in moist soils and full sun within Sonoran desertscrub and semidesert grassland. The stem is coated with glandular hairs, and the leaves are oval or heart-shaped with toothed edges. The leaves are velvety in texture, dark green on top and paler underneath. The flowers are pale orange and open for a few hours a day in sunny conditions. In Arizona this plant is known from several mountain ranges, including the Superstition, Tortolita, Santa Catalina, Tucson, Rincon, and Santa Rita mountains (AGFD 2000; ARPC 2001; SEINet 2017).

The General Plan of Operations and Legislative Land Exchange Screening Analysis for Special Status Species (WestLand Resources 2017) found this plant species to have some potential to occur in portions of the TSF.



## 4. METHODS

The General Plan of Operations and Legislative Land Exchange Screening Analysis for Special Status Species (WestLand Resources 2017) looked at the entire Project area on the Tonto National Forest (TNF) and identified all potential TNF sensitive plant species with potential habitat within the Project area. The Project area was evaluated to identify potential survey areas for those TNF sensitive plant species based on geology, slope, aspect, and elevation. All plant species with potential to occur within the Project area were identified, and habitat characteristics and known localities were identified for those species (AGFD 2017; SEINet 2017). Survey timing was scheduled based on species phenology and consultation with TNF (Mark Taylor TNF biologist, pers. comm.). The survey period for each of the target species was scheduled to coincide with each species' phenology in order to survey when the plant would be most detectable.

Survey teams consisted of WestLand biologists with previous experience conducting surveys for rare plant species. Personnel without prior experience with these specific species attended training sessions at known locations of these plants to become familiar with species identification and survey protocols. All survey personnel were also provided with an overview of the ecology and known habitat characteristics of the plant species, as well as photographs detailing the species-specific morphological features.

### 4.1. FIELD METHODS

The Survey Area for each plant species was surveyed by walking parallel belt transects that averaged 30 feet (10 m) in width. However, due to safety concerns, visual surveys of inaccessible cliff walls and rock outcroppings were conducted with binoculars. Binocular surveys were conducted from a safe vantage point that offered the best view of the target area. The Survey Area was visually scanned in overlapping sweeps with the binoculars, choosing obvious landmarks to use as spatial reference points.

During ground survey, transect widths were adjusted to accommodate the density of the vegetation in the Survey Area. In dense stands of vegetation, transect width was reduced as appropriate to achieve full survey coverage. Along each transect, surveyors walked slowly in a zigzag pattern inspecting the ground surface to the front, sides, and rear. To navigate, surveyors maintained position along each transect with the aid of a Garmin™ GPS unit in which the track of the transect was recorded. Transects were organized to take advantage of topography, road cuts, vegetation openings, or other similar landscape features to ensure efficient and complete coverage of the Survey Area for each plant species.

#### 4.1.1. Mapleleaf False Snapdragon

The survey focused on areas within the TSF footprint that contain surficial geology associated with appropriate habitat for this species, that is north- to east-facing rocky rhyolite cliffs (**Figure 2**). To facilitate detection of Mapleleaf false snapdragon, the survey was conducted in March and April, the period in which flowering stalks are produced. The survey was performed by trained and qualified

biologists searching for Mapleleaf false snapdragon using a combination of pedestrian survey and binocular scanning of those areas not accessible by foot.

#### **4.1.2. Hohokam Agave**

The survey focused on areas within and in the vicinity of the TSF that contain prehistoric sites (WestLand Resources 2015) and alluvial and hilly slopes above major drainages, restricted to the reaches of major washes in and surrounding the TSF and MARRCO Corridor, including Queen Creek from Boyce Thompson Arboretum west to the end of USFS land (**Figure 2**). To facilitate detection of Hohokam agave, the survey was conducted in March and April, the period in which flowering stalks are produced. The pedestrian survey was performed by trained and qualified biologists searching for Hohokam agave using a combination of pedestrian survey and binocular scanning of those areas not accessible by foot.

#### **4.1.3. Parish's Indian Mallow**

Surveys were conducted in September and October when the plant has produced leafy foliage in response to summer rains, and when the plant is known to produce a second bloom (AGFD 2000). This survey required substantial effort due to the dense vegetation throughout the survey area. WestLand provided trained botanists with the skills required to identify this species, which has very similar congeners that also occur in the area (Fryxell 1994; SEINet 2017).

We conducted a random sample survey for Parish's Indian mallow in the TSF and the small portion of West Plant Site that is administered by TNF, except for areas unsafe to traverse, with a slope greater than 30 degrees (**Figure 3**). We surveyed a random sample that accounted for 25 percent (964 acres) of the total acreage of these areas (approximately 3,850 acres).

### **4.2. DATA COLLECTION**

When a target species was detected, the location was documented by GPS coordinates (NAD 83) stored in a handheld Garmin<sup>TM</sup> GPS. Data collected on individual plants were recorded on a field data sheet. Data collection began with taking a representative photograph of each plant. Tabular data collected from each plant included any evidence of reproduction (e.g., buds, flowers, or fruits), evidence of disturbance or damage (i.e., herbivory), general comments regarding habitat. Once data were collected for a plant, an intensive search for other plants was conducted within the immediate vicinity.

## 5. RESULTS

### 5.1. SURVEY FOR SPRING FLOWERING PLANTS

#### 5.1.1. Mapleleaf False Snapdragon

Prior to survey, a reconnaissance was made to known populations of Mapleleaf false snapdragon in Peralta Canyon, Superstition Mountains, and Wind Cave in the Utery Mountains to assess whether flowering was occurring and if the plant would be detectable during survey. All the populations were seen to be in bloom and it was determined the species would be detectable for survey.

WestLand field biologists familiar with Mapleleaf false snapdragon characteristics conducted surveys from March 22, 2017 through April 6, 2017 in potential habitat (**Appendix A, Photographs 1 and 2**). 336 acres of potential habitat was surveyed (**Figure 2**). Mapleleaf false snapdragon was not detected during survey.

#### 5.1.2. Hohokam Agave

Prior to survey, a reconnaissance was made to a known population of Hohokam agave by Roosevelt Lake to assess whether reproduction was occurring and if the plant would be detectable during survey. The population was not reproducing but the rosettes were distinct, and it was determined the species would be detectable for survey. The survey was completed over a 10-day period. The survey period was scheduled to coincide with the flowering season when the yellow blooms enhance surveyors' ability to detect the plant.

WestLand field biologists familiar with Hohokam agave characteristics conducted surveys from March 22, 2017 through April 6, 2017 in potential habitat (**Appendix A, Photographs 3 and 4**). 239 acres of potential habitat was surveyed (**Figure 2**). Hohokam agave was not detected during survey.

### 5.2. SURVEY FOR SUMMER FLOWERING PLANTS

#### 5.2.1. Parish's Indian Mallow

Prior to survey, a reconnaissance was made to a known population of Parish's Indian mallow near the Picketpost Mountain trailhead to assess whether reproduction was occurring and if the plant would be detectable during survey. The population was abundant and reproducing, with approximately 200 plants observed (**Appendix B**), and it was determined the species would be detectable for survey. The survey was completed over an 11-day period. The survey period was scheduled to coincide with the emergence of Parish's Indian mallow and the flowering and fruiting period in response to summer rains (AGFD 2000).

WestLand field biologists familiar with the target species' characteristics conducted surveys from September 19, 2017 through October 5, 2017. 949 acres of potential habitat was surveyed (**Figure 2**). Parish's Indian mallow was detected during survey in the area just west of Perlite Spring in the northeastern portion of the proposed TSF. Approximately 90 plants were observed on and around the bluffs in that area. Some of the observed plants were outside the random sample Survey Area as biologists followed and documented the distribution of the plants as thoroughly as possible (**Figure 3**). Parish's Indian mallow was also detected during survey in the area south of Roblas Canyon in the northwestern portion of the proposed TSF. Approximately 40 plants were observed in that area (**Figure 3**).

In addition, five offsite locations that are known to support Parish's Indian mallow (SEINet 2017), were surveyed in order to determine persistence and abundance of the species at these locations. The results of these surveys are provided in **Appendix B**.

The locations of each Parish's Indian mallow identified within the Survey Area are provided in **Table 1** and **Figure 3**. Representative photographs of the target species and habitat it was observed in are provided in **Appendix A, Photographs 5 through 12**.

**Table 1. Locations of Parish's Indian Mallow Observed within the Survey Area**  
(some locations had more than one plant observed)

Perlite Spring Area		Roblas Canyon Area	
Location UTM NAD 83 12S		Location UTM NAD 83 12S	
Easting	Northing	Easting	Northing
484342	3687070	480976	3687484
484342	3687064	480973	3687486
484334	3687062	480972	3687483
484330	3687059	480955	3687496
484331	3687051	480962	3687517
484277	3687011	481001	3687567
484233	3686927	481001	3687566
484202	3686924	480987	3687566
484448	3686836	480992	3687558
484459	3686848	481006	3687556
484463	3686840	481008	3687556
484465	3686825	480999	3687538
484436	3686771	480997	3687536
484467	3686721	480997	3687536
484475	3686756	480985	3687517
484478	3686766	480968	3687528
484479	3686765	480968	3687527
484481	3686768	480967	3687527



**Table 1. Locations of Parish's Indian Mallow Observed within the Survey Area**  
(some locations had more than one plant observed)

Perlite Spring Area		Roblas Canyon Area	
Location UTM NAD 83 12S		Location UTM NAD 83 12S	
Easting	Northing	Easting	Northing
484480	3686731	480966	3687527
484501	3686698	480966	3687528
484323	3687046	480959	3687536
484323	3687053	480962	3687537
484324	3687049	480963	3687536
484325	3687049	480963	3687539
484326	3687053	480963	3687540
484330	3687054	480963	3687540
484332*	3687065	480961	3687541
484333	3687061	480959	3687542
484342	3687079	480963	3687546
484344	3687063	480965	3687545
484348	3687079	480964	3687547
484428	3687078	480965	3687548
484480*	3686731	480959	3687546
484501*	3686698	480960	3687549
484546	3686712	480956	3687550
484605	3686640	480956	3687552
484448*	3686836	480957	3687553
484428*	3686760	480958	3687552
484467*	3686721	480959	3687552
484475	3686756	480959	3687553
484479	3686765	480960	3687554
484478*	3686766	480961	3687555
484481	3686768		
484463	3686771		
484465	3686825		
484463	3686840		
484459*	3686848		

\* Designates GPS location where more than one plant was recorded.

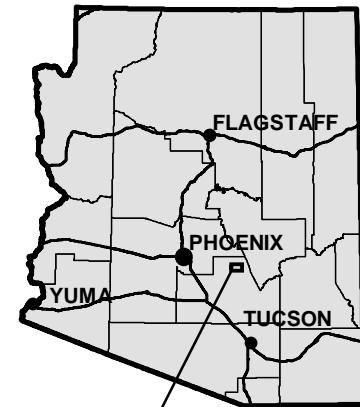
## 6. REFERENCES

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*Unpublished Abstract Compiled and Edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department.  
[https://www.azgfd.gov/w\\_c/edits/documents/Abutpari.fo\\_001.pdf](https://www.azgfd.gov/w_c/edits/documents/Abutpari.fo_001.pdf).
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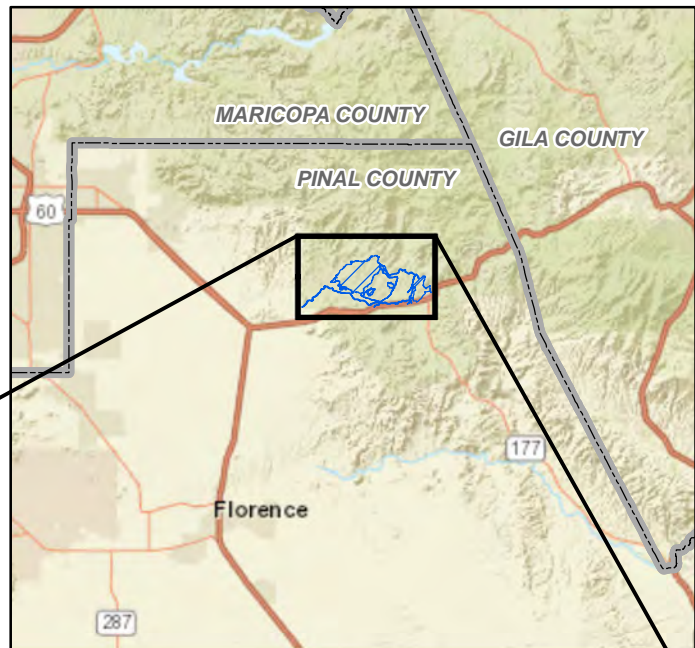
## FIGURES

## ARIZONA



PROJECT  
LOCATION

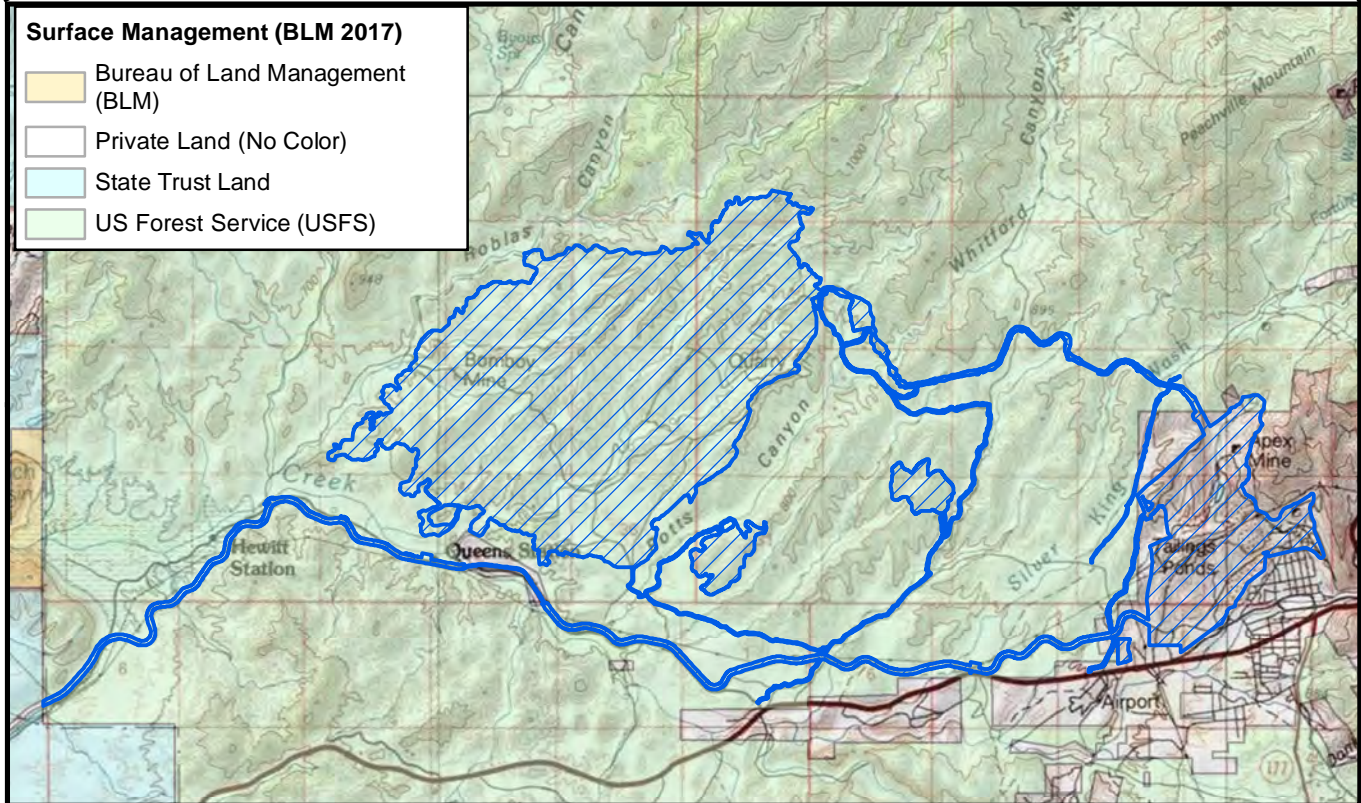
## PROJECT VICINITY



Approximate Scale 1 Inch = 15 Miles

### Surface Management (BLM 2017)

- Bureau of Land Management (BLM)
- Private Land (No Color)
- State Trust Land
- US Forest Service (USFS)



T1S, R10E; T1S, R11E; T1S, R12E,  
T1S, R13E; T2S, R12E; T2S, R13E,  
Pinal County, Arizona,  
Mesa and Globe USGS 1:100,000 Quadrangle  
Image Source: ArcGIS Online,  
USA Topo and World Street Map

### Legend

- Project Area

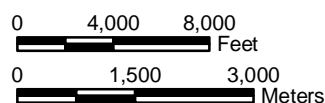
## RESOLUTION COPPER

2017 Forest Sensitive Plant Species Survey  
within the Resolution Copper Project Area

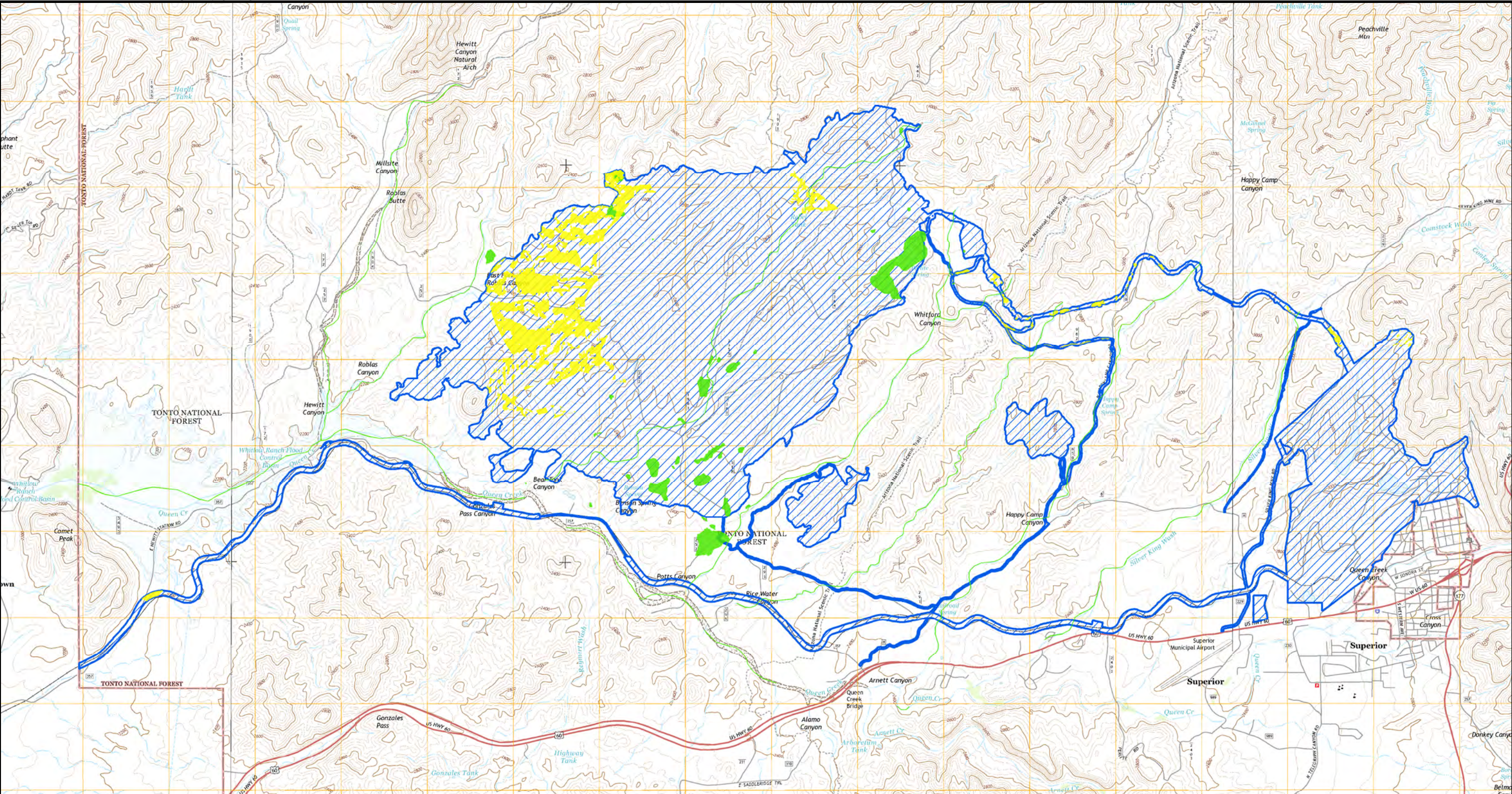
VICINITY MAP

Figure 1

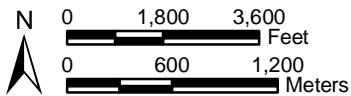
  
WestLand Resources







Project area in:  
T1S, R11E, Portions of Sections 22-27, and 32-36,  
T1S, R12E, Portions of Sections 18-21, and 26-35  
T2S, R11E, Portions of Sections 1-3, 5, and 6,  
T2S, R12E, Portions of Sections 3-6,  
Pinal County, Arizona,  
Florence Junction, Picketpost Mountain, and Superior  
USGS 7.5' Quadrangles (2014)



Legend

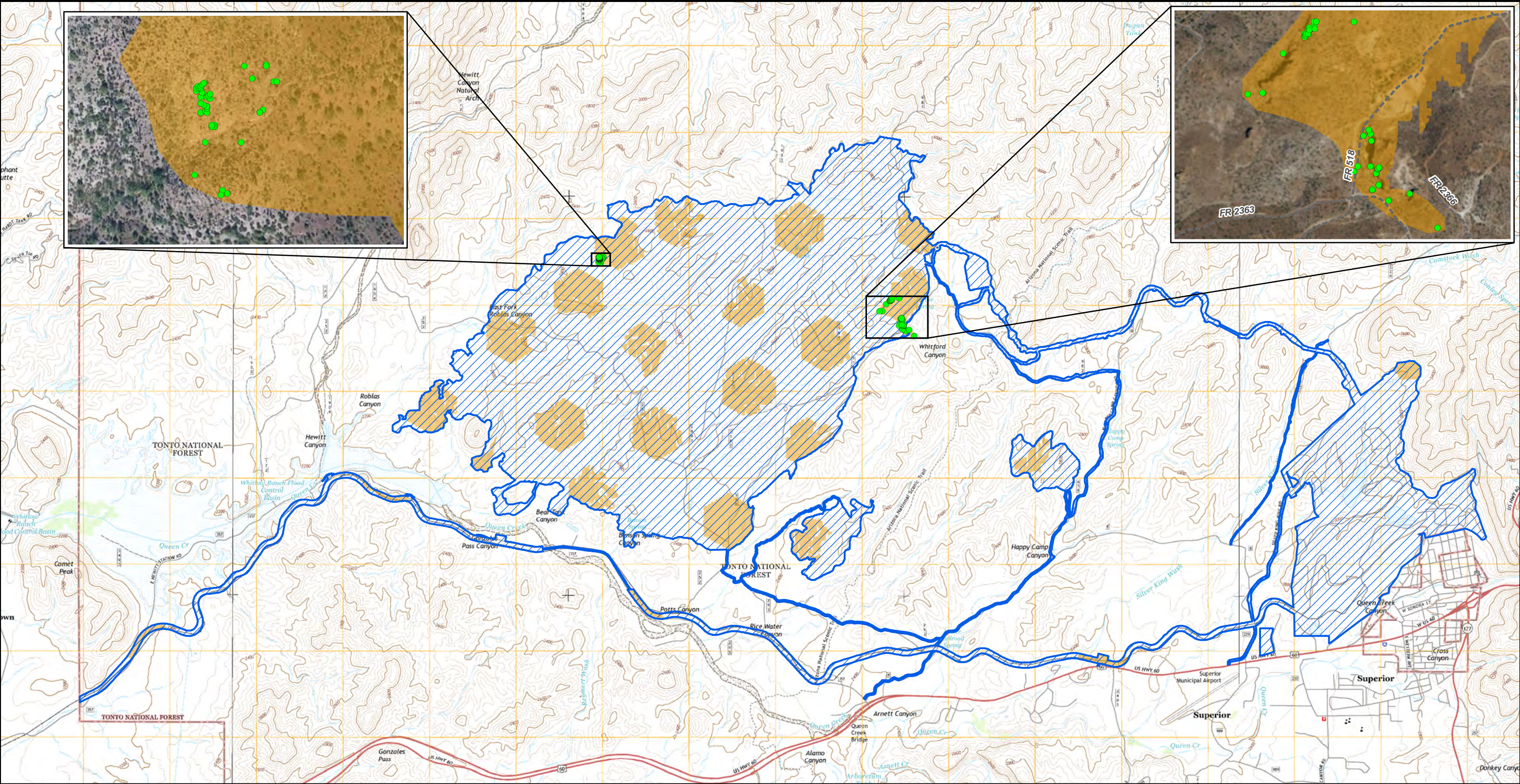
- Survey Area for Mapleleaf False Snapdragon
- Survey Area for Hohokam Agave
- Project Area

RESOLUTION COPPER  
2017 Forest Sensitive Plant Species Survey  
within the Resolution Copper Project Area


SURVEY AREA AND RESULTS  
FOR SPRING FLOWERING PLANTS

Figure 2





Project area in:  
T1S, R11E, Portions of Sections 22-27, and 32-36,  
T1S, R12E, Portions of Sections 18-21, and 26-34  
T2S, R11E, Portions of Sections 1-3, 5, and 6,  
T2S, R12E, Portions of Sections 4-6,  
Pinal County, Arizona,  
Florence Junction, Picketpost Mountain, and Superior  
USGS 7.5' Quadrangles (2014)  
Image: ArcGIS Online



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**Legend**

- Observations of Parish's Indian Mallow
- Survey Area for Parish's Indian Mallow
- ▨ Project Area

**RESOLUTION COPPER**  
2017 Forest Sensitive Plant Species Survey  
within the Resolution Copper Project Area

SURVEY AREA AND RESULTS  
FOR SUMMER FLOWERING PLANTS

Figure 3



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## **APPENDIX A**

**Photographs of  
Parish's Indian  
Mallow and  
Habitat within  
the Resolution  
Project Area**



**Photo 1.** View of potential Mapleleaf false snapdragon habitat surveyed in March 2017



**Photo 3.** View of archaeological site surveyed for Hohokam agave in April 2017



**Photo 2.** View of potential Mapleleaf false snapdragon habitat surveyed in March 2017



**Photo 4.** View of area adjacent to wash surveyed for Hohokam agave in April 2017

Photographs of Parish's Indian Mallow and Habitat  
within the Resolution Copper Project Area

# **Appendix A**

Photopage I





**Photo 5.** View of Perlite buttes where Parish's Indian Mallow was detected, September 2017



**Photo 7.** View of rocky habitat at Perlite buttes where Parish's Indian Mallow was detected, September 2017



**Photo 6.** View of rocky habitat with surveyor pointing to Parish's Indian Mallow, September 2017



**Photo 8.** View of Parish's Indian Mallow in center foreground of photograph, September 2017

Photographs of Parish's Indian Mallow and Habitat  
within the Resolution Copper Project Area

**Appendix A**

Photopage 2





**Photo 9.** View of Parish's Indian Mallow at Perlite butte with characteristic velvety, bi-colored leaves, September 2017



**Photo 11.** View of Parish's Indian Mallow at Perlite butte with characteristic heart shaped leaves with toothed edges, September 2017



**Photo 10.** Close-up view of the leaf of Parish's Indian mallow with characteristic velvety texture



**Photo 12.** Close-up view of the fruit of Parish's Indian mallow with characteristic schizocarp with seven mericarps



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## **APPENDIX B**

**Offsite Surveys  
for Parish's  
Indian Mallow  
2017**

# OFFSITE SURVEYS FOR PARISH'S INDIAN MALLOW 2017

Resolution Copper

Prepared for:



102 Magma Heights – Superior, Arizona 85173

Project Number: 807.132 06

November 2017



WestLand Resources

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## FIGURES

(follow text)

Figure 1.	Vicinity Map
Figure 2.	Survey Locations and Results (a, b and c)

## ATTACHMENT

Attachment A.	Representative Photographs of Parish's Indian Mallow and Habitat
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## I. INTRODUCTION

In 2017, WestLand Resources, Inc. (WestLand) surveyed for Parish's Indian mallow (*Abutilon parishii*) in select locations in the Superstition Mountains (**Figure 1**). The plant is considered a sensitive species in the Tonto National Forest (TNF) by Region 3 of United States Forest Service (USFS 2013). The locations were selected for survey based on herbarium vouchers from areas where Parish's Indian mallow have been observed and documented in the past. The purpose of the survey was to document the persistence and abundance of Parish's Indian mallow at those known locations, and to scout other locations for possible presence of Parish's Indian mallow.

This report discusses the natural history and distribution of Parish's Indian mallow in Arizona (**Section 2**), describes the methods used in the survey (**Section 3**), provides a description of the results (**Section 4**), and a summary (**Section 5**). The references cited in the text are provided in **Section 6**. The photographs referenced in this document are provided in **Attachment A**.

## 2. NATURAL HISTORY AND DISTRIBUTION OF PARISH'S INDIAN MALLOW

Parish's Indian mallow is a shrubby perennial herb in the mallow family (Malvaceae) (ITIS 2017). It is native to Arizona in the United States and Sonora in Mexico. In Arizona this plant grows in several mountain ranges, including the Superstition, Tortolita, Santa Catalina, Tucson, Rincon, and Santa Rita Mountains (SEINet 2017) at elevations between 2,500 and 4,850 ft (755 and 1,450 m). The plant inhabits steep slopes and bluffs composed of vesicular, volcanic rock and hillsides in moist soils and full sun within Sonoran desertscrub and semidesert grassland (AGFD 2000; ARPC 2001).

Parish's Indian mallow grows up to approximately 3.3 ft (1.0 m) in height with a single stem or multiple stems coated in glandular hairs (**Attachment A, Photograph 1**). The leaves are oval or heart-shaped with toothed edges, are velvety in texture, and are discolorous with dark green on top and paler underneath (**Attachment A, Photographs 2-3**). The flowers have pale orange petals (**Attachment A, Photograph 4**) which open for only a few hours a day in sunny conditions. The fruit, when mature, splits into six or eight one-seeded segments and the empty fruit capsules may persist on the stem throughout the winter (**Attachment A, Photographs 5-6**). The plant is known to flower and fruit in June and again after summer rains (AGFD 2000; ARPC 2001; Fryxell 1994; SEINet 2017).

## 3. METHODS

The 2017 survey focused on known localities of Parish's Indian mallow within the Superstition Mountains using herbarium vouchers, available online at the Southwest Environmental Information Network (SEINet), as reference locations. WestLand performed surveys at known locations of this plant to document the persistence and abundance of Parish's Indian mallow at these known locations, and to demonstrate that WestLand is conducting surveys for TNF sensitive plant species during periods when detectability of these plants is relatively high, i.e. when they are emergent, flowering or fruiting. The surveys were scheduled to coincide with the species' phenology in order to survey when

the plant would be most detectable. When feasible, visits to known locations were conducted with TNF biologist Mark Taylor.

In addition, WestLand biologists opportunistically surveyed areas with habitat characteristics for Parish's Indian mallow, i.e. rocky bluffs composed of vesicular volcanic bedrock, when encountered.

Survey teams consisted of WestLand biologists with previous experience conducting surveys for rare plant species. All survey personnel were also provided with an overview of the ecology and known habitat characteristics of the plant species, as well as photographs detailing the species-specific morphological features.

When Parish's Indian mallow was observed, WestLand personnel recorded the location with a hand-held GPS, counted the plants, photographed the plants, and noted if reproduction (i.e. flowers or fruits) was present. In addition, general observations of the condition of the plants, and habitat characteristics were recorded. Once data were collected, an intensive search for other plants was conducted within the immediate vicinity.

#### 4. RESULTS

WestLand surveyed seven known localities of Parish's Indian mallow within the Superstition Mountains in October 2017 and confirmed the presence of Parish's Indian mallow at three of the seven locations (**Table 1; Figure 2**). There were 45 plants observed at the Fish Creek Hill location (**Attachment A, Photographs 7-8**), 12 plants observed at the First Water Trailhead location (**Attachment A, Photograph 9**), and 176 plants observed at the Picketpost Mountain Trailhead location (**Attachment A, Photograph 10**). There were no plants observed at the known locations by Canyon Lake, Apache Trail, or Hieroglyphic Spring (**Table 1; Figure 2**).

A new location for Parish's Indian mallow was observed in Potts Canyon, south of Barnett Camp (**Attachment A, Photograph 11**). There were 36 plants observed at this location (**Table 1; Figure 2**). Additionally, a new location for Parish's Indian mallow was observed between Arnett Creek and Telegraph Canyon, south of Superior (**Attachment A, Photograph 12**). There were 83 plants observed at this location (**Table 1; Figure 2**).

The locations visited, and results, including observations of Parish's Indian mallow are provided in **Table 1** and **Figure 2**. Representative photographs of the species and habitat Parish's Indian mallow was observed in are provided in **Attachment A**.



**Table 1. Survey Locations and Numbers of Parish's Indian Mallow Observed**

Location	SEINet Voucher References	Number of Plants Observed	Former Record of Abundance <sup>1</sup>
Fish Creek Hill	Ecker 8285 Hodgson 8285	45	31 – 100
First Water Trailhead	Rice 433	12	Not recorded
Picketpost Mountain Trail	Hodgson 13113	176	2 – 3 plants
Apache Trail	Keil 1262	0	Not recorded
Canyon Lake – 2 locations	Keil 1214 Damrel 1768B	0	Not recorded
Hieroglyphic Spring	Hodgson H-1177	0	3 plants
Potts Canyon south of Barnett Camp	N.A.	36	N.A.
Between Arnett Creek and Telegraph Canyon south of Superior	N.A.	83	N.A.

<sup>1</sup> Former records of abundance from SEINet and Desert Botanical Garden, Phoenix, Arizona

## 5. SUMMARY

WestLand biologists visited seven locations where Parish's Indian mallow had been previously observed (**Figure 2**). The plant was observed at three of the seven locations, Fish Creek Hill, First Water Trailhead, and Picketpost Mountain, but the plant was not observed at the other four locations (**Table 1**). WestLand biologists observed approximately 200 plants at the Picketpost Mountain Trail location where previously only two to three plants had been observed (**Table 1**). At the other two locations where plants were observed, Fish Creek Hill and First Water Trailhead, the number of plants observed was equivalent to what had been formerly observed at Fish Creek Hill, but at First Water Trailhead there is no former record of abundance (**Table 1**).

WestLand biologists also discovered two locations of Parish's Indian mallow that were not previously known (**Figure 2**). At one of the locations, between Arnett Creek and Telegraph Canyon south of Superior, approximately 80 plants were observed. At the other location, in Potts Canyon south of Barnett Camp, approximately 35 plants were observed (**Table 1**). These new observations, combined with the observations from previously known locations, expand the known range and abundance of Parish's Indian mallow, and it is likely that this plant, considered a sensitive species by TNF, is more widespread and abundant than existing records suggest.

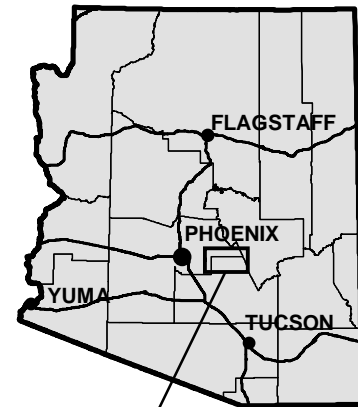
## 6. REFERENCES

- Arizona Game and Fish Department. 2000. "Parish's Indian Mallow (*Abutilon Parishii*).” *Unpublished Abstract Compiled and Edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department.  
[https://www.azgfd.gov/w\\_c/edits/documents/Abutpari.fo\\_001.pdf](https://www.azgfd.gov/w_c/edits/documents/Abutpari.fo_001.pdf).
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[https://itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=21668&print\\_version=PRT&source=to\\_print#null](https://itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=21668&print_version=PRT&source=to_print#null).
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<http://swbiodiversity.org/seinet/index.php>.
- U.S. Forest Service. 2013. "USFS Region 3 Regional Forester's Sensitive Species: Animals - 2013.” U.S. Forest Service Region 3.

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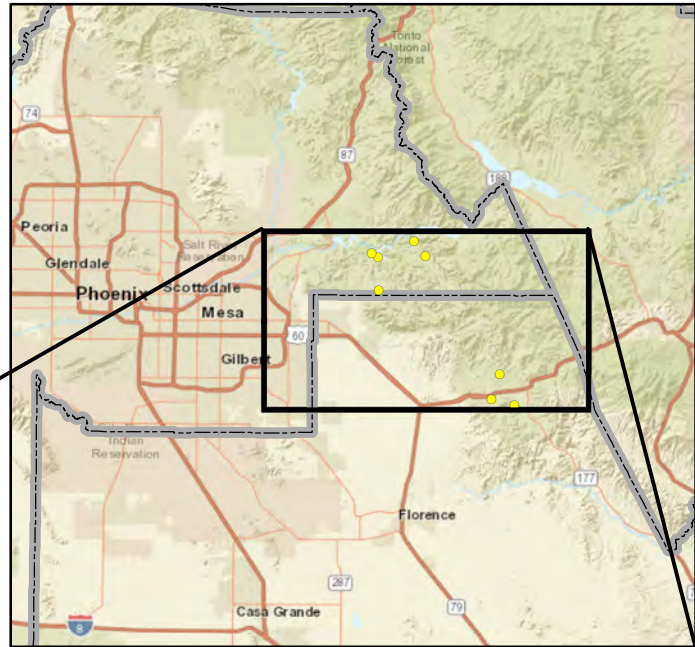
## FIGURES

## ARIZONA

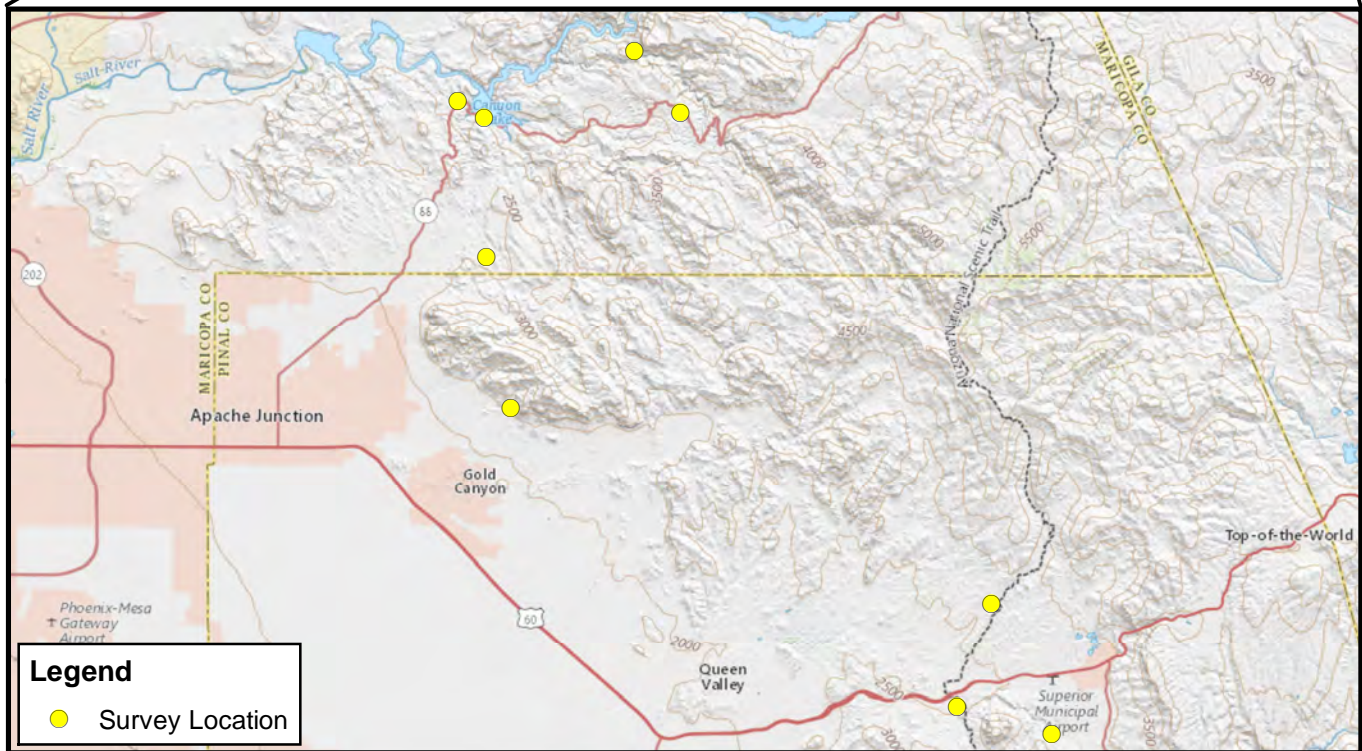


PROJECT LOCATION

## PROJECT VICINITY



Approximate Scale 1 Inch = 25 Miles



T1S, R12E, Portion of Section 29,  
 T2N, R10E, Portion of Section 4 (Unsurveyed Protracted),  
 T2N, R9E, Portion of Section 44,  
 Portions of Sections 5 and 9 (Unsurveyed Protracted),  
 T2S, R11E, Portion of Section 12,  
 T2S, R12E, Portion of Section 16,  
 T3N, R10E, Portion of Section 32 (Unsurveyed Protracted),  
 Maricopa and Pinal Counties, Arizona,  
 Image Source: ArcGIS Online, USGS Topo and World Street Map

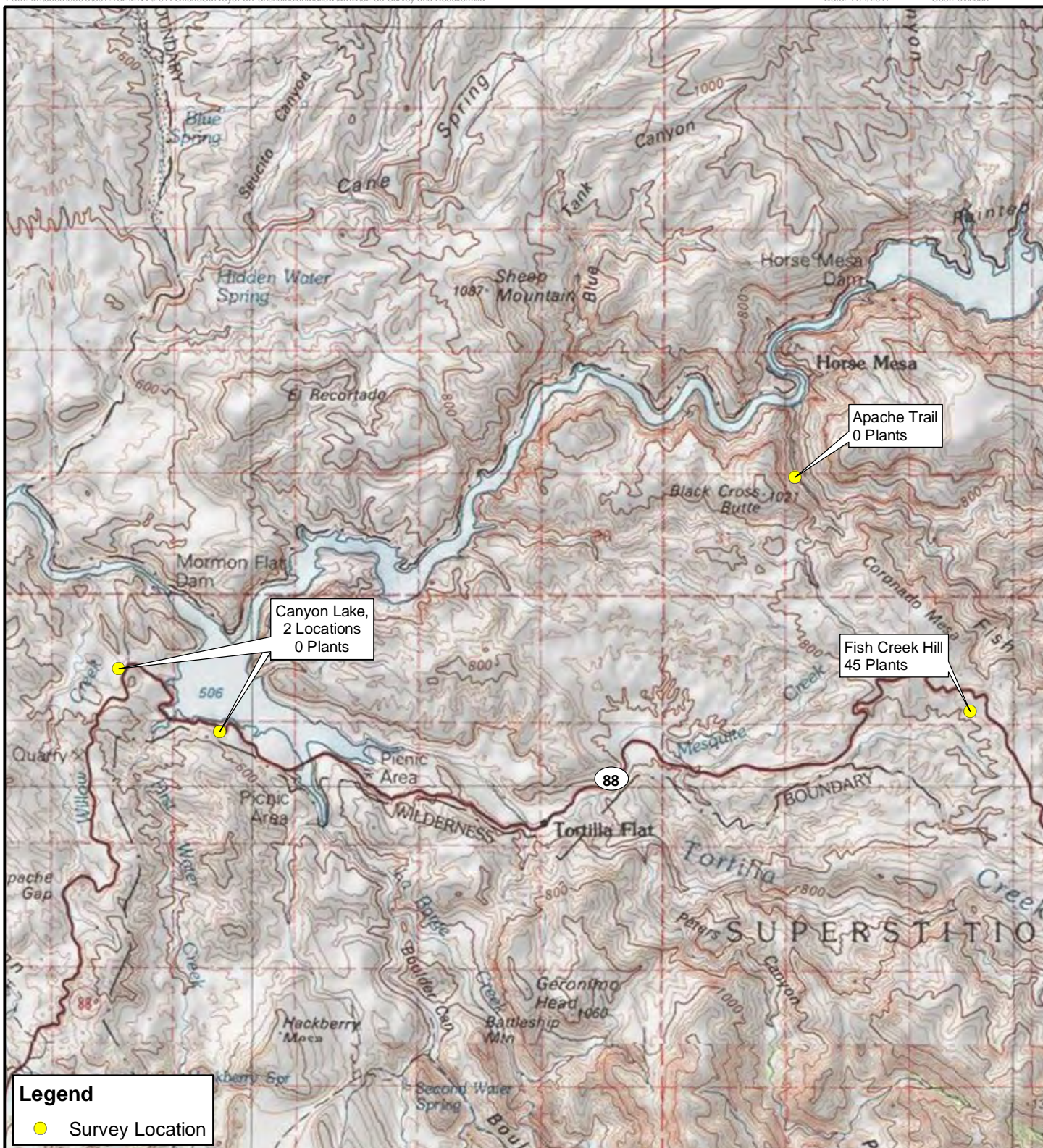
# RESOLUTION COPPER

## Offsite Surveys for Parish's Indian Mallow 2017

VICINITY MAP

Figure 1





T1N, R10E, Portion of Section 4 (Unsurveyed Protracted),  
 Portions of Sections 5 and 9 (Unsurveyed Protracted)  
 Portion of Section 32 (Unsurveyed Protracted),  
 Maricopa County, Arizona,  
 Theodore Roosevelt Lake USGS 1:100,000 Quadrangle

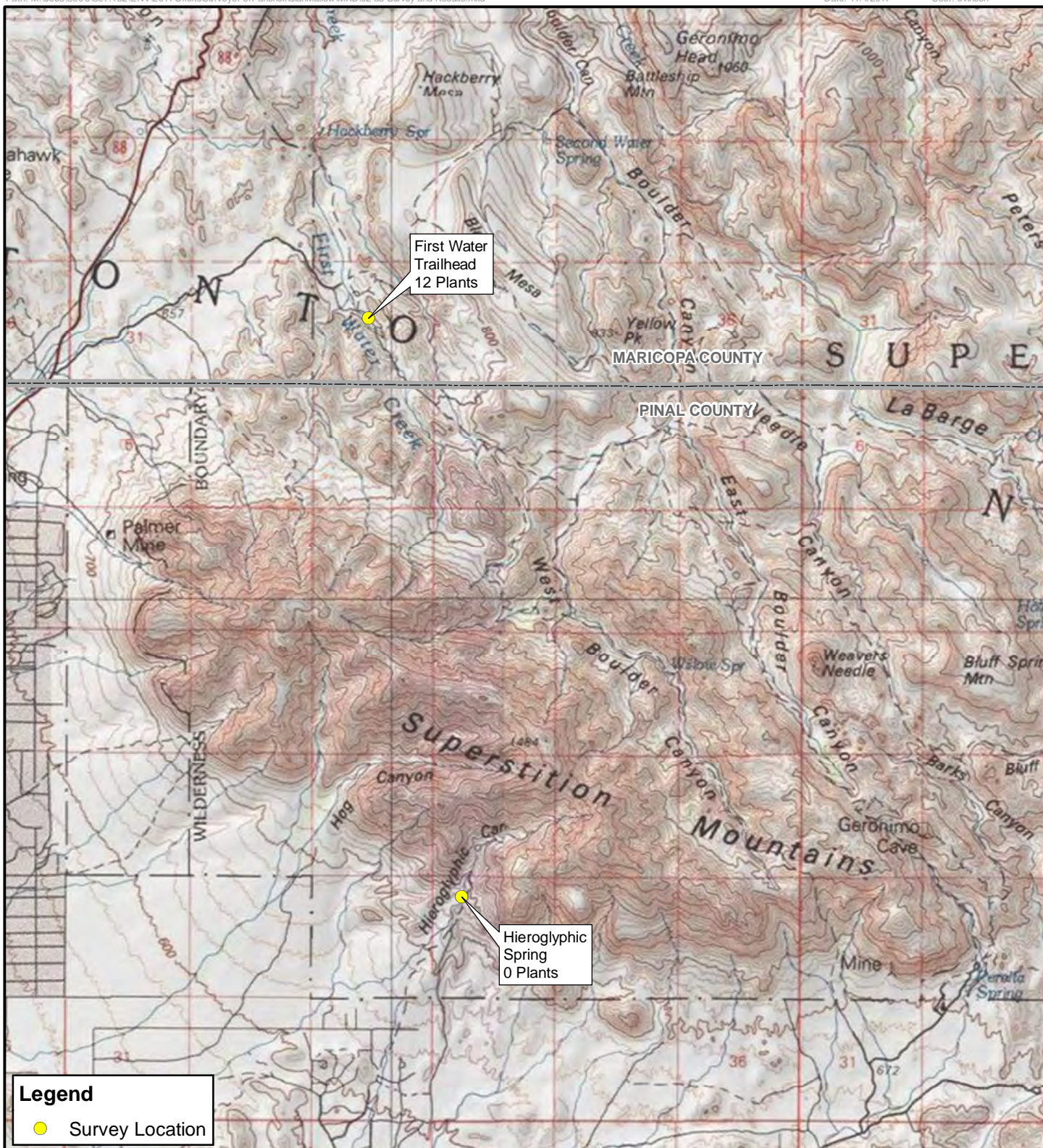
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### Offsite Surveys for Parish's Indian Mallow 2017

SURVEY LOCATIONS AND RESULTS

Figure 2a





T1N, R9E, Portion of Section 27  
 T2N, R9E, Portion of Section 44,  
 Maricopa and Pinal Counties, Arizona,  
 Mesa USGS 1:100,000 Quadrangle

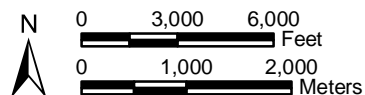
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### Offsite Surveys for Parish's Indian Mallow 2017

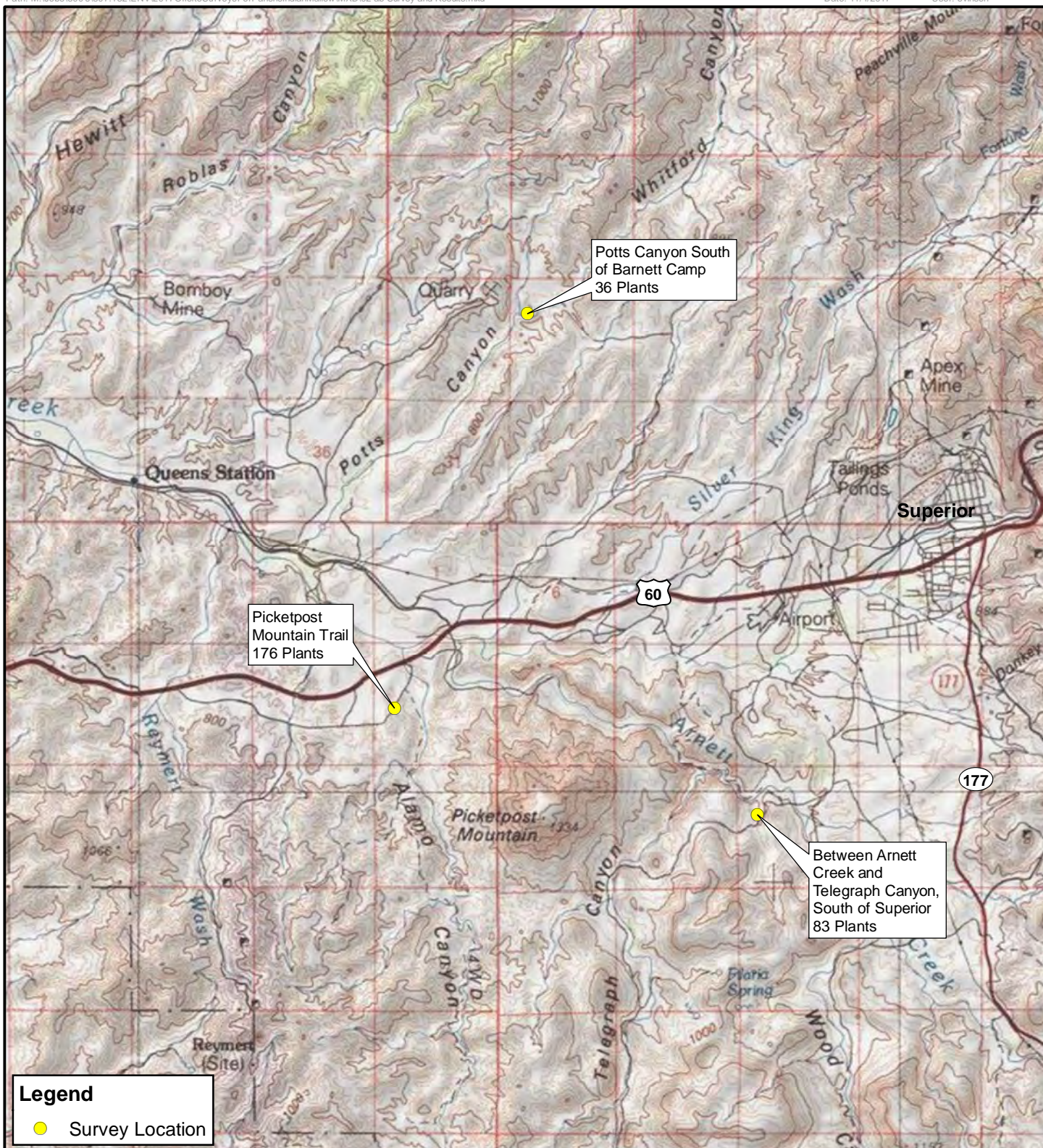
SURVEY LOCATIONS AND RESULTS

Figure 2b

WestLand Resources







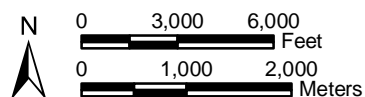
T1S, R12E, Portion of Section 29,  
 T2S, R11E, Portion of Section 12,  
 T2S, R12E, Portion of Section 16,  
 Pinal County, Arizona,  
 Mesa USGS 1:100,000 Quadrangle

## RESOLUTION COPPER

### Offsite Surveys for Parish's Indian Mallow 2017

SURVEY LOCATIONS AND RESULTS

Figure 2c



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## **APPENDIX A**

**Representative  
Photographs of  
Parish's Indian  
Mallow and  
Habitat**





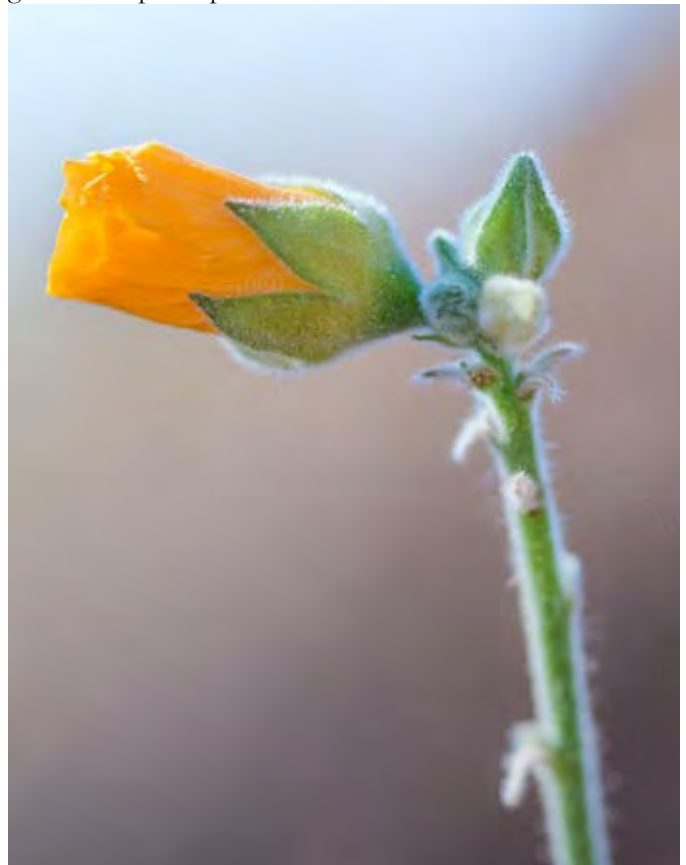
**Photo 1.** View of stem coated in characteristic glandular hairs



**Photo 2.** View of characteristic heart-shaped leaf with toothed edges and velvety texture



**Photo 3.** View of characteristic discoloured leaves, dark green on top and paler underneath



**Photo 4.** View of flower with pale orange petals which only open for a few hours a day

Representative Photographs of Parish's Indian Mallow and Habitat  
**Attachment A**

Photopage I





**Photo 5.** View of fruits with characteristic eight one-seeded segments



**Photo 6.** View of empty fruit capsule persisting on the stem



**Photo 7.** View of Parish's Indian Mallow at Fish Creek Hill location



**Photo 8.** View of Parish's Indian Mallow in habitat at Fish Creek Hill location





**Photo 9.** View of Parish's Indian Mallow in habitat at First Water Trailhead location



**Photo 11.** View of Parish's Indian Mallow (middle of photo) in habitat at new location in Potts Canyon, south of Barnett Camp



**Photo 10.** View of Parish's Indian Mallow (lower left of photo) in habitat at Picketpost Mountain Trailhead location



**Photo 12.** View of Parish's Indian Mallow (middle of photo) in habitat at new location between Arnett Creek and Telegraph Canyon

Representative Photographs of Parish's Indian Mallow and Habitat  
**Attachment A**

Photopage 3