




# **NEVADA TEST AND TRAINING RANGE (NTTR)**

**Land Withdrawal Application Packages/  
Case File and Legislative EIS**



## **RARE PLANTS OF THE NEVADA TEST AND TRAINING RANGE AND PROPOSED EXPANSION ALTERNATIVES**



**FINAL**  
August 2017

**RARE PLANTS OF THE  
NEVADA TEST AND TRAINING RANGE  
AND PROPOSED EXPANSION ALTERNATIVES  
Final Report**

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## ABBREVIATIONS

99 CES/CEIEA	99th Civil Engineering Squadron/Installation Management Environmental Assessments Section
ACC	Air Combat Command
AFI	Air Force Instruction
BLM	Bureau of Land Management
CAFB	Creech Air Force Base
CWA	Clean Water Act
DNWR	Desert National Wildlife Range
DoD	U.S. Department of Defense
DOI	U.S. Department of the Interior
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
GIS	Geographic Information Systems
GPS	Global Positioning System
INRMP	Integrated Natural Resources Management Plan
MSL	Mean Sea Level
NAFB	NAFB
NDCNR	Nevada Department of Conservation and Natural Resources
NDF	Nevada Division of Forestry
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources

NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NNHP	Nevada Natural Heritage Program
NNRP	Nellis Natural Resources Program
NNSS	Nevada National Security Site
NRCS	Natural Resources Conservation Service
NTTR	Nevada Test and Training Range (Also, the new name for 98th Range Wing)
NVCS	National Vegetation Classification Standard
NWAP	Nevada's Wildlife Action Plan
NWHR	Nevada Wild Horse Range
SAR	Small Arms Range
STATSGO2	U.S. General Soil Map
TNC	The Nature Conservancy
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey



## INTRODUCTION

The United States Air Force (USAF) is in the process of extending the withdrawal of land for military operations and training on the Nevada Test and Training Range (NTTR). In addition to extending the current withdrawal, the Air Force is evaluating several potential expansion alternatives. The current withdrawal will expire on November 6, 2021, unless Congress enacts legislation to extend it. In accordance with Section 3016 of the Military Land Withdrawal Act (MLWA), the USAF, in coordination with the Department of Defense (DOD), has notified Congress of a continuing military need for the NTTR withdrawal. Furthermore, the Air Force plans to submit a Legislative Environmental Impact Statement (LEIS) that supports a legislative withdrawal proposal which will be submitted through the Department of the Interior (DOI) to extend the withdrawal.

As part of the LEIS process, the Air Force is preparing documentation required to support the Application Package, Case File, and legislative language to successfully accomplish the NTTR land withdrawal by November 2021. To maintain critical test and training capabilities at the NTTR, the Air Force must complete all required studies in compliance with the National Environmental Policy Act (NEPA), the *Engle Act*, *Federal Land Policy and Management Act*, the MLWA, and Land Withdrawals regulations set forth in Title 43 Code of Federal Regulations (CFR) Part 2300. This report provides a summary of the historical and current rare plant surveys that have been conducted on the NTTR and proposed expansion alternatives.

Vegetation surveys on the NTTR and potential expansion alternatives have been a historical focus of ecosystem management for the Nellis Natural Resources Program (NNRP) and the Desert National Wildlife Refuge (DNWR). Mapping and monitoring vegetation provides the military mission with information that can be used for planning training activities, as well as ensuring that plant communities and their subsequent habitats are conserved to maintain a sustainable training environment. On the DNWR, such studies ensure protection of rare plant populations to encourage plant diversity and provide an excellent environment for public exposure to Mojave Desert and Great Basin Desert ecosystems.

Historical surveys have been conducted in and around the Nevada Test and Training Range (NTTR) since the 1990's to locate rare plant populations. Beginning in 2005, extensive surveys were initiated to confirm and re-establish the known locations for these previously identified rare plant populations. These historical locations of rare plant populations were available from the Nevada Natural Heritage Program (NNHP) as well as The Nature Conservancy (TNC). Since 2009, the NNRP has been inspecting these historically identified sites as well as surveying potential habitats of rare plants. Several of the historical populations of rare plants were found and confirmed, while others remain unconfirmed or may no longer exist.

This report is a summary of the historical surveys conducted for rare plants and vegetation on the study area. Also included is the information currently known about rare plants on the study area and locations of rare plant populations that have been identified on the study area. Fieldwork conducted in 2016 included vegetation surveys to characterize plant communities and identify rare plants on the expansion areas. Data collected from these surveys is included in this report.

## DESCRIPTION OF THE PROJECT AREA

The study area for this report includes NTTR and potential expansion areas designated as Alternatives 3A, 3B, and 3C. NTTR consists of 2,949,603 acres, in rural portions of Nye, Lincoln, and Clark Counties, Nevada (Figure 1). The potential expansion areas are shown in Figure 1 and consist of about 302,000 acres. These potential expansion areas are pre-decisional in nature from a National Environmental Policy Act (NEPA) perspective. Alternative 3A is 18,000 acres lying along the southwest boundary of the North Range of the

NTTR. Alternative 3B is 57,000 acres located immediately south of the South Range of the NTTR. Alternative 3C is 227,000 acres immediately east of the South Range of the NTTR in the DNWR. Geology varies from limestone/dolomite in the south to volcanic fields in the north. The South Range Study Area lies in the eastern Mojave Desert, and the North Range Study Area lies in the southern Great Basin (Figure 2).

Natural sources of water are scarce across most of the study area. Annual precipitation ranges from 3 to 5 in. in the basins as high as 16 in. in upper elevations of mountains. Vegetation composition is strongly influenced by the levels of precipitation. Most of the active springs are found in the North Range Study Area, especially in the Kawich, Belted, and Cactus mountain ranges and Stonewall Mountain. Only five springs are found in the South Range Study Area. Most water sources for wildlife in the South Range Study Area are provided by wildlife water developments, which collect water from storm events and store it in water tanks.

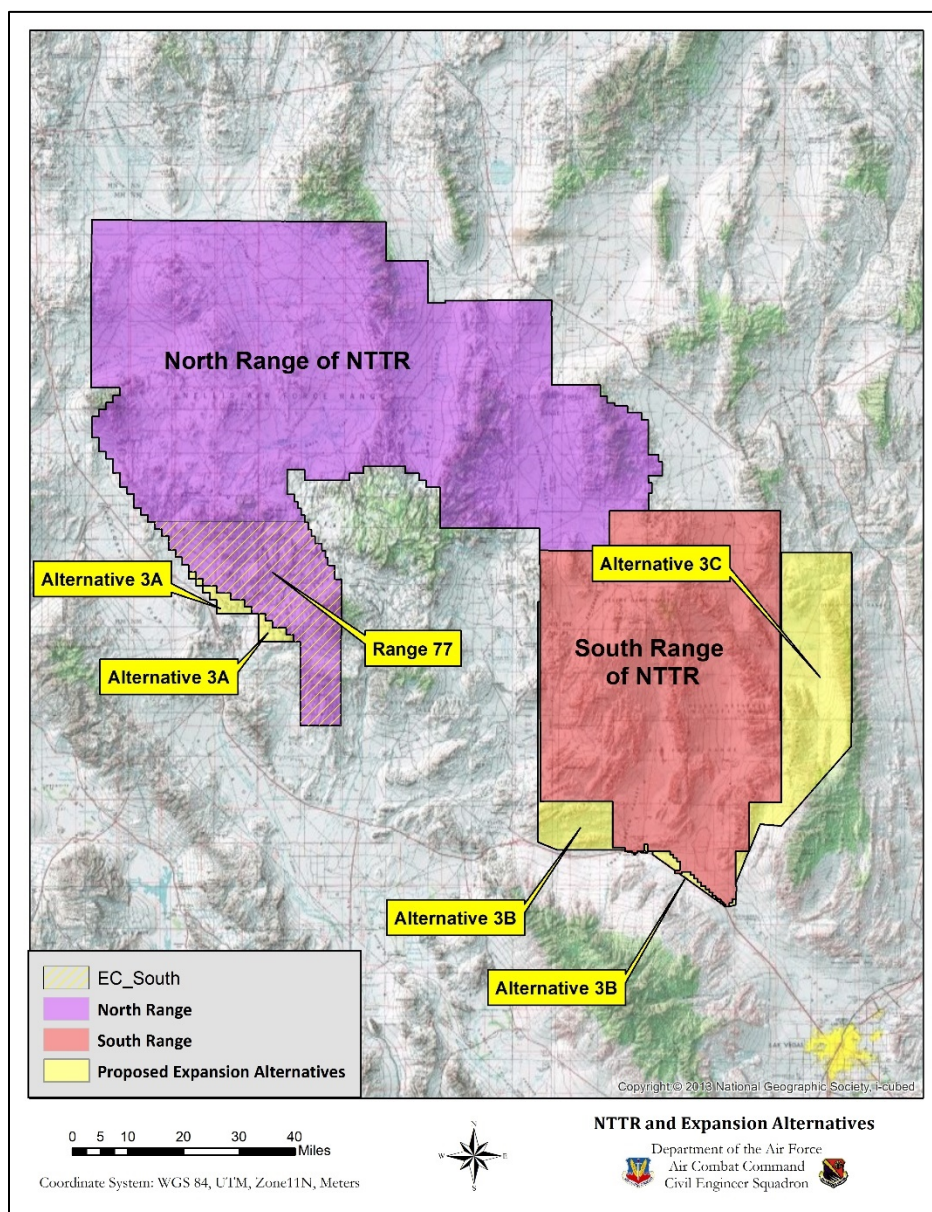


Figure 1. Location of the North and South Ranges of NTTR as well as Alternatives 3A, 3B, and 3C.



The South Range Study Area is typical of the Mojave Desert. Except for the higher elevations, most of the mountains are covered by scattered populations of various desert brush and cactus species. Typical physiography of the area consists of mountain ranges which drain into bajadas (collections of alluvial fans) which eventually drain into playas. Most of the study area drainage systems are considered basins which are part of the internally drained hydrographic Great Basin. Playas tend to have little or no vegetation while bajadas are often dominated by creosote bush (*Larrea tridentata*) and bursage (*Ambrosia dumosa*) in the lower bajadas and blackbrush (*Coleogyne ramosissima*) and Joshua tree (*Yucca brevifolia*) in the upper bajadas. Mountain ranges support scattered populations of bitterbrush (*Purshia spp.*), matchweed (*Gutierrezia spp.*), and shadscale (*Atriplex confertifolia*). At higher elevations, plant communities may be dominated by Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus monophylla*).

The North Range Study Area is typical of the southern portions of the Great Basin Desert. Again, the physiography of the area is comprised of mountains and closed basins similar to the South Range Study Area. However, rainfall is slightly higher in the North Range Study Area resulting in denser plant communities. Like the South Range Study Area, playas in the North Range Study Area contain little or no vegetation.

From the boundaries of the playas to the base of mountains, plant communities are typically dominated by greasewood (*Sarcobatus spp.*) and shadscale (*Atriplex spp.*) in lower elevations and sagebrush (*Artemisia spp.*) in higher elevations. The upper elevations in the mountains are dominated by Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus monophylla*).

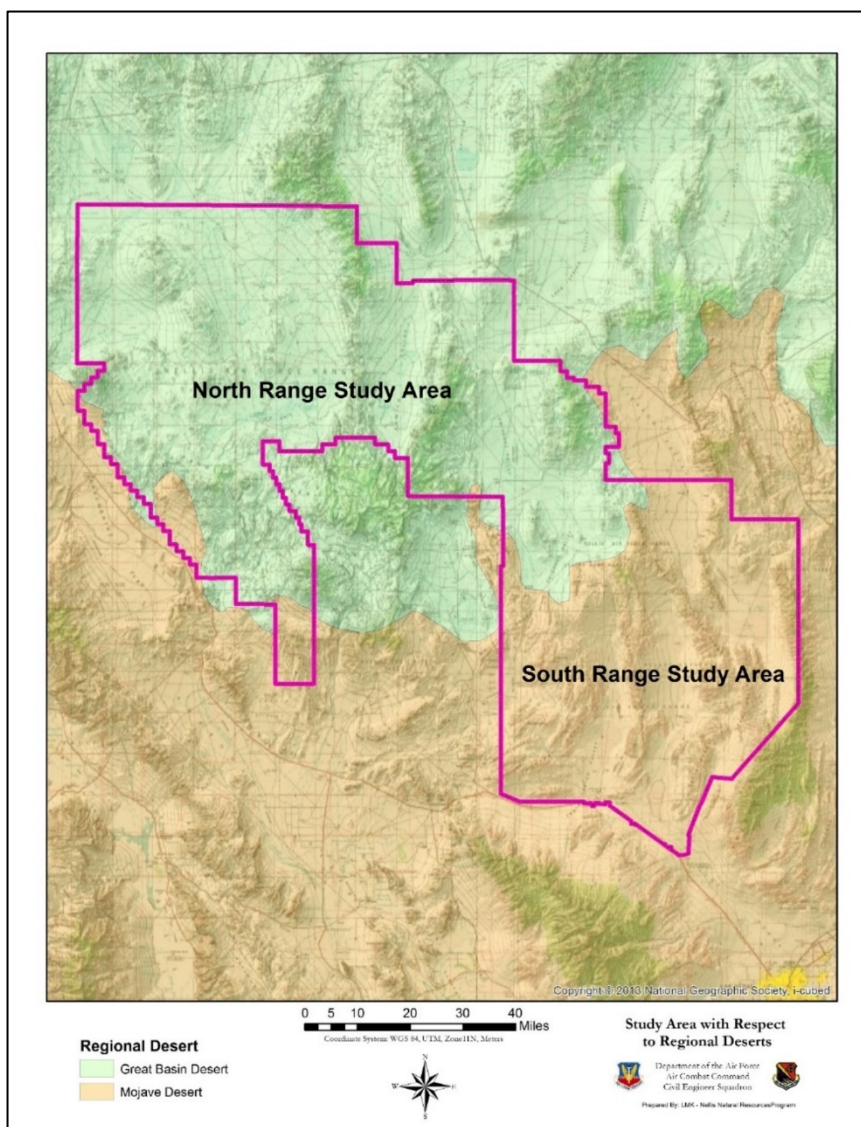
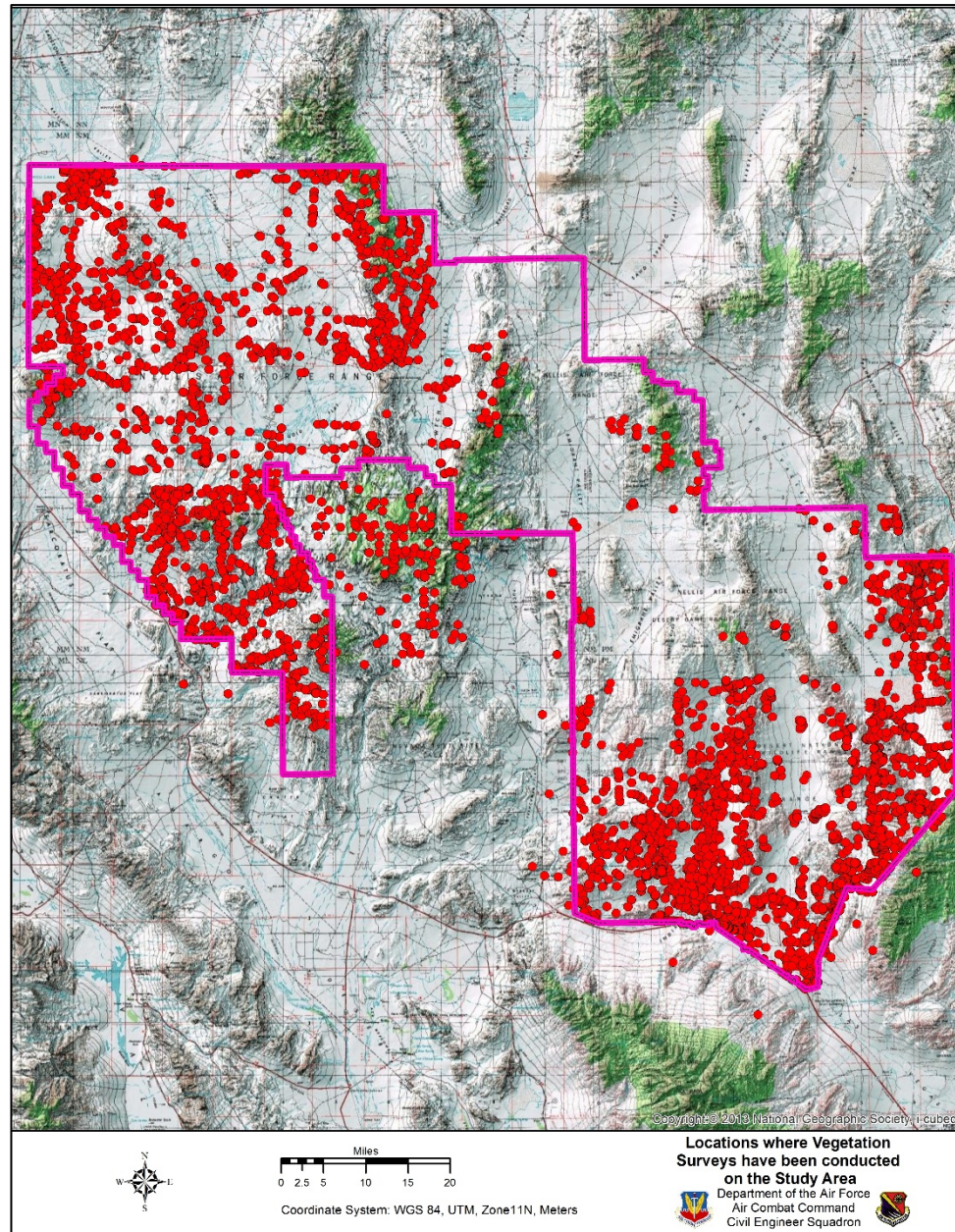


Figure 2. Location of the study area with respect to the Great Basin Desert and the Mojave Desert.



## HISTORIC SURVEYS

Rare plant and vegetation surveys have been conducted on the study area since the early 1990s. The Nevada Natural Heritage Program database contains observations that were made as early as 1906 (Nevada Natural Heritage Program Database, 2016). In the paragraphs that follow, formal surveys that were conducted on the project area will be briefly discussed. It is important to note that a majority of the study area has been extensively surveyed for plant communities and rare plants. Figure 3 provides a map showing all the locations where vegetation has been surveyed for either rare plants or plant communities in and around the study area. A significant amount of information on vegetation has been collected over the years.



**Figure 3. Locations where rare plant and vegetation have been identified and surveyed in various studies on the study area.**

## **1993 INVENTORY OF RARE PLANTS ON NELLIS AIR FORCE BOMBING AND GUNNERY RANGE (KNIGHT T. F., 1997)**

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From 1993 to 1997, NAFB and TNC in cooperation with the USFWS and Nevada Natural Heritage Program (NNHP) initiated a botanical inventory under the Legacy Resource Management Program. The surveys identified relictual white fir forests and large areas of dwarf mountain mahogany. Spring fieldwork was conducted late March to the end of June and fall fieldwork was conducted from September to the end of October. All locations were located and surveyed on foot. Sites were targeted based on potential habitat, known habitat, and historic occurrences. Plant specimens were mounted and locations were mapped directly on topographic maps in the field. During the 4.5 years of this project, 15 species of concern were identified on the NTTR. Species identified included the following:

- *Arctomecon merriamii*
- *Astragalus ackermanii*
- *Astragalus amphioxys* var. *musimonum*
- *Astragalus beatleyae*
- *Astragalus funereus*
- *Astragalus gilmanii*
- *Astragalus mohavensis* var. *hemigyris*
- *Astragalus oophorus* var. *clokeyanus*
- *Chrysothamnus eremobius*
- *Cymopterus ripleyi* var. *saniculoides*
- *Erigeron ovinus*
- *Penstemon pahutensis*
- *Phacelia beatleyi*
- *Phacelia parishii*
- *Porophyllum pygmaeum*

## **1999 MONITORING OF *ARCTOMECON MERRIAMII* (PRITCHETT & SMITH, 2000)**

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Three populations of *Arctomecon merriamii* were located on the NTTR in 1998 and then monitored in 1999. At the time, these populations were being monitored because the species was considered a special status species with potential to be listed. The Desert Range population consisted of two plants, down 93% from those observed in 1998. No plants were found on the Spotted Range. A third population was identified in the Ranger Mountains in 1999 and consisted of 76 plants, which were tagged and marked for future monitoring.

## **1999 MONITORING OF *PHACELIA PARISHII* (PRITCHETT & SMITH, 2000A)**

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Two populations of *Phacelia parishii* were located in the Indian Springs Valley and in Three Lakes Valley of NTTR from 1998 to 1999. The project areas were staked and permanent transects were established in 1998 when substantial populations of both species were observed. No plants were observed during surveys conducted in April and May of 1999. The lack of plants in 1999 was attributed to low rainfall.

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### **1999 RARE PLANT SURVEY FOR *ASCLEPIAS EASTWOODIANA* (SMITH & PRITCHETT, 2000)**

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This project was part of a large rare plant survey project conducted by TNC on the NTTR. This particular rare plant survey was conducted in June 1999 and targeted Eastwood's milkweed (*Asclepias eastwoodiana*, now *A. uncialis*). Substantial populations of this species were found on Cactus Flat. One population contained over 1,300 plants.

### **2000 MONITORING OF *ARCTOMECON MERRIAMII* (PRITCHETT & SMITH, 2001)**

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This report continued the long-term demographic monitoring program for populations of *Arctomecon merriamii* on the NTTR in 2000. The goal of the study was to locate the three populations found in 1998 and 1999 and record demographic and phenological data for each population. Two populations observed in the Desert Range and the Spotted Range during the time of the 1999 monitoring were not found in 2000. The third population in the Ranger Mountains had 65% survivorship from 1999 to 2000. These populations were being monitored due to the fact that the species was treated as a species of concern by the USWFS and being considered as Category Two species for listing under the ESA.

### **2000 MONITORING OF *PHACELIA PARISHII* (PRITCHETT & SMITH, 2001A)**

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Two populations of *Phacelia parishii* were subjected to a monitoring program initiated in May 1998. Over 2,000 plants were counted in each of the populations in 1998. No plants were observed during surveys conducted in April and May of 1999. However, in 2000, the surveys were conducted April 15-16 and one population was determined to be over 9,000 plants while the other was estimated to be 1,985 plants. It was hypothesized that 1 inch of rain in a week in winter was sufficient to fill the playa, saturate soils, and sufficiently trigger germination of *Phacelia parishii* the following spring. Temperature may also be a factor.

### **2000 VEGETATION SAMPLING AT NELLIS AIR FORCE BOMBING AND GUNNERY RANGE (PRITCHETT & SMITH, 2001B)**

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Vegetation sampling and classification was initiated in 1994 at the NTTR. This project was conducted adjunct to surveys for rare, threatened, and endangered species. Plant inventories were created for each plant community by walking 211 plots. Each plot was comprised of a 50 m transect and making ocular cover estimates extending 3 m on each side of the transect. The sampling was conducted to provide ground-truth data for mapping from aerial photographs of the study area. For this survey conducted in 2000, six plant communities were identified and characterized.

### **2001 VEGETATION MAPPING—INDIAN SPRINGS AND INDIAN SPRINGS NW (PRITCHETT & SMITH, 2001C)**

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The vegetation mapping project for the Nellis Air Force Bombing and Gunnery Range was continued in 2001 and covered two USGS 7.5 quads, Indian Springs and Indian Springs Northwest. Mapping was based on 5 m resolution satellite imagery, air photos, field photos, and topographic maps. Ocular estimates of foliar cover of perennial species were taken at 186 different locations to use for plant alliance and association mapping. Fourteen alliances and associations were identified and defined in accordance with the National Vegetation Classification Standard (NVCS) within the study area, and a 15<sup>th</sup> mapping unit was defined as a mosaic of two alliances. Three of the alliances were new to the NVCS. Vegetation inventories were taken at each sampling point and provided information on common and rare plants.



## **2002 VEGETATION MAPPING: INDIAN SPRING SOUTH EAST AND BLACK HILLS SOUTHWEST QUADS (PRITCHETT & SMITH, 2003)**

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This project was a continuation of the 1994 vegetation sampling program on the NAFB Bombing and Gunnery Range. The objective of the project was to produce a digital map of vegetation alliances and associations to facilitate environmental management efforts. Mapping was based on 5 m resolution satellite imagery, air photos, field photos, and topographic maps. Ocular estimates of foliar cover of perennial species were taken at 68 different locations to use for plant alliance and association mapping. Comprehensive vegetation inventories were taken at each sampling point and included common and rare plant species. Twelve alliances and associations were documented from field sampling data and defined according to the NVCS. Eight mapping units were described which were comprised of mosaics of these alliances/associations. Extensive occurrence of desert pavement was observed.

## **2005 RARE PLANT SURVEYS ON THE NORTH RANGES OF NTTR (KARL A. , 2005)**

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In 2005, botanical surveys were conducted on the North Range of NTTR. These surveys were developed to describe plant communities occurring in the ranges and to search for special status plant species in areas where they were likely to occur and in several areas that were identified for future surface disturbances. Two species of rare plants were observed during the surveys and included sanicle biscuitroot (*Cymopterus ripleyi* var. *saniculoides*) and clokey eggvetch (*Astragalus oophorus* var. *clokeyanus*).

## **2005-2006 SURVEY FOR RARE PLANTS ON THE NEVADA TEST AND TRAINING RANGE (KARL & KITCHEN, 2007)**

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Beginning in 2005, the NNRP initiated a comprehensive program of botanical investigations on the North and South Ranges of NTTR. Prior to field work, the NNHP data base and other written sources (e.g., technical flora, reports) were reviewed to identify special-status species that might be found on the northern NTTR, based on habitat and elevation requirements and previously identified populations near the NTTR. Surveys were conducted from May to the end of June. At each site surveyed, the area was walked to survey for rare plants and to describe the plant community. At each site, all species observed were recorded and included describing the dominant and less-common plant species of both the shrub and understory layers, describing the soil types, substrate quality (i.e., size and cover of gravels and cobbles), and topography, and identifying any other special features. In 2005 and 2006, three special status plant species were observed. These included clokey eggvetch (*Astragalus oophorus* var. *clokeyanus*), hermit cactus (*Sclerocactus polyancistrus*), and sanicle biscuitroot (*Cymopterus ripleyi* var. *saniculoides*). Preliminary habitat ranges of 16 rare plant species based on topographic features were also mapped as part of this project.

## **2012 VEGETATION AND FLORISTIC SURVEY DESERT NATIONAL WILDLIFE REFUGE, CLARK AND LINCOLN COUNTIES, NEVADA (CHARLET & WESTENBURG, 2013; CHARLET, LEARY, & WESTENBURG, 2013)**

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The USFWS and the College of Southern Nevada conducted a cooperative study to map vegetation on the DNWR. Between 2008 and 2012, teams of biologists inspected and surveyed 1,013 sample sites. Observations of vascular plants, geophysical features, and other attributes were documented at each point. A comprehensive vegetation inventory was also taken at each point. Using remote sensing software, satellite imagery was classified according to uniform characteristics of the image. Field data was used to determine plant composition within each classified sample. All data were compiled to produce a vegetation map for the DNWR. Field teams were careful to record any rare plants encountered during the survey.



## **2013 FINAL BIOLOGICAL ASSESSMENT CEDAR PEAK WILDLAND FIRE PLAN (NELLIS NATURAL RESOURCES PROGRAM, 2013)**

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A biological assessment was conducted to identify special status plant and animal species potentially impacted by wildland fire fuel reduction efforts. Special status plant species potentially occurring within the boundaries of the project study area were identified using a search of the NNHP database. The survey was conducted on May 25, 2013. Conditions were not ideal for special status plant species to be present due to an extended dry period. No special status plant species were observed within the project study area. However, several species were listed as potentially impacted by activities based on presence of habitat and range requirements.

## **2013 VEGETATION DATABASE FOR LAND-COVER MAPPING, CLARK AND LINCOLN COUNTIES, NEVADA (CHARLET, DAMAR, & LEARY, 2014)**

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Plant data were collected at 3,175 sample sites to support land -cover mapping projects in Clark and Lincoln Counties, Nevada, from 2007 to 2013. Plant inventories and vegetation characteristics were surveyed at each sampling site. This data was compiled to produce a plant community map for the region. Almost all samples were classified into recognized units at the NVCS group level. This effort included the Desert National Wildlife Refuge.

## **METHODOLOGY**

### **SURVEYS CONDUCTED BY NNRP ON NTTR 2005-2015**

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Beginning in 2005, the NNRP conducted rare plant surveys on NTTR annually. Additionally, plant community surveys were conducted and included inspection of survey points for rare plants. All of the data collected for these projects is summarized in this report. The following is a list of reports (not including those already listed) that contain information on rare plants that were collected by NNRP surveys on NTTR:

- Botanical Survey of Dogbone Lake (Charlton, Kitchen, & Woodman, 2004)
- Rare Plant Section of the 2006 Annual Report for NAFB and the Nevada Test and Training Range (Nellis Natural Resources Program, 2007)
- Rare Plant Section of the 2007 Annual Report for NAFB and the Nevada Test and Training Range (Nellis Natural Resources Program, 2008)
- Rare Plant Section of the 2008 Annual Report for NAFB and the Nevada Test and Training Range (Nellis Natural Resources Program, 2009)
- Rare Plant Section of the 2009 Annual Report for NAFB and the Nevada Test and Training Range (Nellis Natural Resources Program, 2010)
- Rare Plant Section of the 2010 Annual Report for NAFB and the Nevada Test and Training Range (Nellis Natural Resources Program, 2011)
- Rare Plant Section of the 2011 Annual Report for NAFB and the Nevada Test and Training Range (Nellis Natural Resources Program, 2012)
- Unique Habitats and Rare Plants 2012 Annual Summary Report (Nellis Natural Resources Program, 2013)
- Final Report: 2013 Unique Habitats and Rare Plants (Nellis Natural Resources Program, 2014)
- Final Report: 2014 Unique Habitats and Rare Plants (Nellis Natural Resources Program, 2015)
- Plant Communities of Range 64B—Final Report (Nellis Natural Resources Program, 2015A)
- Plant Communities of Range 71 North—Final Report (Nellis Natural Resources Program, 2015B)

- Plant Communities of Range 71 South—Final Report (Nellis Natural Resources Program, 2015C)
- Plant Communities of Ranges 64C-F and 65C—Final Report (Nellis Natural Resources Program, 2016)
- Plant Communities of Range EC-South—Final Report (Nellis Natural Resources Program, 2016A)
- Plant Community Maps for the Range 61A Road Improvement Project (Nellis Natural Resources Program, 2014A)
- Final: Management, Habitat, Vegetation Mapping Project for North Range and South Range of NTTR (EC-West and Range 64A) (AMEC Environmental and Infrastructure, Inc., 2014)

Rare plant survey areas were selected for surveys conducted from 2005 to 2015 based on historic sightings of rare plants and areas that have physical and biological properties conducive to the establishment of specific rare plant populations. This information was available from the NNHP as well as several rare plant surveys conducted by independent consultants on the NTTR for TNC. Populations were located on maps using recorded coordinates of all populations or by rectifying maps and determining coordinates using ArcGIS. Beginning in 2009, the NNRP visited each of these historical locations to evaluate any rare populations that may still be present. Several of the historic populations were found and confirmed, while others remain unconfirmed and potentially no longer exist. Surveys were conducted during the period from late March to early July and from September to late October. Access to survey areas was subject to scheduling by the USAF and usually occurred on weekends and holidays.

Study areas were accessed either by vehicle or helicopter. At each site surveyed, the area was subjected to a thorough pedestrian survey focusing on rare plants that might occur in the area. At each sampling point, botanists prepared a comprehensive inventory of all plant species observed, describing the dominant and less common plant species of the tree/shrub and herbaceous understory strata. Additionally, the soil, substrate quality (i.e., size and cover of gravels and cobbles), topography, and other natural features were described. When use of cameras was allowed, each site was photo-documented and the GPS coordinates (UTM WGS84 Zone 11N) recorded. Samples of rare plants were taken to confirm the identification in the field, but none of the samples were mounted for herbarium use. From 2005 to 2015, 91 days of rare plants surveys were completed by the NNRP.

Number of Survey Days	Year
4	2005
5	2006
10	2007
4	2008
8	2009
10	2010
20	2011
1	2012
5	2013
17	2014
7	2015
<b>91</b>	<b>Total</b>

## 2016 RARE PLANT SURVEYS

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In 2016, rare plant surveys were conducted on the potential expansion lands listed as Alternatives 3A, 3B, and 3C in support of the land withdrawal process. Survey locations were selected based on historical sightings of rare plants and areas that have topographic and biological properties that are conducive to the establishment of rare plant populations. Rare plant surveys were also conducted in conjunction with plant community surveys. In 2016, study areas were accessed either by helicopter and/or vehicle. In the field, biologists utilized aerial imagery on electronic tablets and paper maps to locate potential sites for rare plants within the study area. The lead botanist selected a representative sample area of potential habitat on the maps, after which teams would navigate to the area and establish a sample plot. A central point was established within the plot and recorded using a GPS Garmin Oregon 400, 450, or 600 T unit. At each site surveyed, the area was subjected to a thorough pedestrian survey focusing on rare plants that might occur in the area.

Survey plots were created by establishing a 100-foot radius from the central GPS survey point. Biologists then walked within the 100-ft. radius and recorded plant species observed. Botanists developed a comprehensive list of all species, describing the dominant and less-common plant species of both the shrub and herbaceous understory layers. Foliar cover of live woody plants, dead or dormant woody plants and herbaceous plants was measured on four 100-ft. transects originated at the central survey point. Percent bare ground was also estimated. Additionally, the soil, substrate quality (i.e., size and cover of gravels and cobbles), topography, and other natural features were described. Each site was photo-documented and the GPS coordinates (UTM WGS84 Zone 11N) recorded. When rare plants were identified, a separate GPS point was taken to provide a specific location for that population. From this point, biologists established a 300-foot radius and walked within the designated survey area. Individual plants of the rare plant population were tabulated and recorded to establish the population density. During the walks between selected survey points, biologists documented incidental observations of rare plants.

In addition to the surveys specifically targeting rare plants, incidental observations of rare plants were included as part of the general vegetation community surveys conducted from April to September. For the 2016 surveys, GPS waypoints were located in the office on high resolution satellite imagery. High resolution 4-band imagery (RGBN 50-cm spatial resolution) was acquired from Airbus Defense & Space at the initiation of the project. This imagery covered the proposed expansion areas and was taken on April 3 and 4, 2016. The points were selected to be representative of classes of imagery patterns observed on the satellite imagery. The imagery patterns were eventually used to map the boundaries of plant communities. The survey points were then uploaded to a GPS device which was then used to locate survey points in the field.

## RESULTS: STATE/FEDERAL LISTED OR CRITICALLY IMPERILED SPECIES

For the purposes of this report, a list of rare plant species was developed by a committee including representatives from USAF, UAFWS, NDOW, BLM, and USGS to include those species that have been granted some level of status on state or federal endangered and threatened species lists or were listed as a state ranking of “S1” or critically imperiled and are of special interest to cooperating agencies (Table 1). These species will be discussed in detail in this report and will be subjected to habitat range modeling in a separate special status species habitat range modeling report. In the paragraphs that follow, each of the species listed in Table 1 will be described in detail. Maps showing the locations of observations are provided if observations have been made in or around the study area. In this report, “recent observations” indicates that the plants were identified after 2004.

**Table 1. Rare plant species that have been placed on state or federal endangered and threatened species lists or have a state ranking of S1 (critically imperiled) and are of special interest to cooperating agencies.**

COMMON NAME	SCIENTIFIC NAME	USWFS	NEVADA STATUS	BLM STATUS	USFS STATUS	NDOW WILDLIFE ACTION PLAN	STATE RANK
Las Vegas Bearpoppy	<i>Arctomecon californica</i>	None	CE	S	None	None	S3
Threecorner Milkvetch	<i>Astragalus geyeri</i> var. <i>triquetrus</i>	None	CE	S	None	None	S2S3
Gilman Milkvetch	<i>Astragalus gilmanii</i>	None	None	S	None	None	S1
Inyo Milkvetch	<i>Astragalus inyoensis</i>	None	None	None	None	None	S1
Remote Rabbitbrush	<i>Chrysothamnus eremobius</i>	None	None	None	None	None	S1
Clokey Pincushion	<i>Coryphantha vivipara</i> var. <i>rosea</i>	None	CY	None	None	None	S3
Las Vegas Catseye	<i>Cryptantha insolita</i>	None	CE	None	None	None	SH
Armored Hedgehog Cactus	<i>Echinocereus engelmannii</i> var. <i>armatus</i>	None	CY	None	None	None	S1
Las Vegas Buckwheat	<i>Eriogonum corymbosum</i> var. <i>nilesii</i>	C	None	S	None	None	S1S2
Pinyon Mesa Buckwheat	<i>Eriogonum mensicola</i>	None	None	None	None	None	S1
Kingston Mountains Bedstraw	<i>Galium hilendiae</i> ssp. <i>kingstonense</i>	None	None	None	None	None	S1
Ash Meadows Gumplant	<i>Grindelia fraxinopratensis</i>	LT	CE	S	None	None	S2
Rock Purpusia	<i>Ivesia arizonica</i> var. <i>saxosa</i>	None	None	S	None	None	S1
Ash Meadows Blazingstar	<i>Mentzelia leucophylla</i>	LT	CE	S	None	None	S1
White Margined Beardtongue	<i>Penstemon albomarginatus</i>	None	CE?	S	None	None	S2
Bashful Beardtongue	<i>Penstemon pudicus</i>	None	None	S	S	None	S1
Cliff Needlegrass	<i>Piptatherum shoshoneanum</i>	None	None	None	None	None	S1
Williams Combleaf	<i>Polyctenium williamsiae</i>	None	CE	S	S	None	S2
Hermit Cactus	<i>Sclerocactus polyancistrus</i>	None	CY	None	None	None	S2S3

**USFWS Status:**

- LT - Listed Threatened – likely to be classified as Endangered in the foreseeable future if threats continue.
- C - Candidate for listing as Threatened or Endangered

**BLM Status:**

- S - Nevada Special Status Species, USFWS listed, proposed, candidate species or otherwise protected by Nevada state law

**USFS Status:**

- S - Sensitive Species

**State Rank:**

- S - State rank indicator, based on distribution within Nevada at the lowest taxonomic level
- 1 - Critically imperiled and especially vulnerable to extinction or extirpation due to extreme rarity, threats, or other factors
- 2 - Imperiled due to rarity or other demonstrable factors
- 3 - Vulnerable to decline because rare and local throughout range, or with very restricted range
- H - Possibly Extinct – Known from only historical occurrences but still some hope of rediscovery

## LAS VEGAS BEAR POPPY (*ARCTOMECON CALIFORNICA*)

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### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** S
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G3
- **Nevada Natural Heritage Program State Rank:** S3
- **Other Agencies:** None

### DESCRIPTION

Las Vegas bearpoppy (LVBP) is a member of the poppy family (Papaveraceae). It is native to the Mojave Desert and is classified as Fully Protected by the State of Nevada (NAC 527.010), according to the NNHP (NNHP, 2009). It is a perennial forb that is commonly found on gypsum-rich and limestone soils. The hairy, silvery-gray leaves grow in a clump at the base of the plant, and the large, yellow, poppy flowers grow atop long stems (Boone J. , 2016). The NNHP estimates that there are more than 445,000 Las Vegas bearpoppies occupying roughly 20,614 acres in the Las Vegas and Lake Mead areas (Nevada Natural Heritage Program, 2001). It should be noted that the populations found around Lake Mead "... are large and relatively-well protected" (Nevada Natural Heritage Program, 2001). Three populations are located on NAFB, and the largest population of the three is being protected in a conservation area on base (U.S. Air Force, 2004) .

The habitat for the LVBP typically consists of "...dissected or hummocked soils with high gypsum contents" (Nevada Natural Heritage Program, 2001). Other features associated with LVBP include a well-developed soil crust, open soil surfaces with sparse populations of competing plants, and elevations ranging from 1,060 to 3,642 ft. MSL (Nevada Natural Heritage Program, 2001). The gypsiferous soil may actually benefit the LVBP by bringing water to the plant (Meyer, Garcia-Moya, & Lagunes-Espinoza, 1992). The plant blooms mostly March through May. It is often found on open, dry, spongy or powdery, often dissected or hummocked soils with high gypsum content, in areas of generally low relief on all aspects and slopes, and surrounded by plant communities dominated by *Larrea tridentata*, *Atriplex* spp., and *Coleogyne ramosissima*. On appropriate soil types, the species will often revegetate disturbed areas that have been allowed to recover if a seed-bank remains (Nevada Natural Heritage Program, 2001).

LVBP is an herbaceous perennial with yellow flowers and oval-shaped seed pods that blooms in April and May. Flower stalks are 8-16 in. tall (Nevada Natural Heritage Program, 2001). The plant usually has one or more clusters of basal rosettes of leaves with a generally light grey or green appearance and densely covered with hairs. Closer examination shows the leaves to be generally wedge-shaped, with the end of



Typical Las Vegas bearpoppy plant on a gravelly soil.



each divided into several teeth. The leaves are densely covered with long hairs 0.2-0.6 in. in length. Pollination is dependent on insects, specifically several species of bees and two beetles, *Schizopus laetus* and *Trichochroides* (Tepedino & Hickerson, 1996). However, it is believed that the primary pollinators are bees (Bardeen & Williams, 2000).

While gypsiferous soil is preferred, it is not always required for the growth and survival of the plant (Childers, 2004). In a comparison of location data from the BLM with soil data from Natural Resources Conservation Service (NRCS) and the U.S. Geologic Survey (USGS), 36% of the 2,575 plants were found to grow on a limestone, but not gypsiferous, soil (Childers, 2004). Furthermore, 28% of the plants in this study were found in locations that did not possess soils with a cryptogamic surface (Childers, 2004). This is corroborated by another study that indicated the LVBP's ability to grow in rocky areas and hard pan areas (Sheldon, 1994). While more analysis should be performed, this demonstrates that the range of the LVBP's habitat is not fully understood and there are unexplored factors contributing to its growth.

Another interesting note regarding the habitat of the LVBP is its occurrence in locations that have few or no competing plants. This may relate to the harsh growing conditions of LVBP. There are "...unusually high nitrate-nitrogen concentrations" that prevent the growth of plants typically associated with the general habitat of the LVBP (Meyer, 1986). Soils supporting LVBP populations also tend to have high sulfur and salt concentrations (Sheldon, 1994). LVBP appears to have a greater tolerance to these soil constituents, which may give it an advantage over its competitors.

NNHP has documented several threats to this species. However, the primary threat is anthropogenic activities. Urban development into LVBP habitat has caused the disappearance of entire sub-populations (Nelson & Walsh, 1993). The LVBP has also been negatively impacted by highway construction, flood control, and illegal dumping (Mistretta, Pant, Ross, & Porter, 1996). Other threats include: habitat clearing, gypsum mining, off-road vehicle use, and



Las Vegas bearpoppy in the vegetative state early in the growing season.



Typical habitat of the Las Vegas bearpoppy. Note the gravel-covered, light-colored gypsiferous soil.

the decline of insect pollinators at least partially due to habitat fragmentation (Nevada Natural Heritage Program, 2001). Though established populations are susceptible to these disturbances, re-vegetation typically occurs when appropriate conditions are met, including appropriate soil and an adequate seed bank (Nevada Natural Heritage Program, 2001).

Populations of the LVBP are declining across its range. According to the NNHP, as of 2001 in Nevada, 92 extant and 22 extirpated populations were documented. This is based on defining populations as groups of individual plants clearly separated by at least 0.1 mi. (Nevada Natural Heritage Program, 2001). As early as 1996, 23.1% of the populations on private land and 1.8% of populations on public lands in Nevada had been extirpated (Mistretta, Pant, Ross, & Porter, 1996). The Clark County Habitat Conservation Plan (HCP) estimated that 12% of the LVBP population was extirpated by urban development as of 1996, with a projected loss of 16% (RECON, 2000). In contrast, the NNHP found that only 0.3% of the populations on NAFB had been negatively impacted by anthropogenic activities (Mistretta, Pant, Ross, & Porter, 1996).

## RECENT AND HISTORICAL OBSERVATIONS

Rare plant surveys conducted on NAFB and NTTR found two major LVBP populations and one minor LVBP population on NAFB. However, no populations of LVBP have been found on the study area as of 2016, and no map of observations is needed. The NNRP continues to include this species in rare plant and vegetation surveys on the NTTR

## THREE-CORNER MILKVETCH (*ASTRAGALUS GEYERI* VAR. *TRIQUETRUS*)

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### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** S
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G4T2T3
- **Nevada Natural Heritage Program State Rank:** S2S3
- **Other Agencies:** None

### DESCRIPTION

Three-corner milkvetch is endemic to the southeastern Mojave Desert and has been observed in Clark and Lincoln counties (RECON, 2000). Plants have been observed about 10 miles east of the eastern boundary of Alternative 3C. The plants appear to occur in low numbers (10 to 40 individuals per location) and may not appear every year. Appearances of the plant appear to be average to above average in rainfall years (RECON, 2000) because the species germinates only in wetter years (Program, Rare Plant Fact Sheet, 2001). The plant is a short, spindly, but upright annual forb with pinnately divided leaves. The small pea-flowers are white, but the defining character is the 3-cornered seedpod.



Three-Cornered Milkvetch (Photo by Teri Knight, Nevada Natural Heritage Program)



Three-corner milkvetch is an uncommon component of desert vegetation in the Mojave Desert Scrub community on wind-blown sandy soils originating from sedimentary formations, especially those adjacent to Lake Mead and its tributary valleys (Three-corner Milkvetch (*Astragalus geyeri* var. *triquetrus*), n.d.; RECON, 2000). The species prefers open, deep sandy soil or dunes, generally stabilized by vegetation and/or a gravel veneer and can be found in Nevada at elevations of 1,100-2,400 feet MSL (Program, Rare Plant Fact Sheet, 2001).

The species is fully protected in the state of Nevada under the state Critically Endangered Species List (Boone, 2016). Major threats to the species include off-road vehicles and other recreational use, residential expansion, sand and gravel mining, utility developments and corridors (Nevada Natural Heritage Program, 2001). Surveys for the plant have been extensive but incomplete with the most recent entry from 1997 (Nevada Natural Heritage Program, 2001). The species can be found in Lincoln and Clark Counties (Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

To date, no observations of three-corner milkvetch have been made within the study area, and no map of observations is needed. The NTTR has conducted extensive vegetation surveys in the potential habitat of this species, but none have been identified on the study area.

## GILMAN'S MILKVETCH (*ASTRAGALUS GILMANII*)

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### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** S
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G2
- **Nevada Natural Heritage Program State Rank:** S1
- **Other Agencies:** None

## DESCRIPTION

Gilman's milkvetch is a small, low-growing winter annual that is 3-6 in. tall (Barneby R. C., 1989). It forms clumps of hairy stalks that are incurved-ascending and no more than 1.26 in. long. The leaves are about 3 in. long and consist of 7 to 17 leaflets that are linear-elliptic and obtuse with a length of 0.41 in.. The edges of the leaflets are purple and the tips may be notched. The inflorescence bears 4 to 9 pinkish-purple re-curved flowers. The fruit reaches a length of about 1.00 in. and a width of 0.63 in. The fruit is pod-shaped with the appearance of an inflated bladder and a papery texture; it is covered with small curved hairs. Inside the fruit, there is a single chamber with multiple seeds. It flowers from May to June (The Nature Conservancy, 1997; Wojciechowski M. F., 2012).



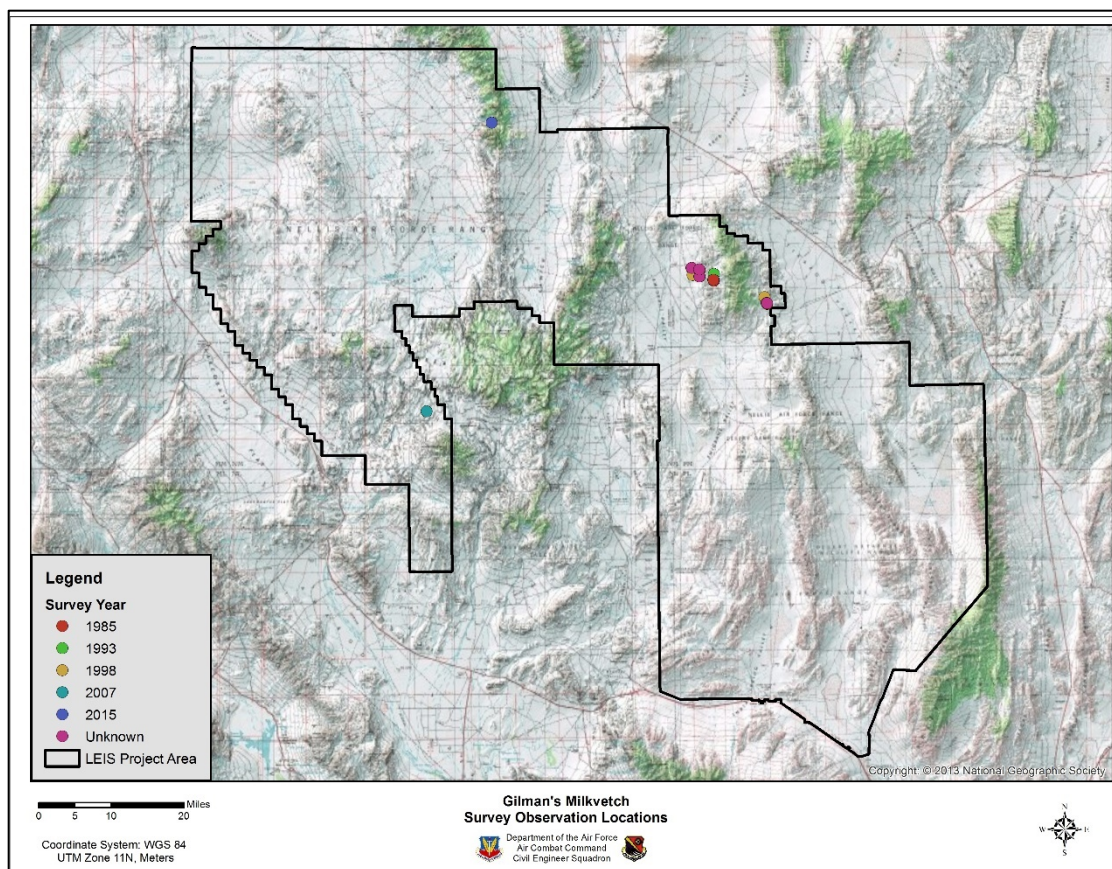
Gilman's Milkvetch

Information regarding Gilman's milkvetch habitat in Nevada is limited, mostly due to an absence of comprehensive data and extensive surveys on this plant. However, it has been found in gravelly areas among Pinyon-Juniper Woodlands as well as light-colored volcanic slopes that are composed of tuff. It grows at elevations ranging from 5,300 to 6,200 feet (The Nature Conservancy, 1997; Nevada Natural Heritage Program, 2001; Wojciechowski M. F., 2012).

The historical range of Gilman's milkvetch is Lincoln County, Nevada, as well as California. Its Nevada range dimension is estimated at 10.4 miles (Nevada Natural Heritage Program, 2001). The total number of sites occupied by this plant is unknown, but less than five locations have been confirmed. Surveys performed in 1985 indicated four sites in the Groom Range (The Nature Conservancy, 1997). Later surveys have not led to the discovery of other populations, but the Belted Range, as well as areas of the Groom Range, are considered potential locations (The Nature Conservancy, 1997). The NNHP cites three occurrences with a total estimated population of 52 individuals (Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

Gilman's milkvetch has been observed at three general areas within the study area (Figure 4). Populations have been documented at a location north of the Timber Mountains between Thirsty Canyon and Parachute Canyon. Additional observations were made along Cedar Pass in the Kawich Range and across the Groom Range in multiple locations. The NNHP has three additional records in the Groom Range from as early as 1985.



**Figure 4. Locations where Gilman's milkvetch has been observed in or around the study area.**



## INYO MILKVETCH (*ASTRAGALUS INYOENSIS*)

### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** None
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G3
- **Nevada Natural Heritage Program State Rank:** S1
- **Other Agencies:** None



Inyo milkvetch in bloom (Photo by Jim Morefield, Nevada Natural Heritage Program)

### DESCRIPTION

Inyo milkvetch is a low, mat-forming perennial herb which grows on sandy and gravelly clay soils, mostly derived from carbonate parent rock, in open pinyon-juniper woodlands, often associated with sagebrush (Contu, 2012). It occurs between 4,900 and 7,500 ft. elevation MSL (Contu, 2012). This milkvetch has been identified in only one location in Nevada, which is on the Groom Range on the study area within Lincoln County (Nevada Natural Heritage Program, 2016) but has also been observed in the White and Inyo Mountains of California (NatureServe Explorer, 2016). The species is considered Critically Imperiled in the state of Nevada due to a limited distribution range, and the onset of any threatening process could immediately place this species into a threatened category (Contu, 2012).

### RECENT AND HISTORICAL OBSERVATIONS

The NNHP lists the only recorded observation of this species in 1985. The plant was located on the western slopes of the Groom Range near Cattle Spring at approximately 6,400 ft. MSL (Figure 5).

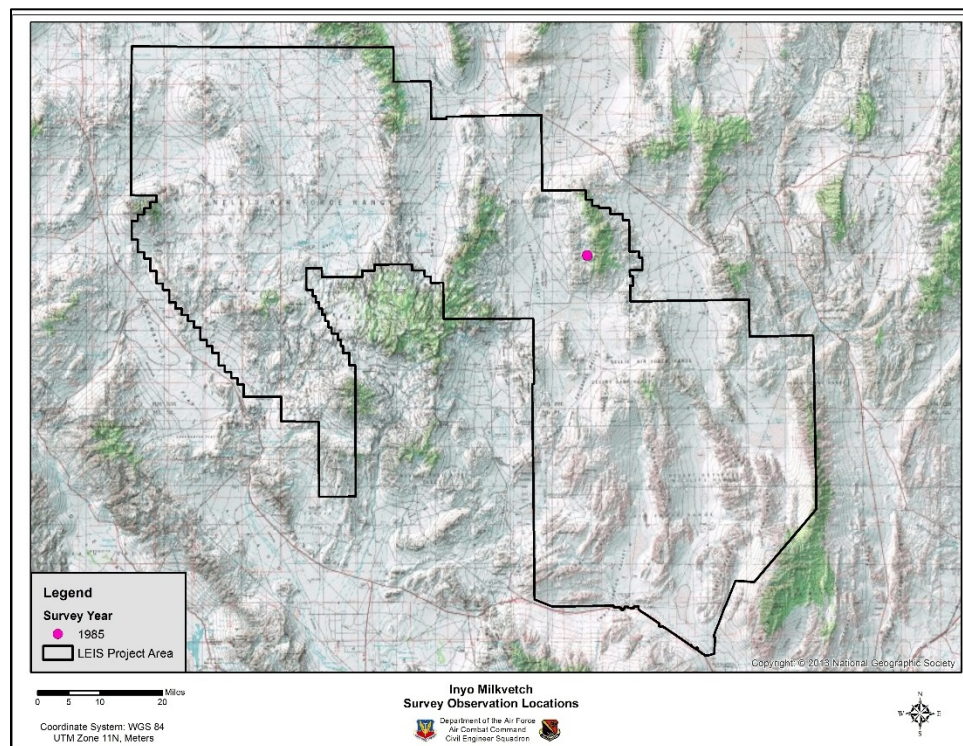


Figure 5. Locations where Inyo milkvetch has been observed in or around the study area.

## PINTWATER RABBITBRUSH (*CHRYSOETHAMNUS EREMOBIUS*)

### Regulatory Status:

- **United States Fish and Wildlife Service (USFWS):** None
- **U.S. Forest Service:** None
- **Bureau of Land Management (BLM):** None
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program (NNHP) Global Rank:** G1
- **Nevada Natural Heritage Program (NNHP) State Rank:** S1
- **Other Agencies:** None

### DESCRIPTION

Pintwater rabbitbrush is a low-growing, shrubby bush reaching approximately 15 in. tall and dying back to approximately 7 to 8 in. during winter dormancy. Stems are leafy with no hairs or pubescence. Leaves are shaped like a spatula and 2 to 3 in. long and about 0.5 in. wide. The flowers are congested with individual heads being 0.4 in. wide and comprised of 5 to 6 yellow disc flowers. Clusters of yellow flower heads bloom in August and September (NatureServe, 2016). Bracts subtending the flower are 0.7 to 1.0 in. long with a green spot on the tip (Knight T. F., 1997). The total population in Nevada is estimated at over 131 plants over a range dimension of 26.1 miles in Clark and Lincoln Counties (Nevada Natural Heritage Program, 2001). The species is endemic to three locations in Clark and Lincoln Counties within the Sheep and Pintwater Ranges in Nevada, with fewer than 100 plants existing at each location (NatureServe Explorer, 2016). Recorded elevations lie between 4,850 – 6,400 ft. MSL (Nevada Natural Heritage Program, 2001).

Pintwater rabbitbrush is often found within crevices or rubble of north-facing carbonate cliffs in and just below Pinyon-Juniper-Artemisia vegetation community at elevations from 4,600-7,000 ft. MSL (Anderson L. C., 1983; Knight T. F., 1997). The plant is usually found in association with littleleaf mountain mahogany (*Cercocarpus intricatus*), prickleleaf (*Hecastocleis shockleyi*), Torrey's jointfir (*Ephedra torreyana*), and rubber rabbitbrush (*Ericameria nauseosa*) (Anderson L. C., 1983; Nevada Natural Heritage Program, 2001). It also occurs among skunk-bush sumac (*Rhus trilobata*), and rock goldenrod (*Petradoria sp.*) (Nevada Natural Heritage Program, 2001). Other plants include: narrowleaf laphamia (*Perityle intricata*), petiolate beardtongue (*Pentstemon petiolatus*), and Mormon tea (*Ephedra viridis*) (Knight T. F., 1997).



Pintwater Rabbitbrush



Pintwater rabbitbrush by Teri Knight (Knight T. F., 1997).



## RECENT AND HISTORICAL OBSERVATIONS

Pintwater rabbitbrush was observed in 1979 on the South Range Study Area in the Pintwater Range, due east of Indian Springs Valley (Figure 6). The population exists near Sand Spring between 4,400 and 5,800 ft. MSL. This population was confirmed in 1993. Additional observations were made by the NNHP just outside of the eastern boundary of Alternative 3C within the Sheep Range in 1979. One of the populations was located southwest of Lamb's Spring and the other population was located in Grapevine Canyon at Grapevine Spring. No recent observations of the species have been made as of 2016.

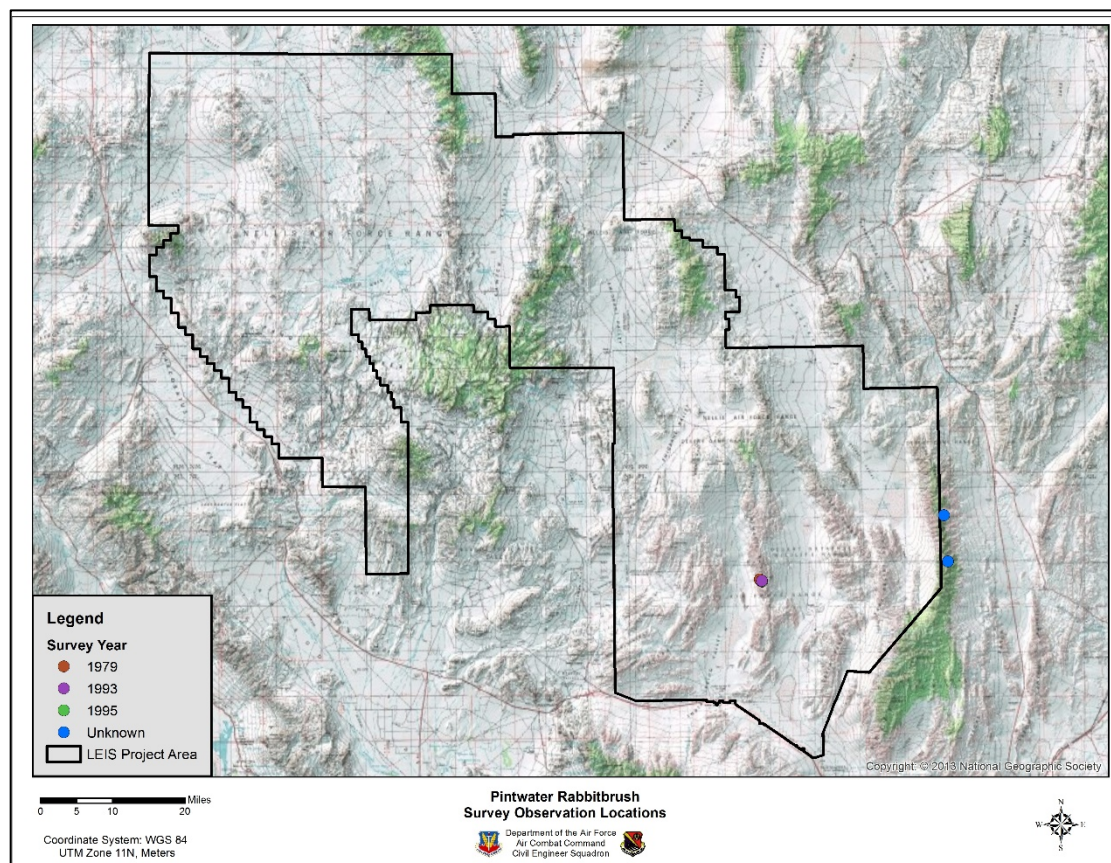


Figure 6. Location of Pintwater rabbitbrush populations on the study area.

## CLOKEY PINCUSHION (*ESCOBARIA VIVIPARA* VAR. *ROSEA*)

### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** None
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G5T3
- **Nevada Natural Heritage Program State Rank:** S3
- **Other Agencies:** None

## DESCRIPTION

Clokey pincushion is a small, perennial cactus that can be seen blooming from May to June (Calflora, 2016). The general species is the most widespread, abundant, and variable member of the genus (LLifle, 2016). This cactus usually has one to several stems that are between 3-6 in. in diameter and 3-7 in. tall. The plant typically has 10 to 12 spines per areole centrally and 12 to 18 radially. All other varieties of this species have 4-7 central spines. The flowers are 1-2 in. in diameter and pale to dark rose pink or magenta. The lobes of the stigma extend into the flower and are usually white or pale magenta. A well-defined mid-stripe on the flower petals is lacking.

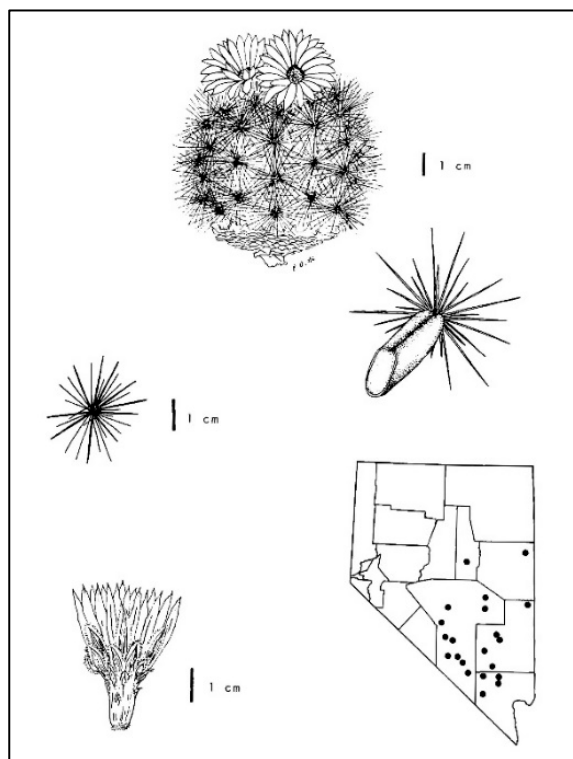
This species variety is found on limestone slopes and gravelly areas in woodland or desert mountains at 5,000 – 9,000 ft. MSL (Benson, 1969). It occurs in dry valleys, plains, foothills and on open, gentle to steep rocky slopes and flats, with sagebrush or conifer species and grasslands. Different varieties occur in grasslands, woodlands, montane forests, or deserts (Benson, 1982). The species can be found in two major vegetation communities--creosote bush scrub and pinon-juniper woodland (Calflora, 2016).



Clokey Pincushion

## RECENT AND HISTORICAL OBSERVATIONS

The Clokey pincushion has been frequently observed within the study area. Several historic observations were made in the Groom Range and in the Nevada National Security Site (NNSS) around Yucca Flat, Pahute Mesa, and Timber Mountain. Most of the observations on the study area were made between 2008 to 2016 in the Spotted Range, Desert Range, and Sheep Range. One observation was made on the southern end of the Kawich Range (Figure 7).



Drawing of Clokey Pincushion (NNHP. Photographer Jeanne R. Janish) (Mozingo & Williams, 1980)



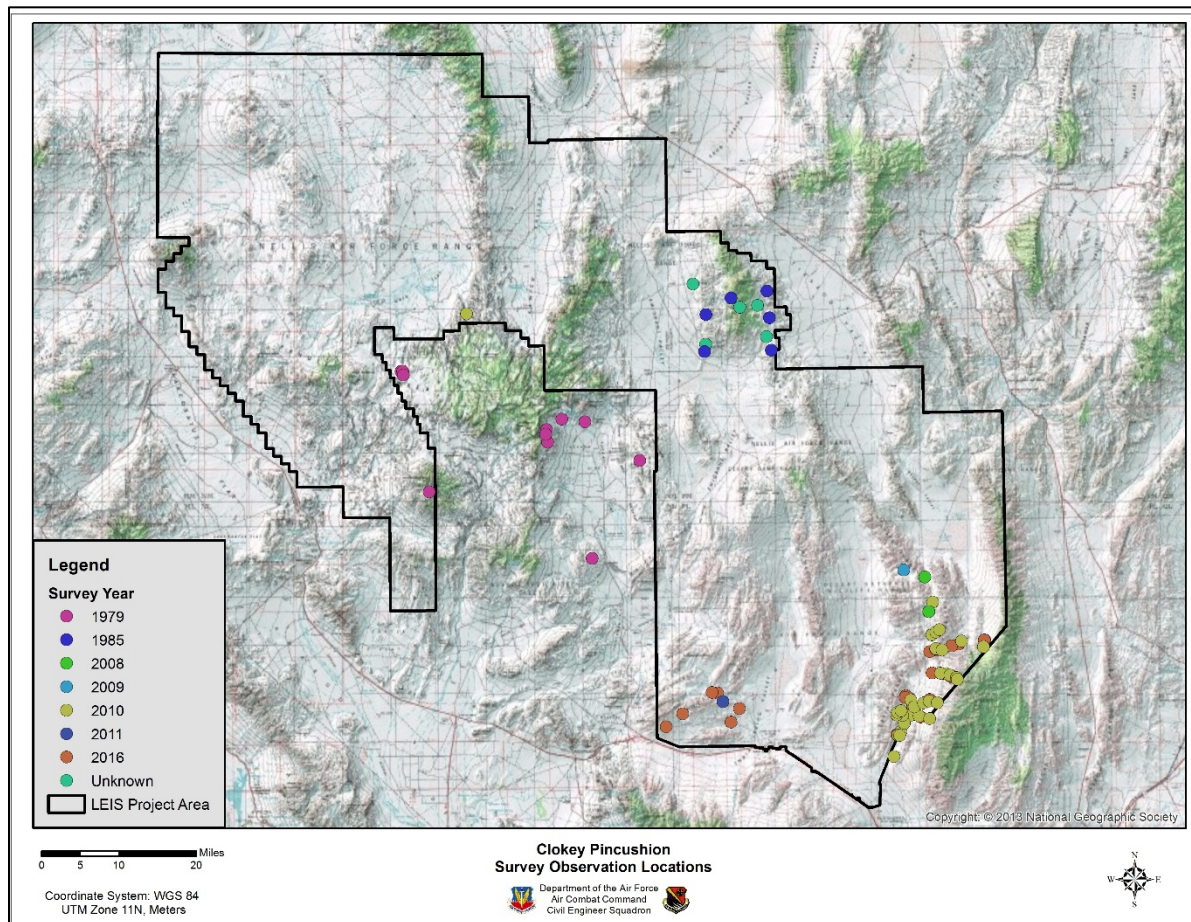


Figure 7. Locations where Clokey Pincushion has been observed in and around the study area.

## LAS VEGAS CATSEYE (*CRYPTANTHA INSOLITA*)

### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** None
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** GHQ
- **Nevada Natural Heritage Program State Rank:** SH
- **Other Agencies:** None

### DESCRIPTION

The Las Vegas catseye is a perennial herb of the Boraginaceae plant family that is endemic to the state of Nevada (Nevada Natural Heritage Program, 2001). The plant has 1-2 stems, 11-16 in. tall, with spatula-shaped leaves having appressed, spreading bristles. The plant may bloom from April to June and must have mature fruit for identification (NatureServe, 2016). The species exists on light-colored, alkaline clay



flats and low hills in the creosote bush community from 1,000 – 2,000 ft. MSL (Nevada Natural Heritage Program, 2001).

### RECENT AND HISTORICAL OBSERVATIONS

To date, no observations of Las Vegas catseye have been made within the study area, and no map of observations is needed. The species is known from two collections, one from 1905, the other 1942. The collections were made on bajadas north of Las Vegas, an area currently undergoing rapid development. Since 1942, surveys have been conducted to search for this species without success and the species may now be extinct (NatureServe, 2016).

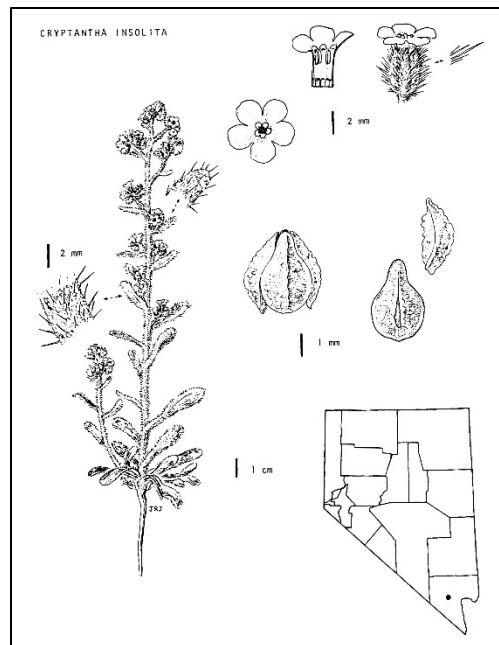


Illustration of Las Vegas Catseye (Mozingo & Williams, 1980).

### ARMORED HEDGEHOG CACTUS (*ECHINOCEREUS ENGELMANNII* VAR. *ARMATUS*)

#### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** None
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G5T2
- **Nevada Natural Heritage Program State Rank:** S1
- **Other Agencies:** None

#### DESCRIPTION

Armored hedgehog cactus is a succulent native perennial cactus with purple to magenta flowers and four well-armed central spines. A single specimen may consist of up to 60 spiny cylindrical stems in a clump up to 3 ft. in diameter. The *armatus* variety is the most formidably spiny variety of the species, with a central spine up to 5 in. long (LLifle, 2016). The plant's stems are some direct or indirect light green and cylindrical but may taper distally. The stems are usually 6-8 in. tall, 2 in. in diameter, and branch freely from the base (LLifle, 2016). This species can be found on gravel, sand, and rocky hills in creosote bush scrub, pinyon juniper woodlands, and Joshua tree woodlands from 3,000 to 4,000 ft. MSL (LLifle, 2016). It is native to the southwest desert, from California to Utah and Arizona, and into Mexico.



Armored Hedgehog Cactus (Photo by Cactus Art)

### RECENT AND HISTORICAL OBSERVATIONS

The observations of this species variety were recorded in the NNHP database as being observed prior to 1976. One population was observed in the study area in Thirsty Canyon near Ribbon Cliff. A second

sighting was on the NNSS in the upper reaches of East Thirsty Canyon south of Trail Ridge (Nevada Natural Heritage Program, 2016) (Figure 8).

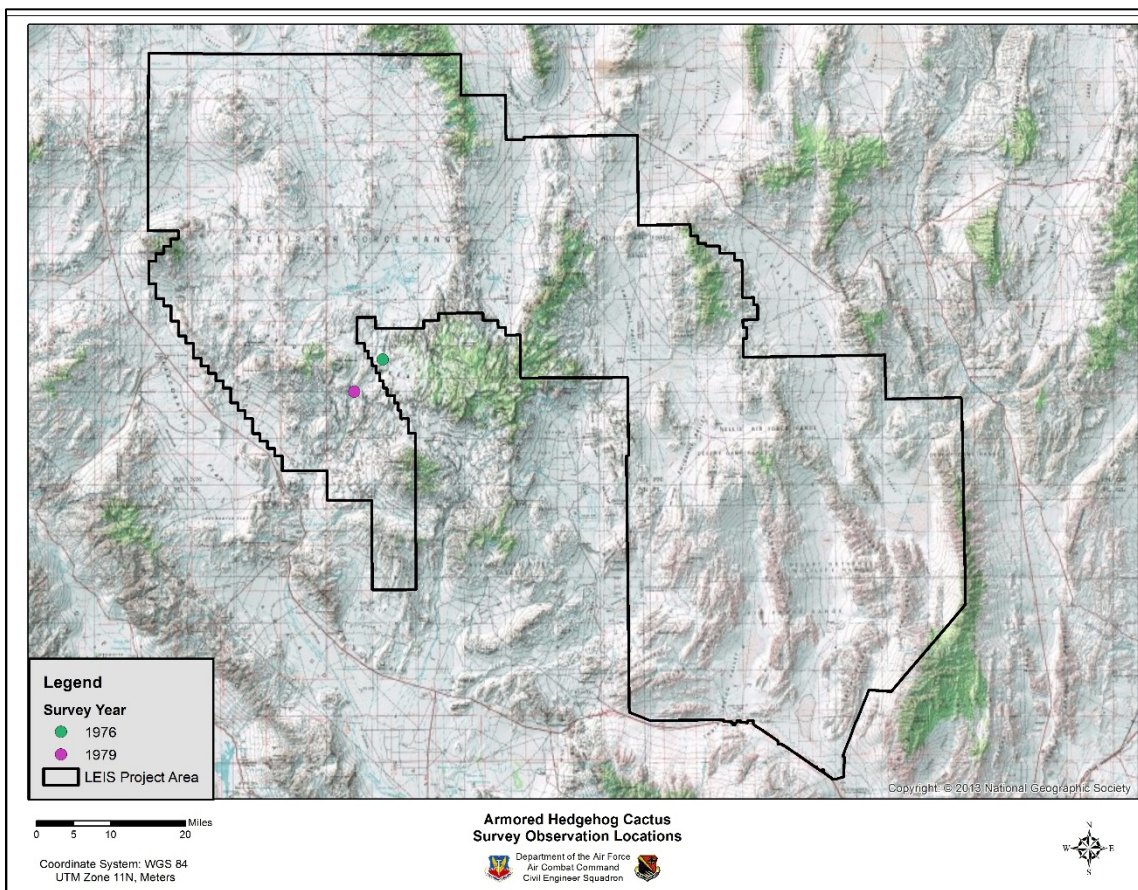


Figure 8. Map showing the locations where Armored Hedgehog Cactus has been observed on or near the study area.

## LAS VEGAS BUCKWHEAT (*ERIOGONUM CORYMBOSUM* VAR. *NILESII*)

### Regulatory Status

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** S
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G5T2
- **Nevada Natural Heritage Program State Rank:** S1S2
- **Other Agencies:** None

### DESCRIPTION

Las Vegas buckwheat (LVB) is a member of the buckwheat family (Polygonaceae). It is native to Clark County and Lincoln County in Nevada (Mrowka, 2008). A GIS study from 2007 indicates that most (63%) of the species' historical occurrence has been extirpated and that only 4.8% of the current populations are under protective management (Morefield, 2007). Because of its



Las Vegas buckwheat flowering



endemic nature, the State of Nevada has recommended full protection for this species, and it is currently listed as Sensitive by the NNHP (Nevada Natural Heritage Program, 2001). The Las Vegas buckwheat is a woody perennial shrub up to 4 ft. high in a dome shaped canopy. The subspecies is distinguished from closely related taxa by leaves that are densely hairy on one or both surfaces, at least twice as long as wide with dense hairs spread along the stem. The branches are woolly haired and swollen at branch intersections. The inflorescences are 1 to 4 in. long with the flowers arranged in umbrella-like clusters at the end of branches. The inflorescence branches are rigid and sometimes spinescent. The numerous flowers are small and yellow with small bract like leaves at the base of each flower. This plant is very conspicuous when flowering in late September and early October (Mrowka, 2008).



Typical Las Vegas Buckwheat plant

The habitat for the LVB is similar to habitat known for the Las Vegas bearpoppy and typically consists of soils with high gypsum contents (Mrowka, 2008). Other features associated with LVB include unusual substrates such as clay beds and high-boron shale, and deeper soils. Typically, gypsum soil outcroppings occupied by LVB are sparsely vegetated with bare exposed soils covered with a cryptogammic soil crust. Other habitat includes outcrops in washes and drainages or in areas of generally low relief surrounded by *Ambrosia dumosa*, *Stanleya pinnata*, *Atriplex canescens*, *Ephedra torreyana*, *Larrea tridentata*, *Acacia greggii*, or *Psoralea fremontii*. Elevation recorded for this species is from 1,900-3,839 ft. MSL (Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

Because the taxonomy of this species was only recently resolved, little information regarding the historical range distribution is available within the literature. However, some historical data does exist, dating back to 1970, and it indicates that the LVB historically occurs primarily in Clark County (Morefield, 2007). Based on herbarium records, Las Vegas buckwheat is historically known from three locations in Clark County--Las Vegas Valley, Gold Butte, and Muddy Mountains (U.S. Fish and Wildlife Service, 2000). LVB has also been identified in the Coyote Springs area, north of Las Vegas (Morefield, 2007). As of 2007, there are 22 populations throughout these four areas and 8 of these populations faced extirpation (Morefield, 2007). As of 2008, populations from 15 different sites are known, each having varying degrees of protection and viability (Mrowka, 2008). Two LVB populations reside within NAFB--one covers 233 acres and the other covers 137 acres (U.S. Fish and Wildlife Service, 2007). It should be noted that Area III of NAFB contains the largest and most intact remaining populations of LVB. Of the two populations, the larger is considered potentially conserved as of 2007, though it is vulnerable to public recreation and equestrian activities (U.S. Fish and Wildlife Service, 2007). The smaller population, however, lies in an area that has been or will be developed in the near future (U.S. Fish and Wildlife Service, 2007). To date, no observations of Las Vegas Buckwheat have been made on NTTR within the study area, and no map of observations is needed.

## PINYON MESA BUCKWHEAT (*ERIOGONUM MENSICOLA*)

### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** None
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G2G3
- **Nevada Natural Heritage Program State Rank:** S1
- **Other Agencies:** None

### DESCRIPTION

Pinyon Mesa buckwheat is a member of the buckwheat family (Polygonaceae). The plant is a perennial herb found between 6,000 – 9,000 ft. MSL (Calflora, 2016). This buckwheat is a low growing perennial with a crown of oval shaped, densely hairy leaves close to the ground with weakly branched flowering stems. Before flowering, the few involucres are large and appear to be red buttons in appearance (The Jepson Herbarium, 2016). The plants are usually 6-14 in. tall with solitary basal leaves. The flowering stems are usually erect and slender. The inflorescence is cymose with white to whitish brown flowers (Holmgren, Holmgren, & Reveal, 2012) (Figure 9).



Pinyon Mesa Buckwheat (Photo by Steve Matson)

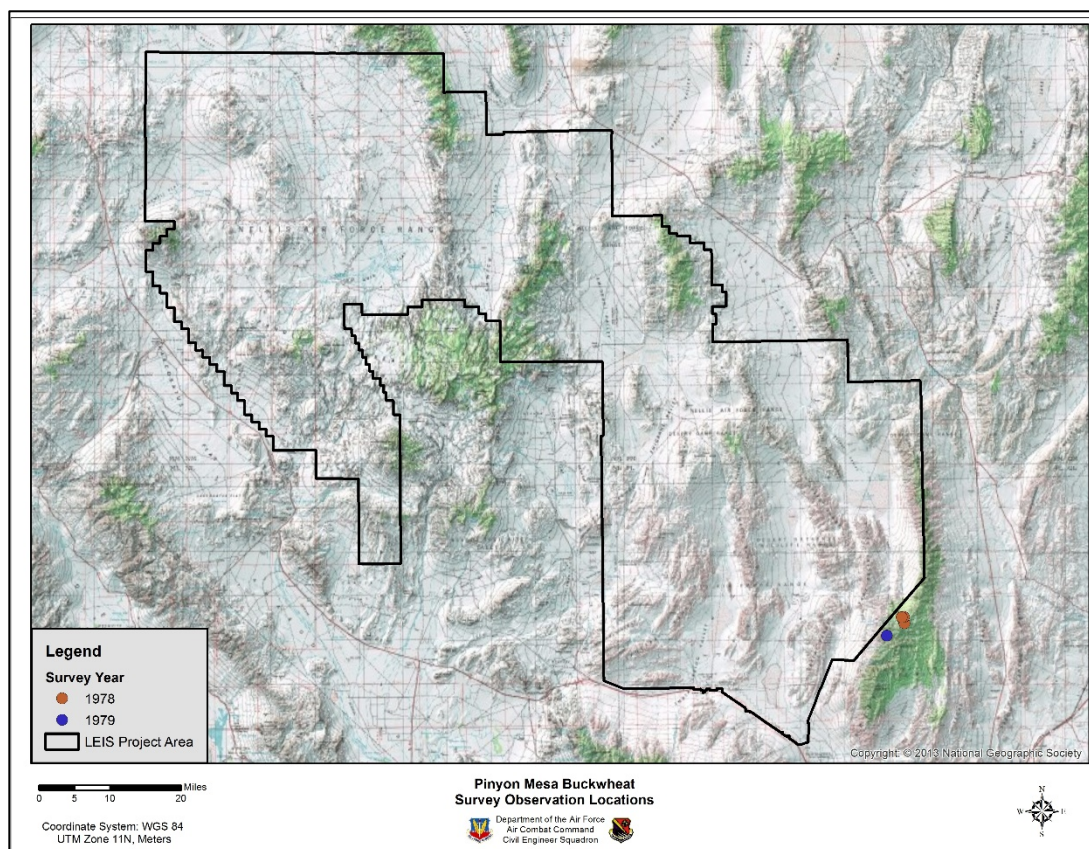


Figure 9. Locations where Pinyon Mesa buckwheat has been observed in and around the study area.



## RECENT AND HISTORICAL OBSERVATIONS

The species has been observed in Clark County on rocky to gravelly flats and slopes within the vegetative communities of sagebrush, mountain mahogany, pinyon-juniper, and montane conifer woodlands (NatureServe, 2016). To date, no observations of Pinyon Mesa buckwheat have been made within the study area. However, the NNHP does show records of the species southeast of the study area boundary line in the Sheep Range near Bootleg, Yellowjacket, and Basin Springs.

### KINGSTON MOUNTAINS BEDSTRAW (*GALIUM HILENDIAE* SSP. *KINGSTONENSE*)

#### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** None
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G4T2
- **Nevada Natural Heritage Program State Rank:** S1
- **Other Agencies:** None

#### DESCRIPTION

Kingston Mountains bedstraw is a perennial herb native to Nevada and California found within the pinyon-juniper woodland community (Calflora, 2016). The plant is generally matted with densely hairy leaves with a pink to cream/white flower (The Jepson Herbarium, 2016). It has a Global Status of T2, or Imperiled. This species prefers dry, rocky to gravelly soils derived from rhyolitic tuff on steep northeast to south aspects, mostly under trees and shrubs in the pinyon-juniper-Gambel oak plant community from 5,200 – 5,640 ft. MSL. Kingston Mountains bedstraw is rare in Nye County, Nevada, and is largely threatened by mining activities (NatureServe, 2016).

#### RECENT AND HISTORICAL OBSERVATIONS

The Kingston Mountains bedstraw has been observed at three locations in the South Range Study Area, with three additional locations along the study



Kingston Mountain Bedstraw (Photo by Duncan S. Bell)

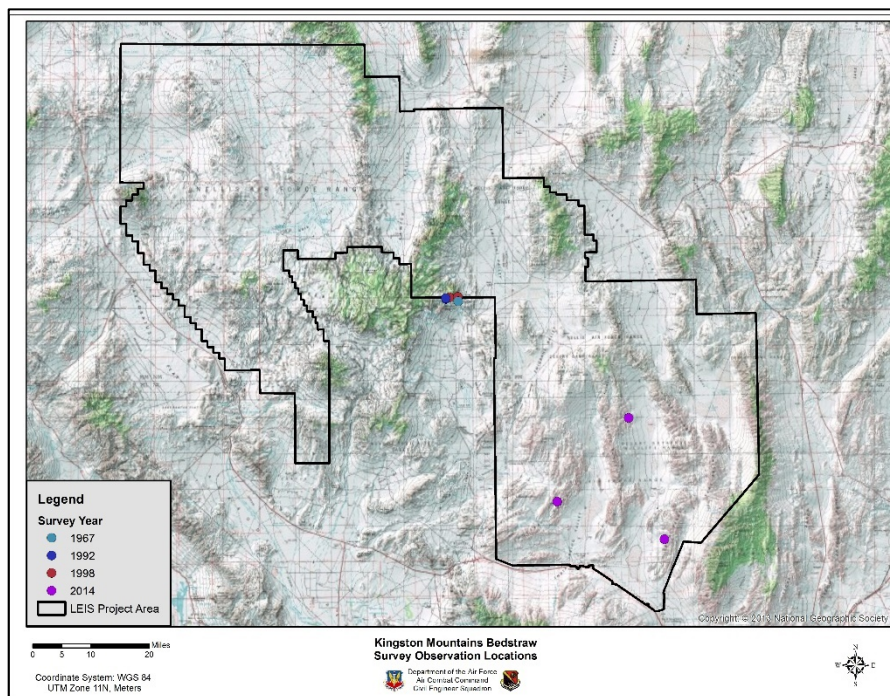


Figure 10. Locations where Kingston Mountains Bedstraw have been observed in and around the study area.

area border, both on and due north of the NNSS. Two additional historical observations within the NNSS were made near Oak Spring Butte, an area that borders the study area (Figure 10).

## ASH MEADOWS GUMPLANT (*GRINDELIA FRAXINOPRATENSIS*)

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### Regulatory Status:

- **United States Fish and Wildlife Service (USFWS):** None
- **U.S. Forest Service:** None
- **Bureau of Land Management (BLM):** S
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program (NNHP) Global Rank:** G2
- **Nevada Natural Heritage Program (NNHP) State Rank:** S1
- **Other Agencies:** None



Ash Meadows Gumplant (Photo by James M. Andre)

### DESCRIPTION

Ash Meadows gumplant is a perennial herb in the sunflower (Asteraceae) family (Moore, 2016). The gumplant genus is named due to the very sticky flower heads (U.S. Fish and Wildlife Service, 2007). The plant is approximately 1.6 to 3.9 ft. in height (Desert Renewable Energy Conservation Plan, 2012). The leaves are oblanceolate to oblong, from 0.4 – 3.0 in. long, and are entire to serrate (Moore, 2016). The yellow ray flower has 8 – 12 petals that are approximately 0.16 – 0.24 in. long (Moore, 2016). The Ash Meadows gumplant flowers in late summer from July to October (Moore, 2016). The seeds are primarily wind dispersed, though seeds that land close to the parent plant can be further transported by heavy rains during the rainy season or flash flood events (Desert Renewable Energy Conservation Plan, 2012).

Ash Meadows gumplant is most commonly found in open, flat, strongly alkaline clay soils in meadows along stream channels and associated shallow pools, and drainages near seeps and springs (Desert Renewable Energy Conservation Plan, 2012). In Nevada, it is considered wetland-dependent or aquatic (Nevada Natural Heritage Program, 2001). It can be found in the creosote-bursage and shadscale zones in ash-mesquite woodlands, shadscale shrub, or saltgrass meadows (Nevada Natural Heritage Program, 2001). Ash Meadows gumplant is found at elevations between 2,070 – 2,320 ft. MSL and generally prefers aspects with open sun exposure (Desert Renewable Energy Conservation Plan, 2012). This species is most abundant on silty clay loam soils with a pH slightly over 7.0 (Soil Ecology and Research Group, 2004).

The Ash Meadows gumplant is listed as threatened because water redirection and groundwater pumping has destroyed much of the mesic meadow habitat required, causing historically large populations to be fractured (Desert Renewable Energy Conservation Plan, 2012; Moore, 2016).

### RECENT AND HISTORICAL OBSERVATIONS

The Ash Meadows gumplant is endemic to Ash Meadows in Nye County, NV, though it has been observed in California near the Amargosa River, directly across the California-Nevada state line from the Ash Meadows National Wildlife Refuge. The species is distributed into three main populations with several smaller surrounding populations (U.S. Fish and Wildlife Service, 2007). However, based on anecdotal observations, the distribution has likely increased since the Ash Meadows gumplant was listed in 1985 due to habitat restoration activities (U.S. Fish and Wildlife Service, 2007). Surveys conducted in the early 2000's estimate the population of Ash Meadows gumplant within Nevada to be between 13,000 and 81,000 individuals (U.S. Fish and Wildlife Service, 2007; Nevada Natural Heritage Program, 2001). To date, no

observations of Ash Meadows gumplant have been made within the study area, and no map of observations is needed.

## ROCK PURPUSIA (*IVESIA ARIZONICA* VAR. *SAXOSA*)

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### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** S
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G3T1
- **Nevada Natural Heritage Program State Rank:** S1
- **Other Agencies:** None



Rock purpusia in bloom (Photo by Gregory Gust)

### DESCRIPTION

Rock purpusia is one of two varieties of a perennial herb in the rose (Rosaceae) family. Discovered in 1899 in the Sheep Range in Nevada, this plant was originally classified as *Purpusia saxosa* (Brandege, 1899). This classification continued for some time, and Beatley did not differentiate between the two varieties when she encountered them on the NNSS in 1976 (Beatley, 1976). It has also been referred to as the *Potentilla ostenhoutii* var. *saxosa* (Nevada Natural Heritage Program, 2001). It was first described as a variety of *Ivesia arizonica* in 1989 (Ertter B. , 1989). This variety differs from the other one only in petal color and hypanthium. *I. arizonica* var. *saxosa* produces white petals (Ertter B. , 2002) and a “deeper, turbinate hypanthium” (Nevada Natural Heritage Program, 2001) . It is endemic to Nevada, especially in Lincoln and Nye Counties over a 25.2 mile range dimension (Nevada Natural Heritage Program, 2001).

Rock purpusia grows to a height of 2-4 in. It develops green, hanging clumps of 4-6 in. long flat leaves. The sheathing bases are mostly glabrous. Each leaf is divided into 2 to 4 opposite leaflet pairs and each leaflet is round and deeply lobed or toothed. The inflorescence is open and approximately the length of the basal leaves. The pedicels are 0.2 to 1.2 in. long and look approximately “S”-shaped in fruit. Flowers are 0.2 to 0.4 in. wide and white. The petals are 0.08 to 0.12 in. long and may be oblanceolate to elliptic in shape with five stamens and two to ten pistils. The receptacle is stalked in the pistil-bearing portion, a trait that is unique to this genus. The fruit is mostly ridged and pale with a length 0.06 to 0.08 in. It blooms from May to August (Ertter B. , 2002).

Rock purpusia grows in crevices of cliffs and boulders on volcanic and possibly carbonate rocks in the upper mixed-shrub, sagebrush, and pinyon-juniper vegetation communities (Nevada Natural Heritage Program, 2001). The species can also be found on bare rock, talus, and scree in conifer woodlands and chaparral shrublands from 4,900 – 6,890 ft. MSL (NatureServe, 2016). Variety *saxosa* is known from scattered locations in the North and South Pahroc ranges in Lincoln County and on Pahute Mesa in Nye County, Nevada. The plant has been identified in the Sheep Range of Clark County, Nevada, as well (Flora of North America, 2016).

### RECENT AND HISTORICAL OBSERVATIONS

To date, no observations of rock purpusia have been made within the study area. However, four observations have been made on the NNSS (Figure 11).



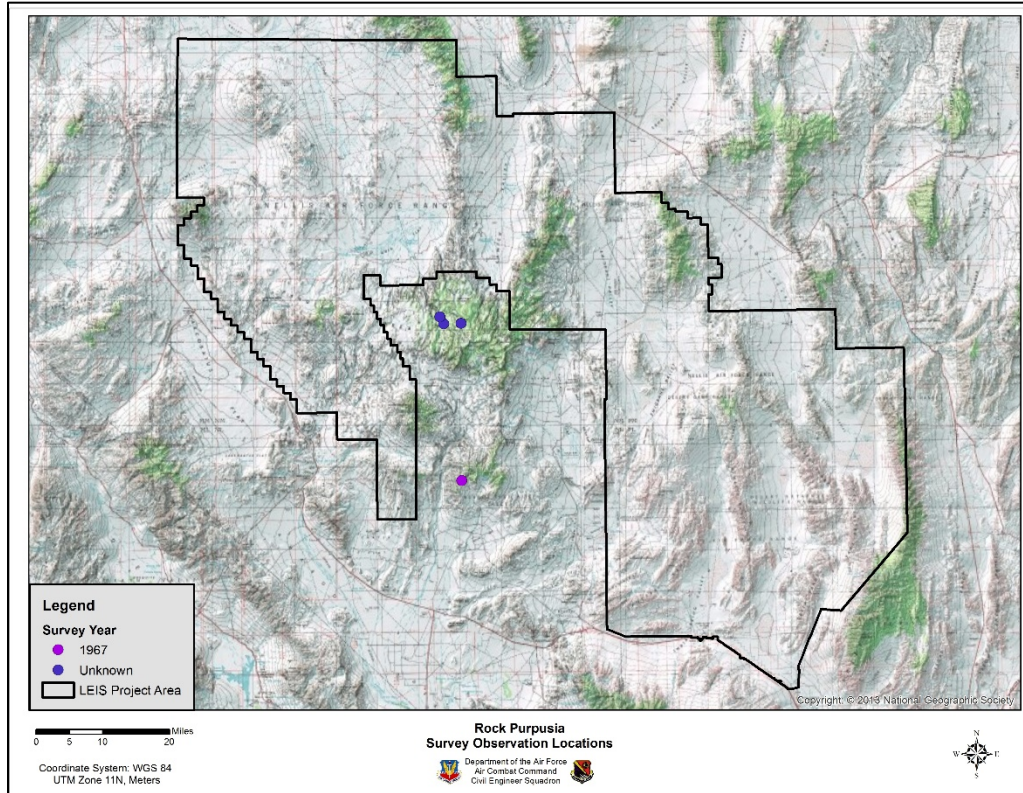


Figure 11. Locations where rock purpusia have been observed in and around the study area.

## ASH MEADOWS BLAZINGSTAR (*MENTZELIA LEUCOPHYLLA*)

### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** S
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G1Q
- **Nevada Natural Heritage Program State Rank:** S1
- **Other Agencies:** None

### DESCRIPTION

The Ash Meadows blazing star is the rarest of the plant species endemic to Ash Meadows and as such, little is known about its life history and habitat requirements (Sada, 1990). The plant is a biennial herb that can grow up to 1.6 ft. tall (Ackerman T. L., 2001). Several white stems, commonly three or fewer, emerge from a thick, woody taproot (Bureau of Land Management, 2013). The leaves are covered in short white hairs, giving the plant a velvety appearance (Ackerman T. L., 2001). The small yellow flowers are comprised of five petals, each approximately 0.4 in. long (Bureau of Land Management, 2013).

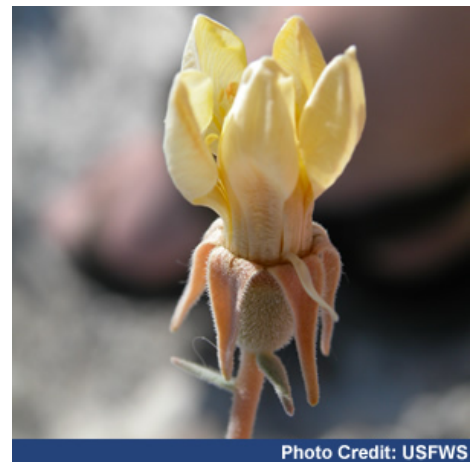


Photo Credit: USFWS

Ash Meadows Blazingstar



The flowers are arranged in open, broad inflorescences (Sada, 1990). Flowering begins in June and continues into September, with flowers only opening for brief periods in the late afternoon (Ackerman T. L., 2001; Sada, 1990). The Ash Meadows blazing star produces an average of six mature seeds per fruit that are primarily wind dispersed, though can be dispersed by water during rain events (Bureau of Land Management, 2013).

The Ash Meadows blazing star is endemic to Ash Meadows and is not found outside of Nevada (Bureau of Land Management, 2013). Within its known habitat range, eight populations exist approximately 0.1 mi. apart from one another (Ackerman T. L., 2001). It is estimated that between 358 – 1,513 individuals exist within Ash Meadows Wildlife Refuge (Bureau of Land Management, 2013; Ackerman T. L., 2001). The critical habitat for the Ash Meadows blazing star is approximately 1,240 acres within Nye County, Nevada, near Bradford Springs and Rogers Spring (Sada, 1990).



Ash Meadows Blazing Star (Photo by Stan Sheb)

The Ash Meadows blazing star has a narrow elevation range and is only found between 2,200-2,350 ft. MSL (Ackerman T. L., 2001). It occurs in sandy to gravelly alkali soils in drainages and low bluffs and swales (Ackerman T. L., 2001; Bureau of Land Management, 2013; Sada, 1990). The Ash Meadows blazing star is closely associated with shadscale (*Atriplex confertifolia*) and the Ash Meadows sunray (*Enceliopsis nudicaulis* var. *corrugata*), also endemic to Ash Meadows (Sada, 1990). The original plant description by James Reveal states that because the plant is always associated with dry soils, being uninfluenced by seeps and springs (Sada, 1990). Later studies show that while these soils are dry during summer months, in the winter, the water table rises to near surface level (Bureau of Land Management, 2013). The Ash Meadows blazing star seems to be dependent on these seasonally saturated soils (Bureau of Land Management, 2013).

## RECENT AND HISTORICAL OBSERVATIONS

To date, no observations of Ash Meadows blazing star have been made within the study area, and no map of observations is needed.

## WHITE MARGINED BEARDTONGUE (*PENSTEMON ALBOMARGINATUS*)

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### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** S
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G2
- **Nevada Natural Heritage Program State Rank:** S2
- **Other Agencies:** None

## DESCRIPTION

The white-margined beardtongue is a low growing, perennial herb in the Figwort (Scrophulariaceae) family. The entire plant is pallid and glabrous with many stems arising from a 12 - 48 in. long taproot (Arizona Game and Fish Department, 2003). Its leaves are green-gray with a very thin line of white around the margin, 0.4-1.2 in. wide (Arizona Game and Fish Department, 2003). The plant flowers from March to May, and the flowering does not always appear to be dependent on amount of rainfall (MacKay, 1998).



White-Margined Beardtongue (Photo by Frank Smith NNHP)

The white-margined beardtongue has been found in association with multiple species. These include: ragweed (*Ambrosia* spp.) and creosote bush (*Larrea tridentata*) (Beatley, 1976), and Joshua tree (*Yucca brevifolia*) (Arizona Game and Fish Department, 2003). This plant is dependent on deep sand for its long taproots (Nevada Natural Heritage Program, 2001). Therefore, stabilized sand dunes, as well as Mojave Desert scrub with alluvial sandy soils, comprise the habitat for this species (Arizona Game and Fish Department, 2003). Soil types include “volcanic derived soils and coarse sand with high amounts of silt” (Arizona Game and Fish Department, 2003). Recorded elevations range from 2,750 to 5,890 ft. MSL in Nevada (Nevada Natural Heritage Program, 2001).

“White-margined beardtongue occurs in southern Nevada, western Arizona, and in the western Mojave Desert in San Bernardino County, California. Its distribution in the western Mojave is restricted, occurring in a large four-mile long wash near Pisgah Crater and Lavic Lake, extending southwest from Sleeping Beauty Peak, crossing Interstate 40, and terminating in a flat spreading basin south of the freeway” (MacKay, 1998). In Nevada, the plant has been observed within Clark and Nye Counties. The Nevada Natural Heritage Program has estimated a total of 14,000 individuals within 909 acres (Nevada Natural Heritage Program, 2001). Fifteen populations have been found in southern Nevada--twelve from Clark County and three from Nye County (MacKay, 1998). The Nevada populations are mostly in Clark County, clustered near Las Vegas. In Las Vegas, impacts to the white-margined beardtongue are increasing due to people seeking outdoor recreational opportunities away from the city (MacKay, 1998).

## RECENT AND HISTORICAL OBSERVATIONS

To date, no observations of White-Margined beardtongue have been made within the study area, and no map of observations is needed. The known global extent of this species is located south and west of the study area, with plant populations found south of Las Vegas in southern Clark County (The Nature Conservancy, 2007).

## BASHFUL BEARDTONGUE (*PENSTEMON PUDICUS*)

### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** S
- **Bureau of Land Management:** S
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G1
- **Nevada Natural Heritage Program State Rank:** S1
- **Other Agencies:** None

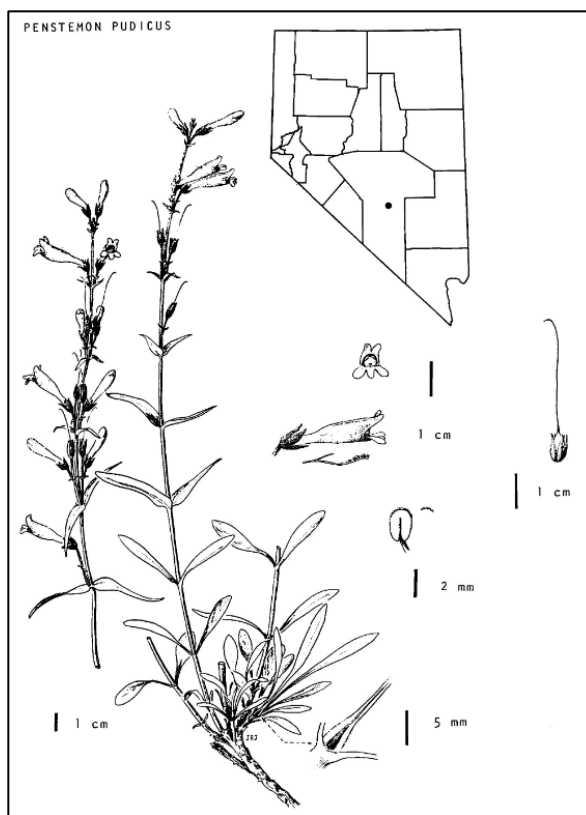


Bashful Beardtongue  
(Kate Walker, USFS)

### DESCRIPTION

Bashful beardtongue is a perennial herb in the Figwort (Scrophulariaceae) family. The plant has a woody base from which arises several somewhat glandular stems. The basal leaves are oblanceolate to spatulate and 2.0 in. long on slender petioles 0.4 to 1.2 in. long. The stem leaves are linear-oblanceolate and as long as 2.0 in. The open inflorescence bears 3 to 6 clusters of blue to violet flowers. The inflorescence, individual flower stalks, and the exterior of the flowers bear small glands. The individual flower stalks are usually shorter than 0.8 in. and support 0.24 to 0.31 in. long sepals. The corolla is 1.0 to 1.4 in. long and hairless on the inside. The sterile stamen is bearded with long golden yellow hairs. The anthers are hairless. The dark brown capsules are 0.31 to 0.43 in. long and produce yellowish black or grayish seeds about 0.06 in. long. The bearded staminode, large flowers, and 8 to 18 in. height, allow easy separation from *Penstemon kingii* S. Wats., a smaller plant found in the same general area. The plant blooms in June and July (Mozingo & Williams, 1980).

The plant has been documented as occurring at elevations occurring between 7,500 – 9,000 ft. MSL (Nevada Natural Heritage Program, 2001). This species is considered critically imperiled on the global scale. It is only known to occur in the north Kawich Range in Nye County, Nevada, likely with fewer than 1,000 individuals total (NatureServe Explorer, 2016). The plant can be located within crevices, soil pockets, and coarse rocky soils of felsic volcanic outcrops, boulder piles, steep protected slopes, and drainage bottoms, mostly on north and east aspects, in the subalpine sagebrush, mountain mahogany, and upper pinyon-juniper plant zones (Nevada Natural Heritage Program, 2001).



Drawing of Bashful Beardtongue (Jeanne R. Janish  
(Mozingo & Williams, 1980))

### RECENT AND HISTORICAL OBSERVATIONS

Bashful beardtongue was first discovered on 5 July 1971 by Janice Beatley between 7,612 and 9,022 ft. MSL on the Kawich Range in Nye County, Nevada (Mozingo & Williams, 1980). It is a Nevada endemic and only 5 populations have been found thus far; these occur over a 4.3-mile range dimension and occupy

three acres (Nevada Natural Heritage Program, 2001). Over 373 individuals have been estimated to exist in the population (Nevada Natural Heritage Program, 2001). To date, no observations of bashful beardtongue have been made within the study area.

### CLIFF NEEDLEGRASS (*PIPTATHERUM SHOSHONEANUM*)

#### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** None
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G2G3
- **Nevada Natural Heritage Program State Rank:** S1
- **Other Agencies:** None

#### DESCRIPTION

Cliff needlegrass is a perennial grass native to Nevada and Idaho (United States Department of Agriculture, 2016). The grass is a bunchgrass and grows like other needlegrasses. Unlike the two common needlegrasses in the area, this one is about 10-20 in. tall and the seeds have an awn that is straight and only 0.1 in. long. The other two needlegrasses have awns that are bent one time and about 2 in. long. The inflorescence is a panicle that extends above the leaves approximately 10 in. with 1 to 4 primary branches. These branches are usually spreading and may be as long as 6 in. (NatureServe, 2016).

The species occurs in moist cracks and crevices of intrusive or extrusive igneous, metamorphic, or west-facing sedimentary cliffs and rock walls in the montane conifer and pinyon-juniper vegetation communities (Nevada Natural Heritage Program, 2001).

#### RECENT AND HISTORICAL OBSERVATIONS

The plant is best known from eastern Idaho, but has been observed southwest of the Belted Range in southwestern Nevada (SEINet: Arizona-New Mexico Chapter, 2016). NNHP records an observation of the plant within the study area near Cliff Spring on the western slopes of the Belted Range in NTTR (Nevada Natural Heritage Program, 2016) (Figure 12).



Cliff Needlegrass



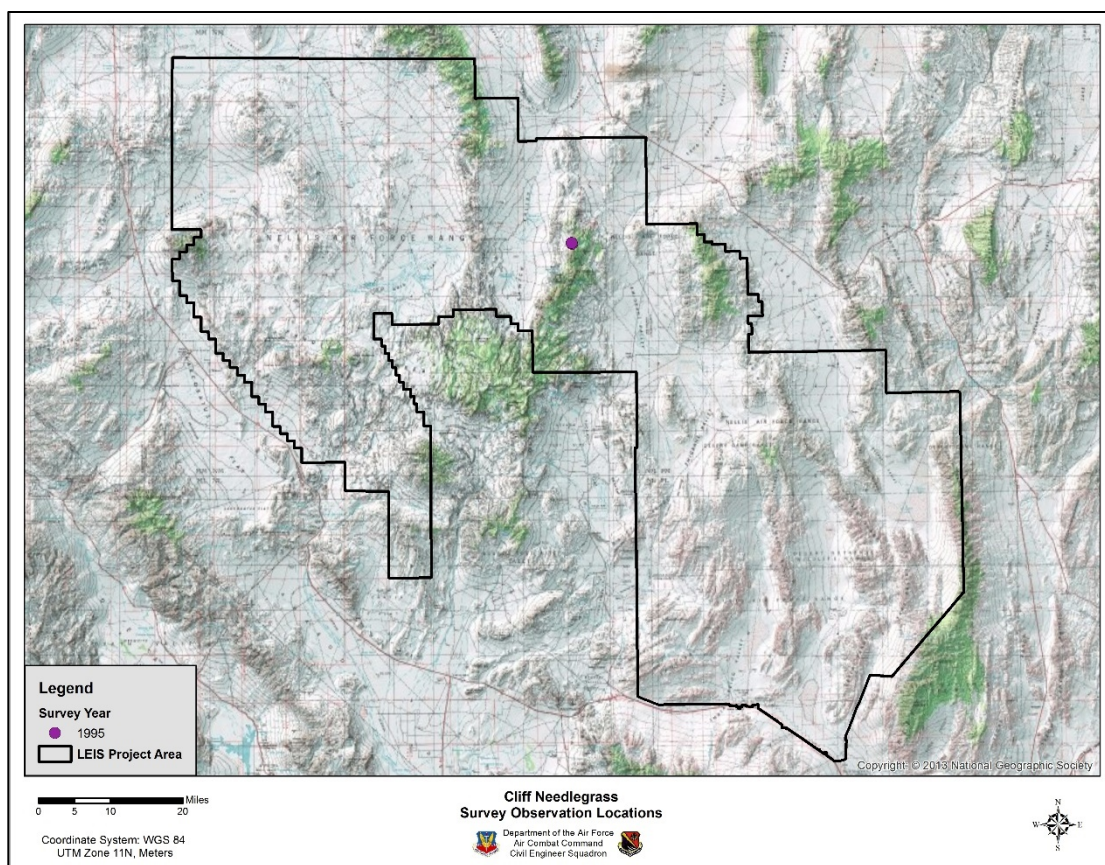


Figure 12. Location where cliff needlegrass has been observed in and around the study area.

## WILLIAMS COMBLEAF (*POLYCTENIUM WILLIAMSIAE*)

### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** S
- **Bureau of Land Management:** S
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G2Q
- **Nevada Natural Heritage Program State Rank:** S2
- **Other Agencies:** None



Williams Combleaf (Photo by Robert F. Holland, NNHP)

### DESCRIPTION

Williams combleaf is a perennial herb in the Brassicaceae family.

The plant flowers mainly in May and June, but this varies depending on the seasonal water levels in ephemeral pool habitats (Nevada Natural Heritage Program, 2001). Williams combleaf is 2 to 4 in. tall and produces clusters of white to purplish flowers in mid-summer. *Polyctenium fremontii* is the only other member of this genus and differs from Williams combleaf by having slightly larger fruit (silique) and flowers (Holmgren, Holmgren, & Cronquist, 2005).

Primary habitat for the plant is in barren, sandy to sandy-clay or mud margins and bottoms of non-alkaline seasonal lakes and playas perched over siliceous volcanic bedrock in silver sagebrush, mountain big sagebrush and juniper woodlands between 4,200 – 9,000 ft. MSL (Nevada Natural Heritage Program, 2001). It is commonly associated with *Artemisia tridentata*, *A. cana*, *Carex douglasii*, *Muhlenbergia richardsonis*, *Potentilla newberryi*, *Eleocharis* spp., and *Juncus balticus*. Major threats to the species include trampling by livestock and feral horses, water diversions and developments, and off-road vehicle use (Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

Williams combleaf has been observed from Mineral County, Nevada, and Mono County, California, north to the California - Nevada line in Washoe County (Bureau of Land Management, 2016). It has also been reported from northeast California at Mud Flat and the Madeline Plains (Lassen County) and into south-eastern Oregon (Bureau of Land Management, 2016). To date, no observations of Williams combleaf have been made within the study area, and no map of observations is needed.

## HERMIT CACTUS (*SCLEROCACTUS POLYANCISTRUS*)

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### Regulatory Status:

- **United States Fish and Wildlife Service:** None
- **U.S. Forest Service:** None
- **Bureau of Land Management:** None
- **Nevada Department of Wildlife:** None
- **Nevada Natural Heritage Program Global Rank:** G4
- **Nevada Natural Heritage Program State Rank:** S2S3
- **Other Agencies:** None



Hermit Cactus

## DESCRIPTION

Hermit cactus is a perennial cactus found in Nevada and California (United States Department of Agriculture, 2016). It is the only member of its genus that truly lacks papillae (small fleshy projections) on their styles, instead the style possesses grooves. The species is easily recognized by its massive stem size (relative to other species of *Sclerocactus*), large purple to magenta flowers, and numerous hooked central spines (five to nine) (The Jepson Herbarium, 2016). It is also known as the Mojave fishhook cactus, pineapple cactus, red-spined fishhook cactus, and devil's claw (May, 1994). "Seed germination and seedling growth occur during the rainy season, between November and May. Seeds from both the previous years' and prior year harvests usually germinate during this time period" (May, 1994). The extent of this species range appears to be linked closely to winter temperatures and summer rainfall (May, 1994).

The cactus often grows in rocky, alluvial, often alkaline soils, within the Mojave Desert scrub community between 1,640 – 8,200 ft. MSL (Flora of North America, 2016) but may be found at elevations as low as 2,000 ft. MSL (Mozingo & Williams, 1980). However, the populations existing in Nevada usually occur between 3,400 and 6,220 ft. MSL (Nevada Natural Heritage Program, 2001). Hermit cactus is known to occur outside of Nevada on basaltic and limestone hills. It can also be found on desert pavement (Nevada Natural Heritage Program, 2001). It appears to prefer the southern and southwestern slopes of hillsides (Nevada Natural Heritage Program, 2001), as well as canyons and alluvial slopes (Porter, 2011).



Hermit cactus grows in many vegetation communities including Creosote Bush Scrub, Joshua Tree Woodland, and Pinyon-Juniper Woodland (Mozingo & Williams, 1980; Porter, 2011). It often grows in conjunction with shadscale saltbush (*Atriplex confertifolia*), winterfat (*Ceratoides lanata*), big sagebrush (*Artemisia tridentata*), and spiny-tar (*Escobaria vivipara* var. *rosea*) (Mozingo & Williams, 1980). Distribution for this plant includes Esmeralda, Mineral, and Nye Counties in Nevada (Mozingo & Williams, 1980). It is known to occur outside of Nevada in California (Nevada Natural Heritage Program, 2001; Porter, 2011) and possibly in Arizona (Mozingo & Williams, 1980).

### RECENT AND HISTORICAL OBSERVATIONS

Hermit cactus has long been known to occur in and around the study area. Populations were recorded on

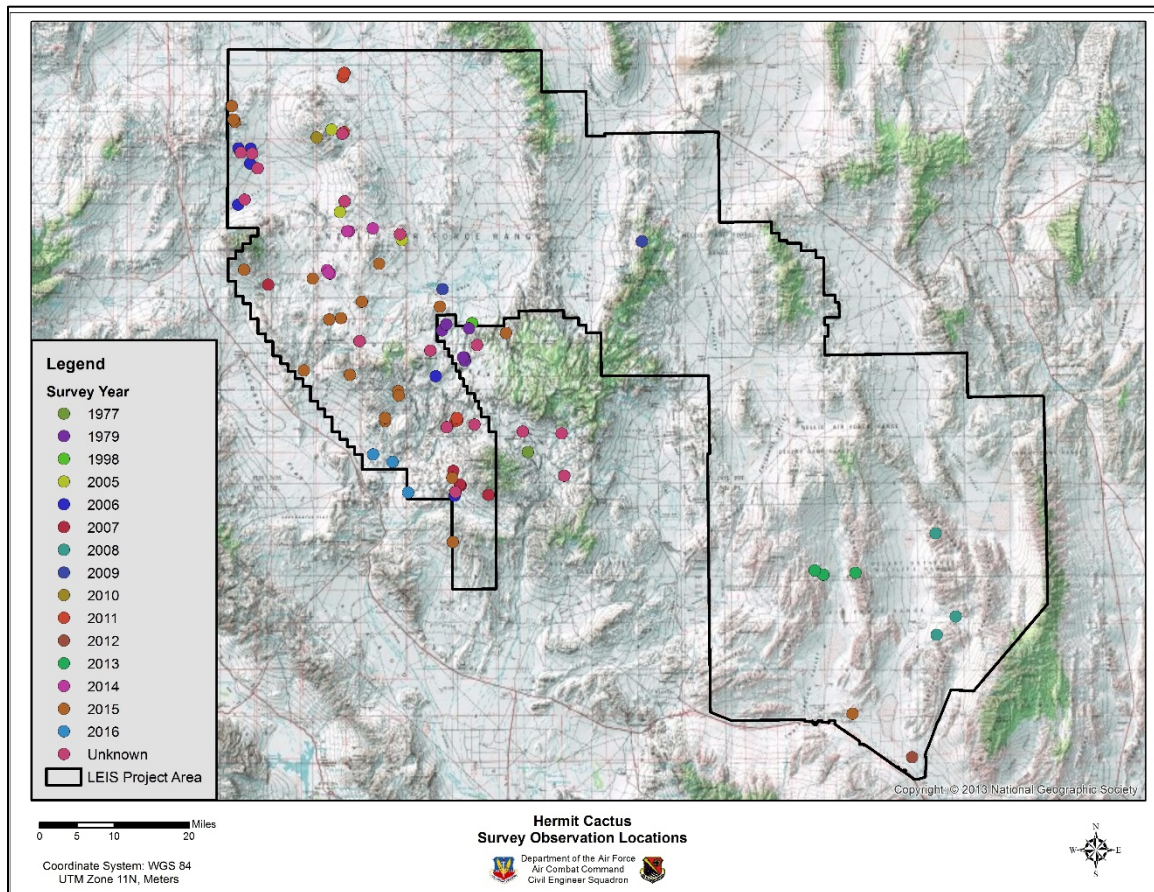
the northwestern area of Pahute Mesa and on the southern portion of Gold Flat during the 1970s (Beatley, 1976). It was also reported to occur throughout the NTTR as early as 1980 (Mozingo & Williams, 1980). During the 2005-2006 surveys by NNRP, it was observed at several locations on the west side of the North Range Study Area (Karl & Kitchen, 2007).

Based on known locations and on the broad habitat associations, it is estimated that the hermit cactus could grow on nearly all of the North Range, except in the loose-sandy areas around the dry lakes (Mozingo & Williams, 1980). Hermit cactus is widely distributed across the North Range Study Area as well as a few locations in the central and southern portions of the study area. The NNHP has additional observations recorded within the NNSS which borders the existing NTTR (Figure 13).



Hermit Cactus without Flowers





**Figure 13. Locations where hermit cactus has been observed in and around the study area.**

## SPECIAL STATUS SPECIES

A second group of special status species was prepared to include all plants that were of special interest to cooperating agencies including BLM, NDOW, USFWS, and USGS. Most of these species are imperiled (S2) or vulnerable to decline (S3). These plant species are listed below in Table 2. In the paragraphs that follow Table 2, each of these species will be briefly described and a map showing the locations of observations of those species on the study area will be provided. A map is not provided if no observations were made in or around the study area.

**Table 2. Special status plant species potentially found on the study area.**

SCIENTIFIC NAME	COMMON NAME	STATE	GLOBAL	BLM	USFS
<i>Abronia nana ssp. covillei</i>	Coville Abronia	S1?	G4T3	None	R5S
<i>Agave utahensis var. eborispina</i>	Ivory-spined Agave	S3	G4T3Q	None	None
<i>Anulocaulis leiosolenus var. leiosolenus</i>	Ringstem	S2	G4T3	S	None
<i>Arctomecon merriamii</i>	White Bearpoppy	S3	G3	S	None
<i>Astragalus ackermanii</i>	Ackerman Milkvetch	S2	G2	None	None
<i>Asclepias eastwoodiana</i>	Eastwood Milkweed	S2S3	G2Q	S	R4S
<i>Astragalus amphioxys var. musimonum</i>	Sheep Range Milkvetch	S2	G5T2	None	None
<i>Astragalus beatleyae</i>	Beatley Milkvetch	S2	G2	None	None
<i>Astragalus calycosus var. monophyllidius</i>	One-leaflet Torrey Milkvetch	S2	G5T2Q	S	None
<i>Astragalus funereus</i>	Black Woollypod	S2	G2	S	None
<i>Astragalus mohavensis var. hemigyris</i>	Halfing Milkvetch	S2S3	G3G4T2T3	S	None
<i>Astragalus mohavensis var. mohavensis</i>	Mojave Milkvetch	S2S3	G3G4T3T4	None	None
<i>Astragalus nyensis</i>	Nye Milkvetch	S3	G3	None	None
<i>Astragalus oophorus var. clokeyanus</i>	Clokey Eggvetch	S2	G4T2	None	R4S
<i>Astragalus pseudiodanthus</i>	Tonopah Milkvetch	S2	G2Q	S	None
<i>Boechera dispar</i>	Pinyon Rockcress	S1S2	G3	None	None
<i>Boechera shockleyi</i>	Shockley Rockcress	S3	G3	None	R5S
<i>Camissonia megalantha</i>	Cane Spring Suncup	S3	G3Q	None	None
<i>Castilleja martinii var. clokeyi</i>	Clokey Paintbrush	S3	G5T3Q	None	None
<i>Cirsium arizonicum var. tenuisectum</i>	Keystone Canyon Thistle	S1S2	G5G2	None	None
<i>Cryptantha tumulosa</i>	New York Mountains Catseye	S2	G4?	None	None
<i>Cymopterus ripleyi var. ripleyi</i>	Ripley Biscuitroot	S2?	G3G4T2Q	None	None
<i>Cymopterus ripleyi var. saniculoides</i>	Sanicle Biscuitroot	S3	G3G4T3Q	None	None
<i>Dudleya pulverulenta ssp. arizonica</i>	Chalk Liveforever	S3	G4G5T4T5	None	None
<i>Ephedra funerea</i>	Death Valley Mormon Tea	S2	G2	None	None
<i>Ericameria cervina</i>	Antelope Canyon Goldenbush	S1	G3?	S	None
<i>Ericameria compacta</i>	Charleston Goldenbush	S2?	G2?	None	R4S
<i>Ericameria watsonii</i>	Watson Goldenbush	S3	G3G4	None	None
<i>Erigeron ovinus</i>	Sheep Fleabane	S2	G2	S	None
<i>Eriogonum concinnum</i>	Darin Buckwheat	S2	G2	S	None
<i>Eriogonum darrovii</i>	Darrow Buckwheat	S2	G2	None	None
<i>Eriogonum heermannii var. clokeyi</i>	Clokey Buckwheat	S2	G5T2	S	R4S
<i>Eremogone congesta var. charlestonensis</i>	Mount Charleston Sandwort	S2?	G5T2?	None	None
<i>Eremogone stenomeres</i>	Meadow Valley Sandwort	S2	G2	None	None
<i>Frasera pahutensis</i>	Pahute Green Gentian	S3	G3Q	None	None
<i>Gilia heterostyla</i>	Cochrane Gilia	S3S4	G3G4	None	None
<i>Gilia nyensis</i>	Nye Gilia	S3	G3	None	None
<i>Gilia ripleyi</i>	Ripley Gilia	S3	G3	None	None
<i>Glossopetalon pungens var. glabrum</i>	Smooth Dwarf Greasebush	S1	G2G3T1Q	S	S
<i>Glossopetalon pungens var. pungens</i>	Rough Dwarf Greasebush	S2	G2G3T2Q	S	None

SCIENTIFIC NAME	COMMON NAME	STATE	GLOBAL	BLM	USFS
<i>Hulsea vestita</i> ssp. <i>inyoensis</i>	Inyo Hulsea	S2	G5T2T3	None	None
<i>Lathyrus hitchcockianus</i>	Bullfrog Hills Sweetpea	S2	G2	S	None
<i>Machaeranthera grindelioides</i> var. <i>depressa</i>	Rayless Tansy Aster	S3	G5T3T4	None	None
<i>Mirabilis pudica</i>	Bashful Four-o'clock	S3	G3	None	None
<i>Pedicularis semibarbata</i> var. <i>charlestonensis</i>	Charleston Pinewood Lousewort	S3	G4T3Q	None	None
<i>Pedimelum castoreum</i>	Beaver Dam Breadroot	S3	G3	S	None
<i>Penstemon arenarius</i>	Nevada Dune Beardtongue	S2	G2G3	S	R4S
<i>Penstemon bicolor</i> ssp. <i>bicolor</i>	Yellow Twotone Beardtongue	S2	G3T2Q	S	None
<i>Penstemon bicolor</i> ssp. <i>roseus</i>	Rosy Twotone Beardtongue	S3	G3T3Q	S	None
<i>Penstemon fruticiformis</i> ssp. <i>amargosae</i>	Death Valley Beardtongue	S2	G4T3	S	None
<i>Penstemon pahutensis</i>	Pahute Mesa Beardtongue	S3	G3	S	None
<i>Penstemon thompsoniae</i> ssp. <i>jaegeri</i>	Jaeger Beardtongue	S2	G4T2	S	R4S
<i>Perityle intricata</i>	Desert Rockdaisy	S3	G3	None	None
<i>Phacelia beatleyae</i>	Beatley Scorpionflower	S3	G3	S	None
<i>Phacelia filiae</i>	Clarke Phacelia	S2	G2	S	None
<i>Phacelia geraniifolia</i>	Jaeger Phacelia	S2	G2Q	None	None
<i>Phacelia mustelina</i>	Weasel Phacelia	S2	G2	C	None
<i>Phacelia parishii</i>	Parish Phacelia	S2S3	G2G3	S	None
<i>Phacelia petrosa</i>	Rock Phacelia	S2	G3G4	None	None
<i>Physaria hitchcockii</i> var. <i>hitchcockii</i>	Hitchcock Bladderpod	S2	G3T2	None	R4S
<i>Polygala heterorhyncha</i>	Notch-beak Milkwort	S3	G3	None	None
<i>Perityle intricata</i>	Desert Rockdaisy	S3	G3	None	None
<i>Porophyllum pygmaeum</i>	Pygmy Poreleaf	S2	G2	None	None
<i>Salvia dorrii</i> var. <i>clokeyi</i>	Clokey Mountain Sage	S3	G5T3	None	None
<i>Townsendia jonesii</i> var. <i>tumulosa</i>	Charleston Grounddaisy	S3	G4T3	None	R4S
<i>Xanthisma grindelioides</i> var. <i>depressum</i>	Rayless Tansy Aster	S3	G5T3T4	None	None

**Applicable codes for the table:**

**BLM Status:**

- S - Nevada Special Status Species, USFWS listed, proposed, candidate species or otherwise protected by Nevada state law
- C - California Special Status Species

**USFS Status:**

- S - Sensitive Species
- R4S - Region 4 (Humboldt-Toiyabe National Forest) Sensitive

**Global Rank or State Rank:**

- G - Global rank indicator, based on worldwide distribution at the species level
- T - Global trinomial rank indicator, based on worldwide distribution at the intraspecific level
- 1 - Critically imperiled and especially vulnerable to extinction or extirpation due to extreme rarity, threats, or other factors
- 2 - Imperiled due to rarity or other demonstrable factors
- 3 - Vulnerable to decline because rare and local throughout range, or with very restricted range
- 4 - Long term concern, though now apparently secure; usually rare in parts of its range, especially at its periphery.
- 5 - Secure – At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.
- Q - Taxonomic status uncertain



## COVILLE'S ABRONIA (*ABRONIA NANA SSP. COVILLEI*)

### DESCRIPTION

Coville's abronia is a perennial herb with densely tufted basal leaves and small white to light pink flowers (The Jepson Herbarium, 2016). The plants are usually found on dry slopes or flats, or on sandy soils often of carbonate origin (U.S. Forest Service, 2005). *Abronia nana ssp. covillei* is found growing in subalpine, mixed coniferous forest, pinyon-juniper and Joshua tree woodlands, dry conifer forests, and Great Basin scrub at elevations of 5,000 - 9,400 ft. MSL (U.S. Forest Service, 2005). In Nevada, the plant can be found in Clark and Lincoln Counties (Nevada Natural Heritage Program, 2001).



Coville Abronia (Calflora)

### RECENT AND HISTORICAL OBSERVATIONS

Coville's abronia has been observed in both the North and South Range study areas. In the North Range Study Area, the species was located by A. Karl in 2006 in Thirsty Canyon, south of Pahute Mesa. In the South Range Study Area, this species was observed within the southwestern end of the Spotted Range, as well as the western slopes of the Sheep Range in 2016 by Adams Ecology botanists. David Charlet identified two more populations on the east side of the Sheep Range in 2010. In 1985, the species was observed on Bald Mountain in the Groom Range (Figure 14).

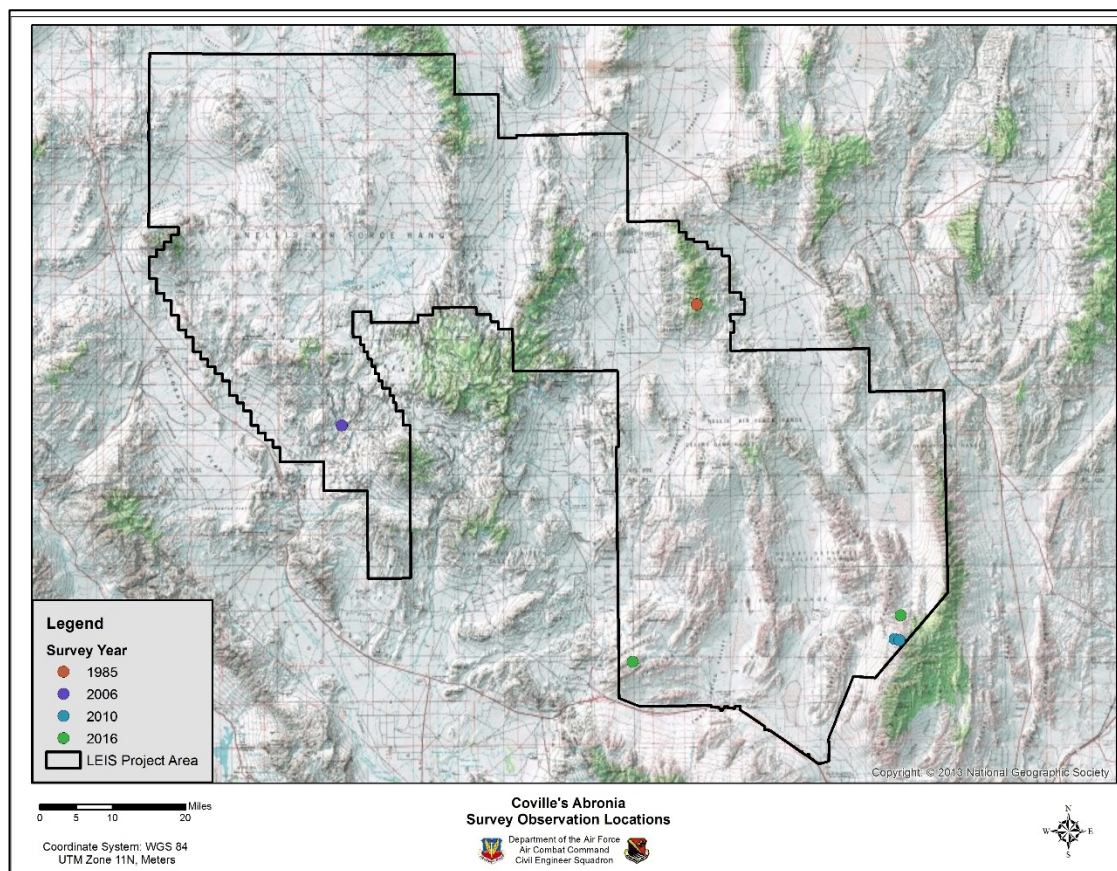


Figure 14. Locations where Coville's abronia has been observed in and around the study area.



## IVORY-SPINED AGAVE (*AGAVE UTAHENSIS* VAR. *EBORISPINA*)

### DESCRIPTION

Ivory-spined agave is located within the creosote bush scrub, Joshua tree woodland, pinyon-juniper woodland communities (Calflora, 2016) in sandy and well-drained soils (Breitung, 2016). It is also found in calcareous outcrops at elevations of 3,600 – 6,250 ft. MSL in California and Nevada (Breitung, 2016). This species of agave has spines that are ivory tipped and, when it flowers, the flowers are white and bell shaped (The Jepson Herbarium, 2016).



Ivory-Spined Agave

### RECENT AND HISTORICAL OBSERVATIONS

Ivory-spined agave has several documented populations in the South Range Study Area. The species was observed within the western slopes of the Sheep Range along the east boundary of the South Range Study Area and prominently in the southwestern end of the Spotted Range. NNHP records the species within the same general locations, with one additional observation outside of the study area to the southeast (Figure 15).

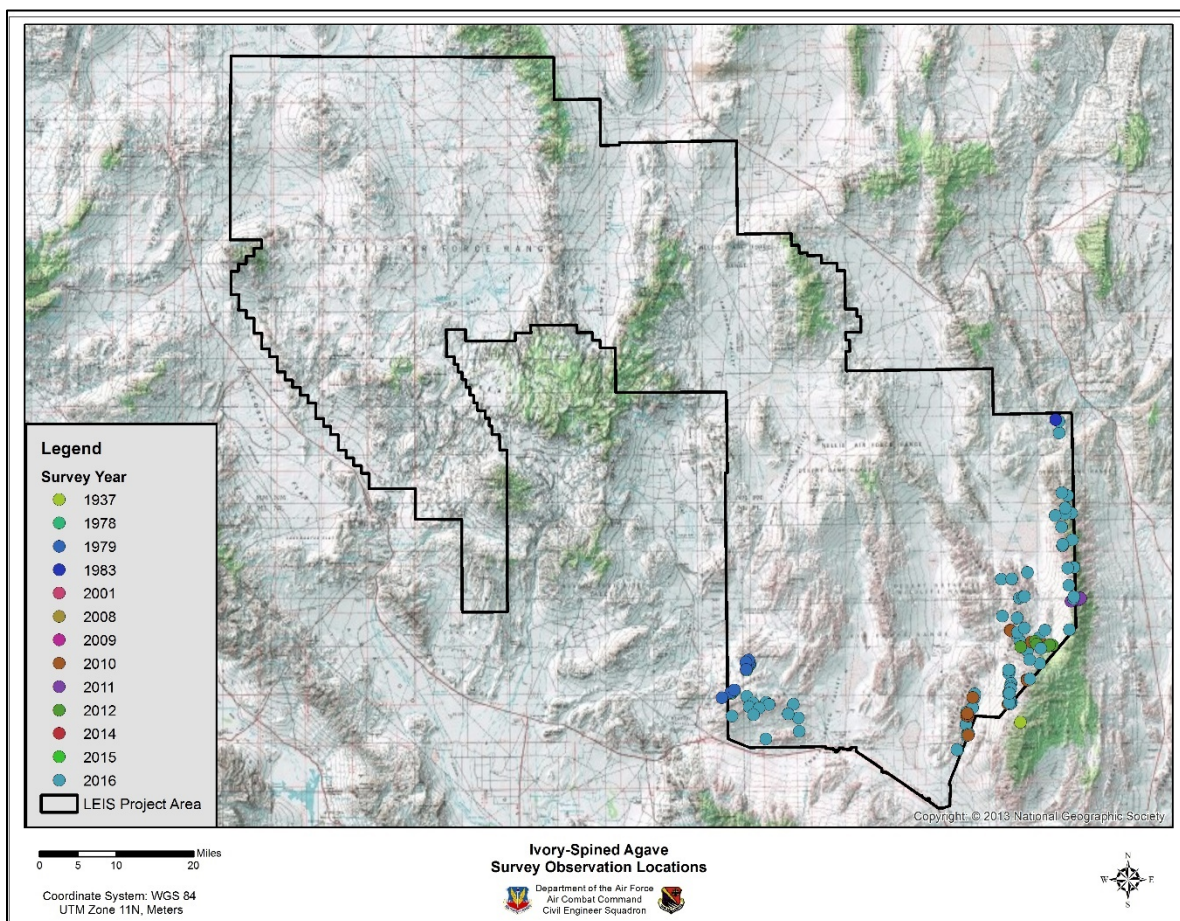


Figure 15. Locations where ivory-spined agave has been observed in and around the study area.

## **RINGSTEM (*ANULOCAULIS LEIOSOLENUS*)**

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### **DESCRIPTION**

Ringstem are thickly-rooted perennial wildflowers with glutinous brown bands at their stem internodes, which gives them their common name. The species flowers in late spring to early fall, growing on calcareous clays, shales, and sometimes on gypsum substrate, between 3,300 – 4,600 ft. MSL (Flora of North America, 2016). Ringstem can be found in open areas of xeromorphic desert shrubs and gypsum dune shrublands (NatureServe, 2016). In Nevada, this species has been observed in Clark County. Overall threats to the species include over-grazing, residential development, and mining (NatureServe, 2016).



Ringstem (Photo by Wynn Anderson)

### **RECENT AND HISTORICAL OBSERVATIONS**

To date, no observations of Ringstem have been made within the study area, and no map of observations is needed.

## **WHITE BEARPOPPY (*ARCTOMECON MERRIAMII*)**

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### **DESCRIPTION**

White Bearpoppy is a perennial herb with hairy basal leaves and white flowers that sit atop green to red stems. (United States Department of Agriculture, 2016). The species flowers from April to May and can be found in creosote bush scrub and shadscale scrub communities from 2,500 – 5,600 ft. MSL (Calflora, 2016). Known vegetative communities for this species include creosote-bursage, blackbrush, and mixed-shrub (Nevada Natural Heritage Program, 2001). White Bearpoppy grows on a wide variety of soils, including dry to moist-basic alkaline clay and sand, gypsum, calcareous alluvial gravels, and carbonate rock outcrops. The plant is native to Nevada and has been observed in Clark and Lincoln Counties (Nevada Natural Heritage Program, 2001).



White Bearpoppy



## RECENT AND HISTORICAL OBSERVATIONS

White Bearpoppy has been observed extensively throughout the South Range Study Area. High densities can be found along the Spotted Range to the southwest, the central Pintwater Range, and Desert Range along the east boundary of the South Range Study Area. Additional observations fall between the ranges along the bajadas and valley bottoms. The NNHP has recorded observations in the same general areas (Figure 16).



White bearpoppy population on the South Range Study Area.

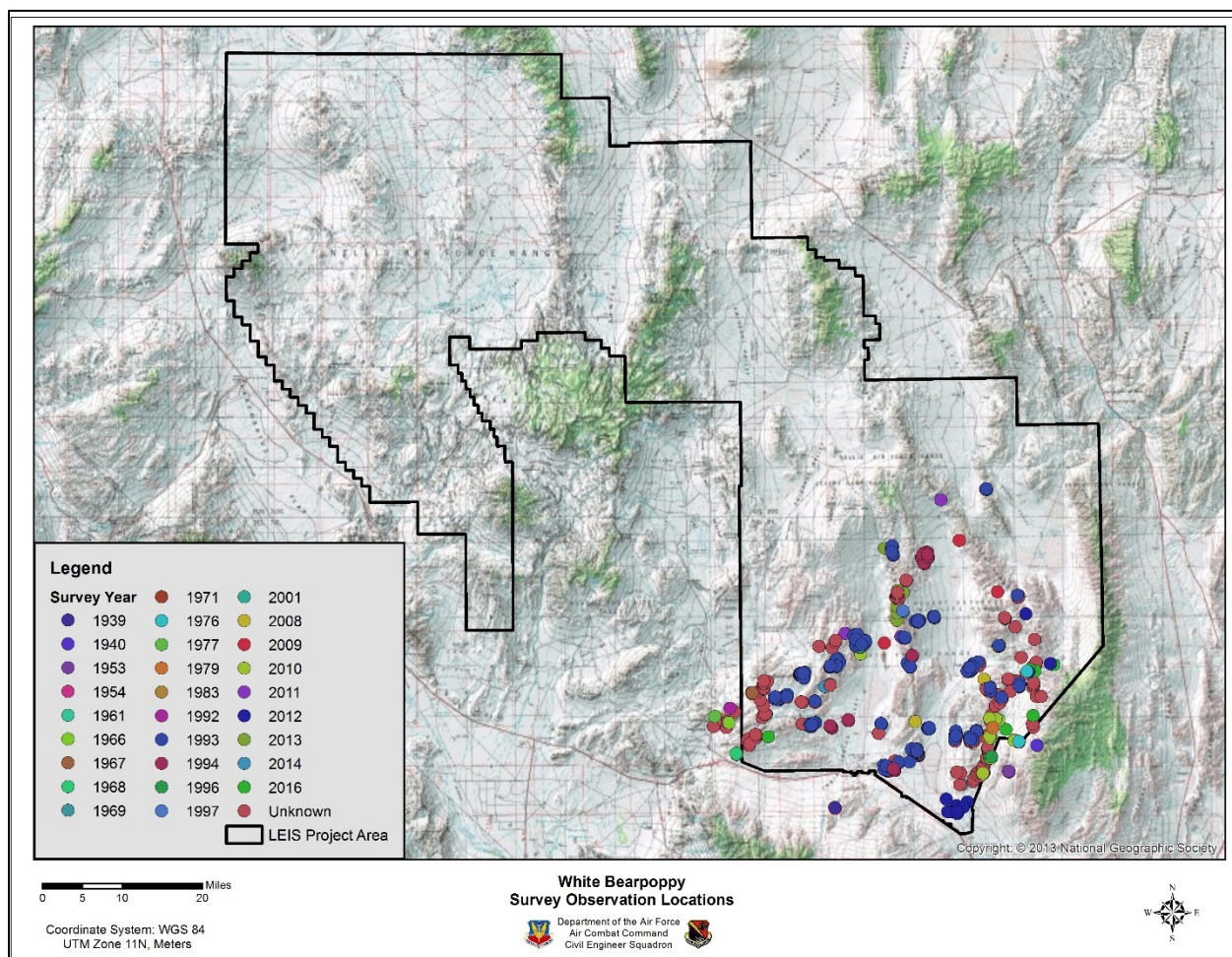


Figure 16. Locations where white bearpoppy has been observed in and around the study area.



## ACKERMAN'S MILKVETCH (*ASTRAGALUS ACKERMANII*)

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### DESCRIPTION

Ackerman's milkvetch is a perennial herb in the Legume family. The stems of Ackerman's milkvetch are erect and woody, emerging from a low-growing woody tuft. The leaves are 2.00-4.75 in. long with 4-7 pairs of leaflets 0.1-0.3 in. long. The flowering stem typically has 2-5 loosely arranged flowers on peduncles no longer than the leaves. Flowers are bell-shaped, pink to reddish purple, turning blue when dry. Fruiting pods are about 0.6-0.8 in. long and 0.12-0.16 in. wide with a 0.04-0.06 in. stalk. The species generally flowers from April to May or June (Barneby R. C., 1980; Knight, Smith, & Pritchett, 1997).

Ackerman's milkvetch restricts its preferred range to steep carbonate or limestone cliffs, crevices and ledges at elevations of 4,000 - 6,200 ft. MSL (Knight, Smith, & Pritchett, 1997). The plant communities associated with this species are mostly found in montane calcareous bedrock habitats and include mixed desert scrub, sagebrush and lower montane woodlands (Knight, Smith, & Pritchett, 1997). Individual plants commonly associated with Ackerman's milkvetch include Utah agave (*Agave utahensis* var. *eborispina*), ragged rockflower (*Crossosoma bigelovii*), James' cryptantha (*Cryptantha cinerea* var. *abortiva*), beavertail pricklypear (*Opuntia basilaris*), petiolate beardtongue (*Penstemon petiolatus*), Rixford's rockwort (*Scopulophila rixfordii*), and desert needlegrass (*Achnatherum speciosum*) (Knight, Smith, & Pritchett, 1997).



Ackerman's Milkvetch



Flower of Ackerman's milkvetch

### RECENT AND HISTORICAL OBSERVATIONS

Several populations of Ackerman's milkvetch have been identified on the Sheep and Pintwater Ranges in the past. Though the Nevada Natural Heritage Program lists only nine populations, thirteen observations have been documented. Thomas Ackerman documented four populations on the Pintwater Range and seven populations on the Sheep Range in 1979 (Ackerman T. , 1981). The populations on the Sheep Range have not been confirmed by other sources. As such, the total population size is unknown for this species (Nevada Natural Heritage Program, 2001). However, during the last survey conducted on NTTR in 1997, one small population of less than 10 individual plants was mapped (Knight, Smith, & Pritchett, 1997). This stands in contrast to Ackerman's survey which found multiple populations on scattered cliffs, but did not obtain a total count and population abundance was not determined (Ackerman T. , 1981). The species was identified during surveys conducted on the South Range in 2011 and 2015. Charlet et al. (2013) found and collected the species in the Cabin Springs area of the northern Sheep Range (on the eastern boundary

of the proposed expansion Alternative 3C) as well as the southern end of the Sheep Range, which is located outside of the study area (Figure 17).

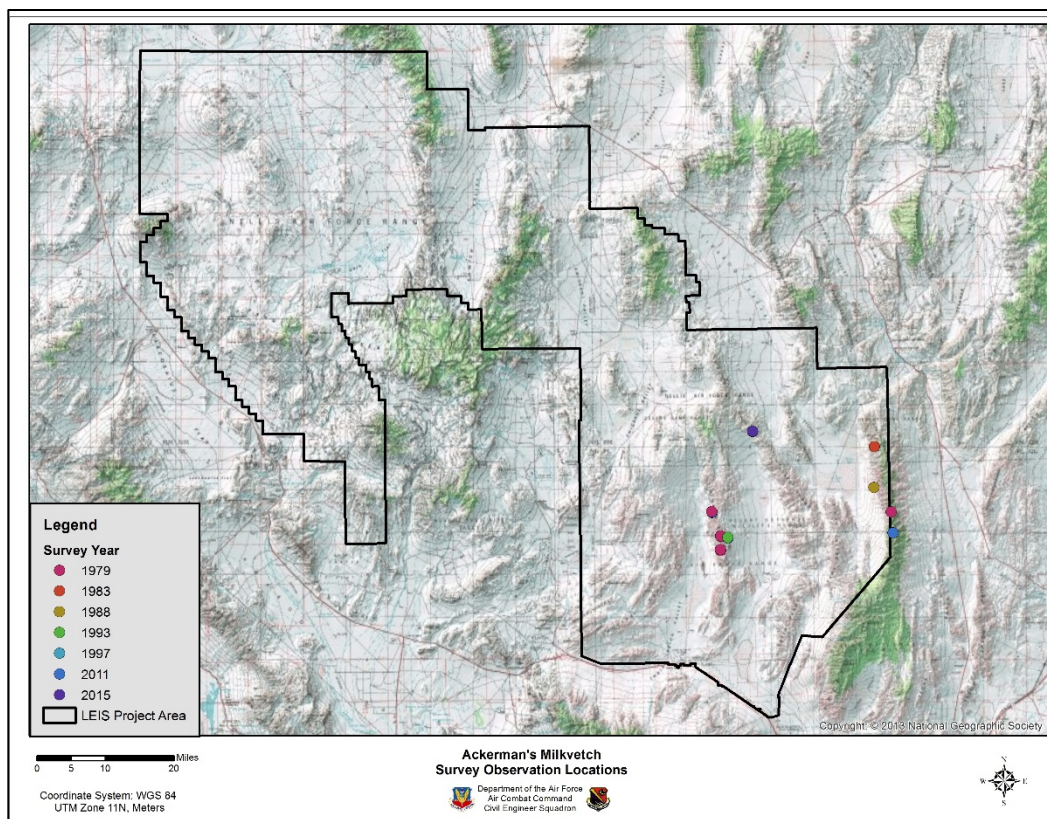


Figure 17. Locations where Ackerman's milkvetch has been observed in and around the study area.

## EASTWOOD'S MILKWEED (*ASCLEPIAS UNCIALIS*)

### DESCRIPTION

Eastwood's milkweed is a herbaceous perennial in the family *Asclepiadaceae*, which contains species commonly known as milkweeds. Eastwood's milkweed is less than 8 in. tall and has a crowded, umbel-like, purple inflorescence. The leaves may reach 1.8 in. in length with the basal leaves up to 1.2 in. wide. Blooming occurs from May to June (Mozingo & Williams, 1980) (Cronquist A. N., 1984). The species grows in sandy gravelly soils in drainages in mixed scrub (Mozingo & Williams, 1980) (Cronquist A. N., 1984) and pinyon-juniper/black sagebrush communities at elevations of 4,680 to 7,080 feet (Smith & Pritchett, Rare plant survey for *Asclepias eastwoodiana* at Nellis Air Force Bombing and Gunnery Range, Clark, Lincoln, and Nye Counties, Nevada Unpub. rept., 2000). It tends to become established in open areas on a wide variety of basic soils including calcareous clays, sand, carbonate or basaltic gravels, or shale outcrops, which are generally barren and



Eastwood milkweed (Photo by James M. Andre)



lacking competition from other species (NNHP, 2001) (Wildland International, 2007). The geology can vary from fractured and weathered rock outcrops to gravelly alluvium formed from igneous and metamorphic rock. Common plants associated with this species are shadscale (*Atriplex confertifolia*), greasewood (*Sarcobatus* sp.), horsebrush (*Tetradymia* sp.) (Mozingo & Williams, 1980), four-winged saltbrush (*Atriplex canescens*), pinyon pine (*Pinus monophylla*), Utah juniper (*Juniperus osteosperma*), Nevada Mormon Tea (*Ephedra nevadensis*), Mexican cliffrose (*Purshia mexicana*), spiny milkwort (*Polygala subspinoso*), povertyweed (*Iva axillaris*), and black sagebrush (*Artemisia nova*) (Smith & Pritchett, Rare plant survey for *Asclepias eastwoodiana* at Nellis Air Force Bombing and Gunnery Range, Clark, Lincoln, and Nye Counties, Nevada Unpub. rept., 2000). Microsite locations appear to be variable, but include low, clay hills and drainage edges in valleys (Mozingo & Williams, 1980) (Smith & Pritchett, Rare plant survey for *Asclepias eastwoodiana* at Nellis Air Force Bombing and Gunnery Range, Clark, Lincoln, and Nye Counties, Nevada Unpub. rept., 2000). Slope ranges from 3 to 40 percent and exposure does not appear to have an influence on the establishment of populations of this species (Smith & Pritchett, 2000).

## RECENT AND HISTORICAL OBSERVATIONS

The geographic range of Eastwood's milkweed includes the Great Basin and Mojave Deserts in Esmeralda, Lander, and Nye Counties in Nevada with the majority of plant populations being found in Nye County (Mozingo & Williams, 1980) (Cronquist A. N., 1984) (Smith & Pritchett, 2000) (Wildland International, 2007). According to a report prepared for the Nevada Division of Water Resources, a large population of 1,800 individuals exists in the Dry Lake Valley in Lincoln County (Wildland International, 2007). The species was observed near Tonopah, Nevada, just north of the NTTR North Range according to historic records (Nevada Natural Heritage Program, 2001). Also, three populations totaling 1,900 plants were found on the west side of Cactus Flat in Range 4809A in 1999 (Nevada Natural Heritage Program, 2001). One of these populations is the largest known population comprised of approximately 1,300 plants (Smith & Pritchett, 2000). This site has been inspected on an annual basis by the NNRP since 2012 and no plants have been observed (Figure 18).

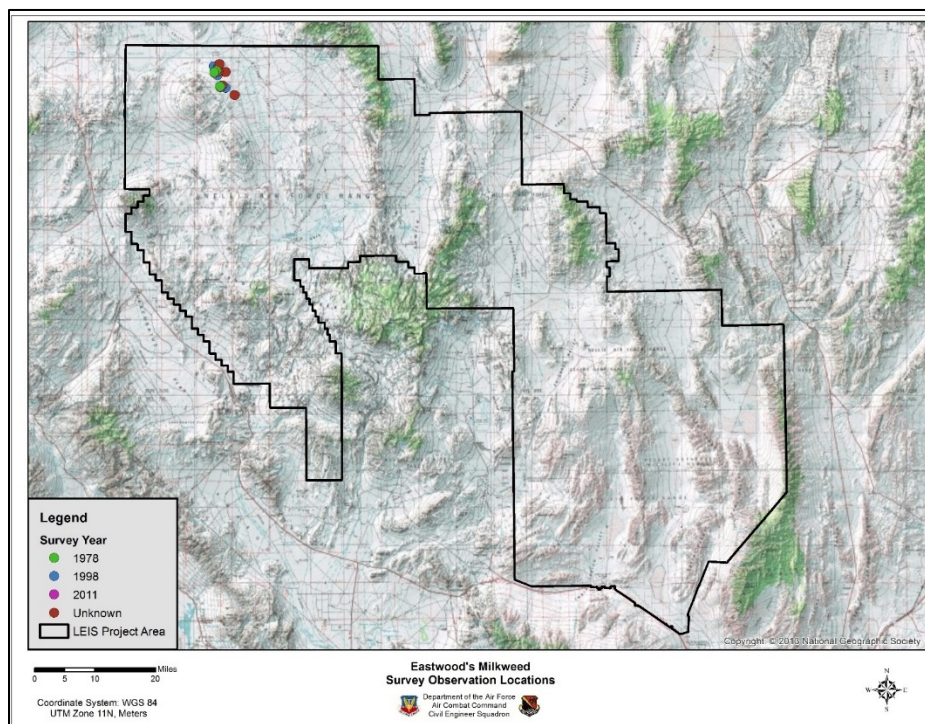


Figure 18. Locations where Eastwood's milkweed has been observed in and around the study area.



## SHEEP RANGE MILKVETCH (*ASTRAGLUS AMPHIOXYS* VAR. *MUSIMONUM*)

### DESCRIPTION

The Sheep Range milkvetch is located in carbonate alluvial gravels, along drainages, roadsides, and in other microsites with enhanced run-off and/or periodic disturbance, in the blackbrush and mixed desert shrub vegetative communities (Nevada Natural Heritage Program, 2001). It is typically found in upper bajadas, gentle slopes, dirt roads, and disturbed areas in mixed desert shrub communities within elevation of 4,400 - 6,000 ft. MSL (Arizona Fish and Game Department, 2005). Field observations indicate that it forms scattered populations on gentle slopes with a light, gravelly surface.



Sheep Range Milkvetch

### RECENT AND HISTORICAL OBSERVATIONS

Sheep Range milkvetch was observed within the South Range Study Area. Plants were found along the Desert Range, as well as within the Pintwater Range and the southwestern end of the Spotted Range. Additionally, the NNHP records show plants occurring along the western slopes of the Sheep Range (Figure 19).

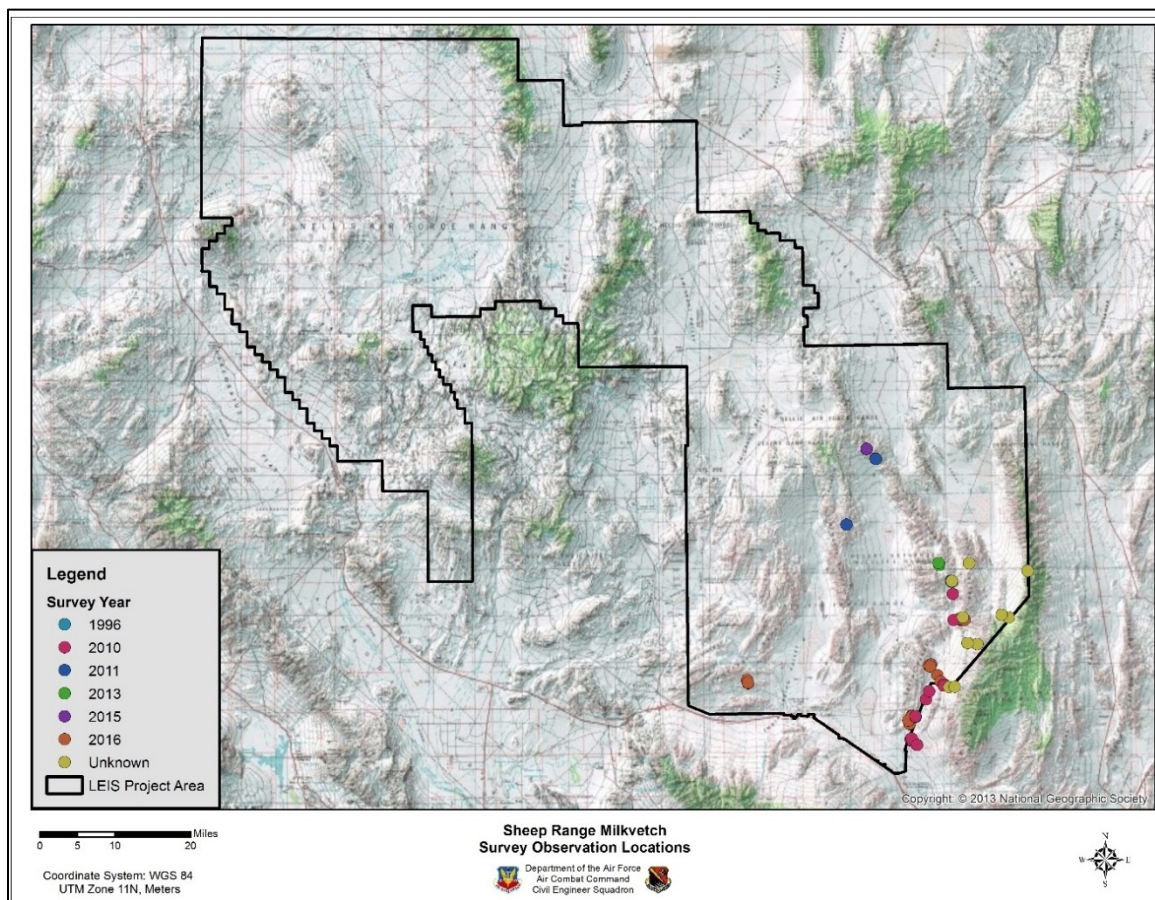


Figure 19. Locations where Sheep Range milkvetch has been observed in and around the study area.

## BEATLEY'S MILKVETCH (*ASTRAGALUS BEATLEYAE*)

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### DESCRIPTION

Beatley's Milkvetch germinates and flowers primarily in the spring, but will reproduce in summer or early fall with sufficient precipitation. Some plants overwinter as short-lived perennials, but most appear as annuals. Beatley's milkvetch is a small herbaceous plant that grows up to 5 in. tall. It is pubescent, covered with straight appressed short hairs. The stems of Beatley's milkvetch are prostrate and form multiple branches as they grow from their base. The leaves of Beatley's milkvetch grow to a length of 0.6 to 1.3 in. with 5-9 leaflets on each leaf with shallow notches at their tips. The inflorescence is a raceme with as many as seven blue-violet flowers. The pods of this legume are minutely pubescent, with slight freckling on a pale background. Blooming occurs from May to June (Beatley, 1976; Knight T. F., 1997).



Beatley Milkvetch (Photo by Frank Smith, The Nature Conservancy)

Beatley's milkvetch grows in volcanic flatrock and other shallow soils (Beatley, 1976) at elevations of 5,200 – 6,900 ft. MSL (Nevada Natural Heritage Program, 2001). It is often found in thin, dry, open residual soils on flat to gently sloping tuffaceous outcrops and gravelly soils (Knight T. F., 1997), mostly in pinyon-juniper woodland with *Artemisia nova* and *Ericameria nana* (Nevada Natural Heritage Program, 2001). Plants commonly associated with Beatley's milkvetch include Utah juniper (*Juniperus osteosperma*), black sagebrush (*Artemisia nova*), shadscale saltbush (*Atriplex confertifolia*), rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), dwarf goldenbush (*Ericameria nana*), needle and thread (*Hesperostipa comata*), hermit cactus (*Sclerocactus polyancistrus*), and desert globemallow (*Sphaeralcea ambigua*) (Knight T. F., 1997). It is also associated with invasive species, such as cheatgrass (*Bromus tectorum*) and saltlover (*Halogeton glomeratus*) (Knight T. F., 1997).

### RECENT AND HISTORICAL OBSERVATIONS

Primarily, Beatley's milkvetch populates the Pahute Mesa which is located on the NNSS and the NTTR (Beatley, 1976; Knight T. F., 1997). Eleven populations have been identified on the NTTR, most of which are found in the Ribbon Cliff of Thirsty Canyon. Total estimated individuals of this species in Nye County are around 77,000. On the North Range Study Area, dense populations have been recorded northwest of Timber Mountain in Thirsty Canyon, continuing north past Black Mountain on the Pahute Mesa. One population was identified in 2011 on the southeastern slopes of Stonewall Mountain along the western boundary of the North Range Study Area (Figure 20).



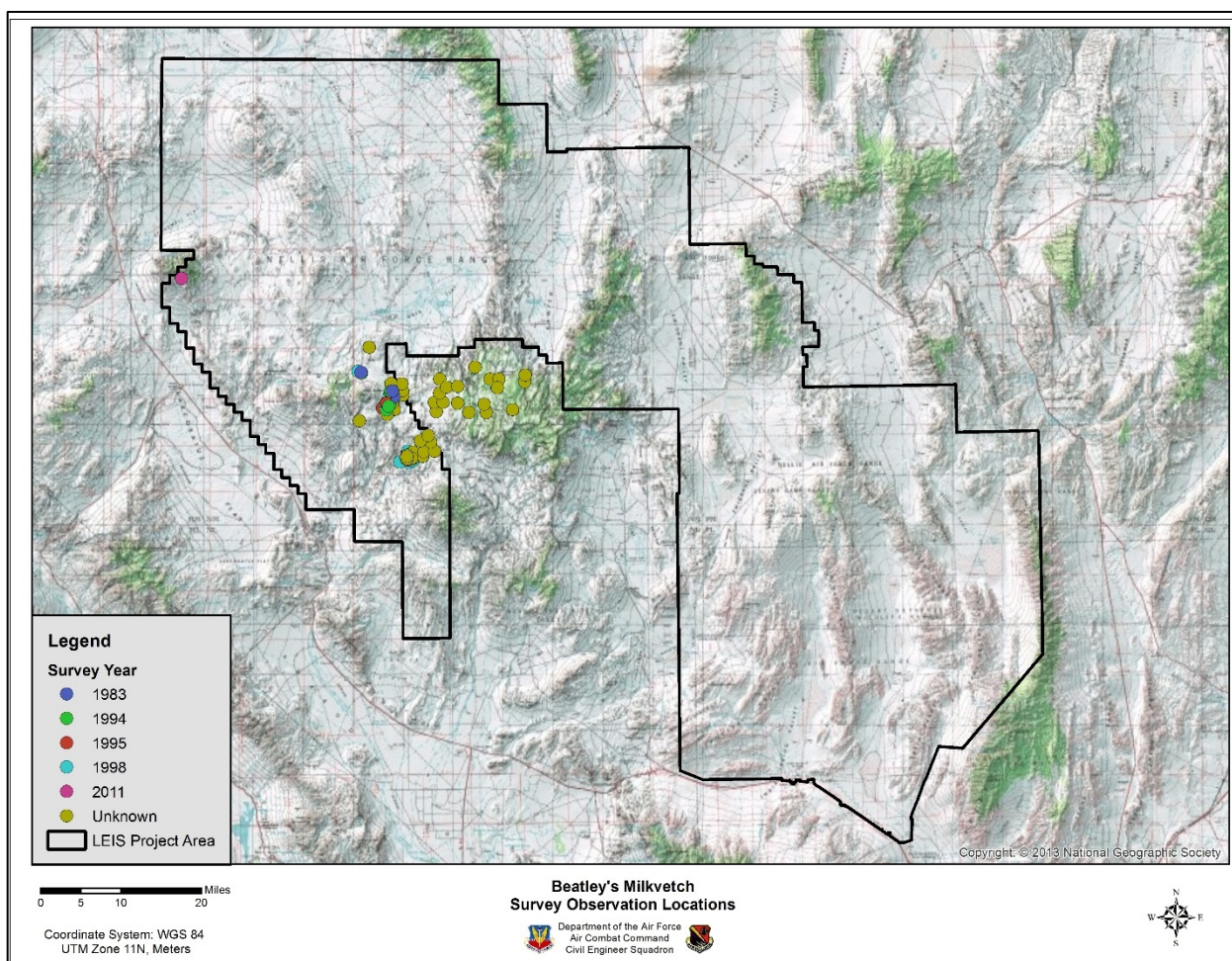


Figure 20. Locations where Beatley's milkvetch has been observed in and around the study area

## ONE-LEAFLET TORREY'S MILKVETCH (*ASTRAGALUS CALYCOSUS* VAR. *MONOPHYLLIDIUS*)

### DESCRIPTION

One-leaflet Torrey's milkvetch is a perennial herb in the legume family (United States Department of Agriculture, 2016). It is a perennial with no stems and leaves that appear silver due to the long, branched hairs on the leaves (The Jepson Herbarium, 2016). The flowers, which will bloom between April and July, are white to bright purple (The Jepson Herbarium, 2016). The plant grows in open gravelly hillsides and limestone in scattered juniper and pinyon pine forests. It favors lower foothill and valley habitats that occur between 5,250–6,600 ft. MSL (NatureServe, 2016). Within



One-leaflet Torrey's Milkvetch (Photo by Janel Johnson, U.S. Forest Service)



Nevada, this species has been observed in nine locations throughout Clark, Elko, Eureka, Lincoln, and Nye Counties (Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

No one-leaflet Torrey's milkvetch populations have been observed on or around the North or South Range Study Area.

## BLACK WOOLLYPOD (*ASTRAGALUS FUNEREUS*)

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### DESCRIPTION

Black woollypod is a perennial herb of the Legume family that is native to California and Nevada (Calflora, 2016). Black woollypod got its name from having short stiff gray hairs on leaves, which makes the plant appear to be black (The Jepson Herbarium, 2016). It blooms with pink to purple flowers between April and May (The Jepson Herbarium, 2016). Black woollypod is known to be beneficial to various species of butterflies, including Queen Alexandra's Sulphur and Arrowhead Blue (Calflora, 2016).



Black Woollypod (Photo by Susan C. Levitsky)

The plant prefers dry, open scree, talus, or gravelly alluvium derived from light-colored volcanic tuff, on east, south, less commonly west, rarely north aspects (Nevada Natural Heritage Program, 2001). The species is commonly found in creosote bush scrub communities from 100–5,875 ft. MSL (Calflora, 2016). Black woollypod is commonly associated with spiny hopsage (*Grayia spinosa*), needle-leaved rabbitbrush (*Chrysothamnus teretifolius*), four-winged saltbush (*Atriplex canescens*), shadscale saltbush (*Atriplex confertifolia*), budsage (*Picrothamnus deserti*), Shockley's goldenhead (*Acamptopappus shockleyi*), and green ephedra (*Ephedra viridis*) (Knight T. F., 1997). It is also found in pinyon-juniper woodlands and known to "...occur on gravelly clay ridges, cliff ledges, or on talus" (Knight T. F., 1997). The plant may also be found in alluvial material that originates from light-colored volcanic tuff (Nevada Natural Heritage Program, 2001). Populations of the black woollypod typically contain less than 100 plants (Knight T. F., 1997).

### RECENT AND HISTORICAL OBSERVATIONS

Observations of this species have been recorded from Inyo County in California to Clark County in Nevada (Knight T. F., 1997). It has been sighted in Nye County and may exist in Lincoln County (Nevada Natural Heritage Program, 2001). Surveys performed in 1981 found a population in excess of 50 plants along the west side of Scarp Canyon and seven plants located in the Raysonde Buttes of the Halfpint Range (Knight T. F., 1997). The most recent survey where plants were identified was conducted in 1992 and listed the total estimated number of individual plants at about 1,514 (Nevada Natural Heritage Program, 2001).

The Black woollypod has been observed at two locations within the study area. One observation was made west of the Groom Range near the north-central study area boundary. The second group of observations are within the Halfpint Range, in and around Scarp Canyon. NNHP has additional records of the species in

the Halfpint Range, with some observations made outside of the study area near French Peak of Massachusetts Mountain and along Yucca Mountain. Since 2005, the NNRP has continued to include this species in its rare plant and vegetation surveys (Figure 21).

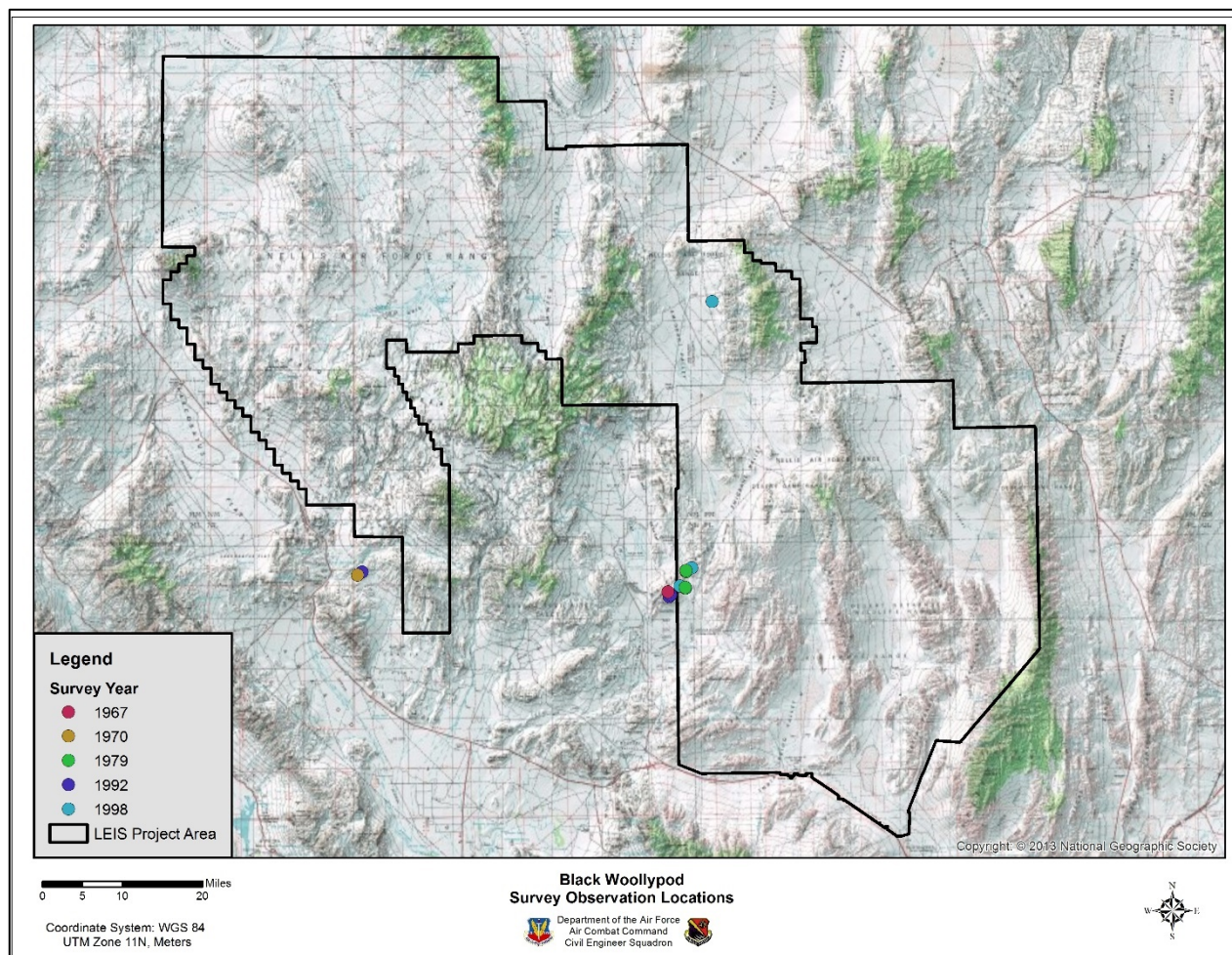


Figure 21. Locations where black woollypod has been observed in and around the study area.

## HALFRING MILKVETCH (*ASTRAGALUS MOHAVENSIS* VAR. *HEMIGYRUS*)

### DESCRIPTION

Halfring milkvetch is one of two varieties of the *Astragalus mohavensis* species. It was discovered in Clark County, Nevada, in the spring of 1939 by Ira W. Clokey. The primary difference between the *hemigyris* variety and the *mohavensis* variety lies in the size and shape of the pods. The pods of halfring milkvetch are narrower and more incurved than those of the *A. mohavensis* var. *mohavensis*, a distinction that lends itself to the common name of the variety (Mozingo & Williams, 1980). The pods of the plant do not in-



Halfring Milkvetch (Photo by Wes Niles, BLM/UNLV)



flate when mature and form a half circle that displays a short beak. When the pod dries, it is leathery and displays a noticeable network of veins that cover its surface (Mozingo & Williams, 1980).

Typical habitats of the halfring milkvetch include carbonate gravels, limestone or dolomite soils, as well as talus. It seems to also occur on ledges, hills, washes, and slopes. There are a few associated plants including *Achnatherum speciosum*, *Ambrosia dumosa*, *Coleogyne ramosissima*, *Ephedra torreyana*, *Juniperus osteosperma*, *Larrea tridentata*, and *Nicotiana obtusifolia*. The elevation varies from 3,000 to 6,070 ft. MSL (Beatley, 1976; Mozingo & Williams, 1980; Knight T. F., 1997; Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

Halfring milkvetch has been observed in the South Range Study Area on the Desert Range by Daniel Pritchett in 2001. A second population was discovered by Smith and Schofield in 1993 and confirmed by A. Karl in 2008 (Nellis Natural Resources Program, 2016). These observations were listed as *Astragalus mohavensis* with no variety, thus, the observation could be var. *hemigyrys* or *mohavensis* (Figure 22).

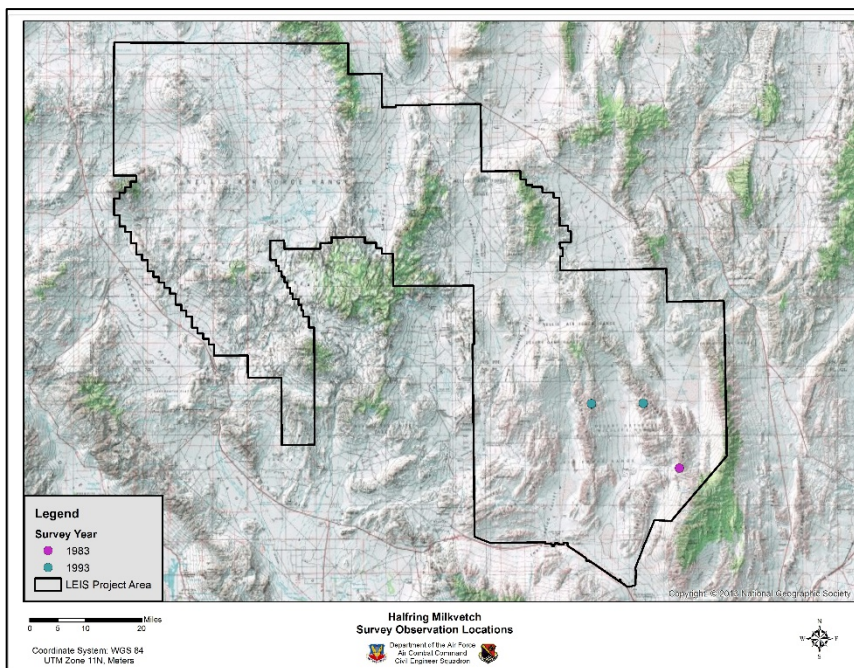


Figure 22. Location where halfring milkvetch has been observed in and around the study area.

## MOJAVE MILKVETCH (*ASTRAGALUS MOHAVENSIS* VAR. *MOHAVENSIS*)

### DESCRIPTION

Mojave milkvetch is known from southeastern California and adjacent Nevada, in the northern Mohave Desert and contiguous mountains. This variety of *Astragalus mohavensis* differs from the variety *hemigyrys* in that its pod is straight while the pod of *hemigyrys* is strongly incurved into half a circle. Habitat of Mojave milkvetch includes desert flats and mountain foothills, washes, dunes, canyons with greasewoods to pinyon-juniper from 2,952 to 7,545 ft. MSL (Nevada Natural Heritage Program, 2001). It occurs on rocky slopes of canyons and the long cliff edges commonly on limestone (Kartesz, 1988).



Mojave Milkvetch (Photo by Wes Niles, UNLV/BLM)



## RECENT AND HISTORICAL OBSERVATIONS

To date, no observations of Mojave milkvetch have been made within the study area and no map of observations is needed.

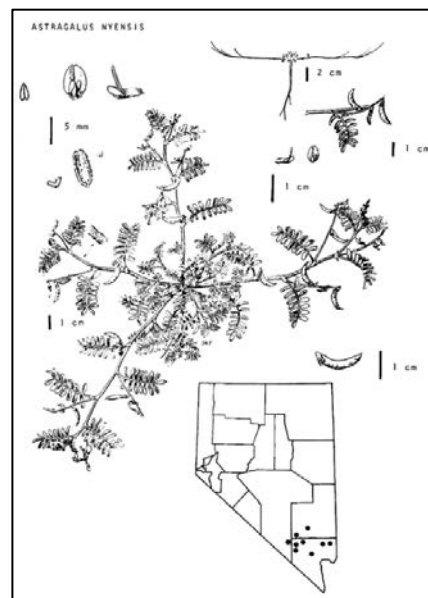
### NYE MILKVETCH (*ASTRAGALUS NYENSIS*)

#### DESCRIPTION

The Nye milkvetch is located at the foothills of desert mountains, calcareous outwash fans and gravelly flats, and sometimes in sandy, gravelly, slightly alkaline soils in the Mojave desert scrub (California Native Plant Society, Rare Plant Program, 2016) from 1,100 to 5,600 feet elevation (Nye Milkvetch (*Astragalus nyensis*), n.d.). It is often in plant communities associated with *Larrea tridentata*, *Ambrosia dumosa*, *Achnatherum hymenoides*, *Hymenoclea salsola*, *Coleogyne ramosissima*, *Hilaria rigida*, *Krameria parvifolia*, and *Astragalus geyeri* var. *triquetrus* (Nevada Natural Heritage Program, 2001).

#### RECENT AND HISTORICAL OBSERVATIONS

Nye milkvetch has been recorded in the South Range Study Area. Populations were observed mostly within the Spotted Range, Ranger Mountains, and Desert Range. NNHP has documented additional observations at the north end of the Sheep Range as well as outside the study area south of Frenchman Lake. Most of these observations were by R.C. Barneby in 1906, Ripley and Barneby in 1941, and T. Ackerman in 1979-1983. No recent observations have been recorded in the study area (Figure 23).



Drawing of Nye Milkvetch (Mozingo & Williams, 1980)

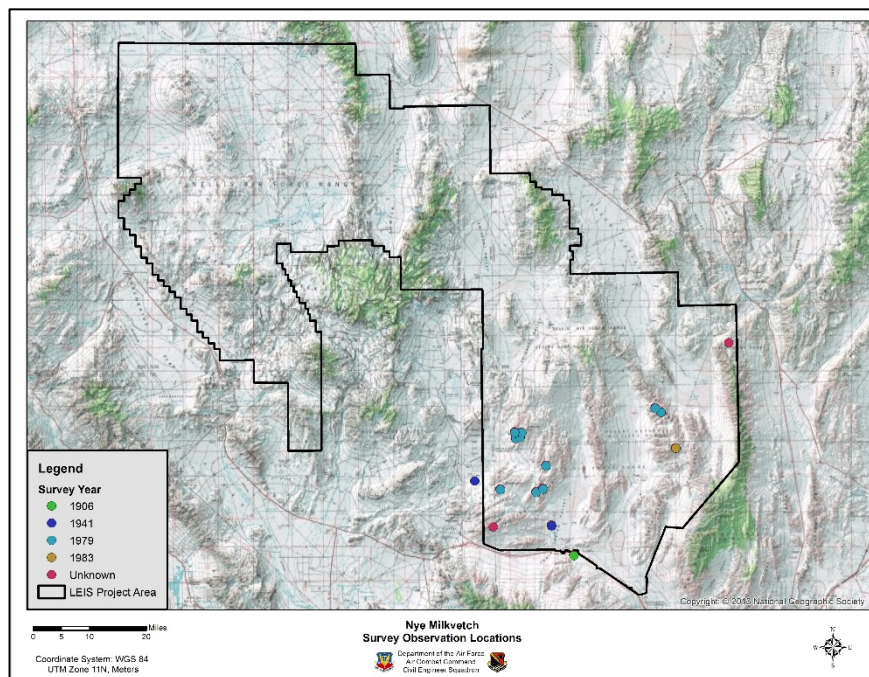


Figure 23. Locations where Nye milkvetch was observed on or around the study area.

## CLOKEY'S EGGVETCH (*ASTRAGALUS OOPHORUS* VAR. *CLOKEYANUS*)

### DESCRIPTION

Clokey's eggvetch is a lax, herbaceous perennial in the Legume family (*Fabaceae*), 2 to 4 in. tall and spreading to one foot (The Jepson Herbarium, 2016). Its flowers are reddish purple with a white eyespot and white wing tips. The distinctive, single-chambered, bladdery fruit is large--1 to 2 in. long and 0.4 - 0.8 wide--and glabrous, with "tiger-stripe", reddish mottling (The Jepson Herbarium, 2016). For this species, blooming occurs from June through July (Barneby R. C., 1954). The key differences between Clokey's eggvetch and other eggvetches are the smaller, bi-colored flowers and fewer seeds per pod. Clokey's eggvetch has 28 seeds versus 41 to 53 seeds in other varieties of *A. oophorus* (Wojciechowski M. F., 2012).



Clokey's Eggvetch (Photo by Frank Smith, NNHP)

Clokey's eggvetch has been recorded in pinyon-juniper and ponderosa pine associations at elevations of 5,000 to 10,300 ft. MSL (Mozingo & Williams, 1980; Wojciechowski M. F., 2012). The NNHP describes habitat for Clokey's eggvetch as "dry to slightly moist open slopes, flats, or drainages on gravelly soil derived from limestone or rhyolitic volcanoes, in openings or under shrubs in ponderosa pine forest, old burns with Gambel oak, and in pinyon-juniper woodlands" (Nevada Natural Heritage Program, 2001).

### RECENT AND HISTORICAL OBSERVATIONS

Clokey's eggvetch has been observed in the north-central part of the study area, with plants observed along the Belted Range and Kawich Range. In addition, observations were made on Timber Mountain close to the study area boundary. Further observations were made on the western boundary and north central portions of the NNSS (Figure 24).

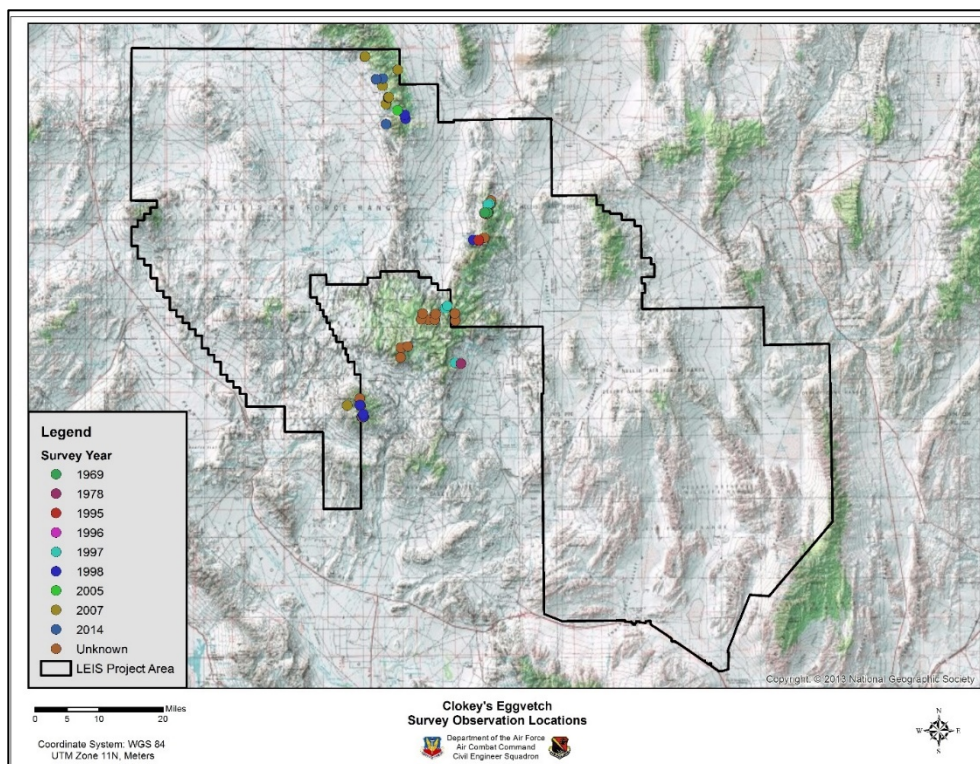


Figure 24. Locations where Clokey's Eggvetch has been observed in and around the study area.



## TONOPAH MILKVETCH (*ASTRAGALUS PSEUDIODANTHUS*)

### DESCRIPTION

The Tonopah milkvetch is a small, mat forming perennial herb. It extends several stems from a root base and may grow to 12 in. long. Leaves are up to 2.0 in. long with 7 to 19 small crowded leaflets ranging in length from 0.11 to 0.71 in. The flowering stalks are 0.5 in. long and bear 12 to 25 flowers. The inflorescence is a cluster of reddish purple flowers, which blooms in May and June. The fruit is a legume pod about 1-inch-long and sometimes curls upward into a complete ring. It is fleshy when young and dries to a leathery texture (Wojciechowski M. F., 2012). Per the NNHP, the Tonopah milkvetch is found in, “deep loose sandy soils of stabilized and active dune margins, old beaches, valley floors, or drainages” and it is, “dependent on sand dunes or deep sand in Nevada”. It grows at elevations ranging from 4,535 to 6,000 ft. MSL (Nevada Natural Heritage Program, 2001).



Tonopah Milkvetch (Photo by U.S. Forest Service)

Tonopah milkvetch usually occurs in plant communities dominated by salt desert shrub taxa (Nevada Natural Heritage Program, 2001). These include, among others, Greasewood (*Sarcobatus vermiculatus*), Four-wing Saltbush (*Atriplex canescens*), Indian Ricegrass (*Oryzopsis hymenoides*), and Shadscale Saltbush (*Atriplex confertifolia*).

### RECENT AND HISTORICAL OBSERVATIONS

To date, no observations of the Tonopah Milkvetch have been made within the study area. However, the NNHP does show records of the species north of the study area, to the east of Tonopah and Mud Lake and north of the Cactus Range (Figure 25).

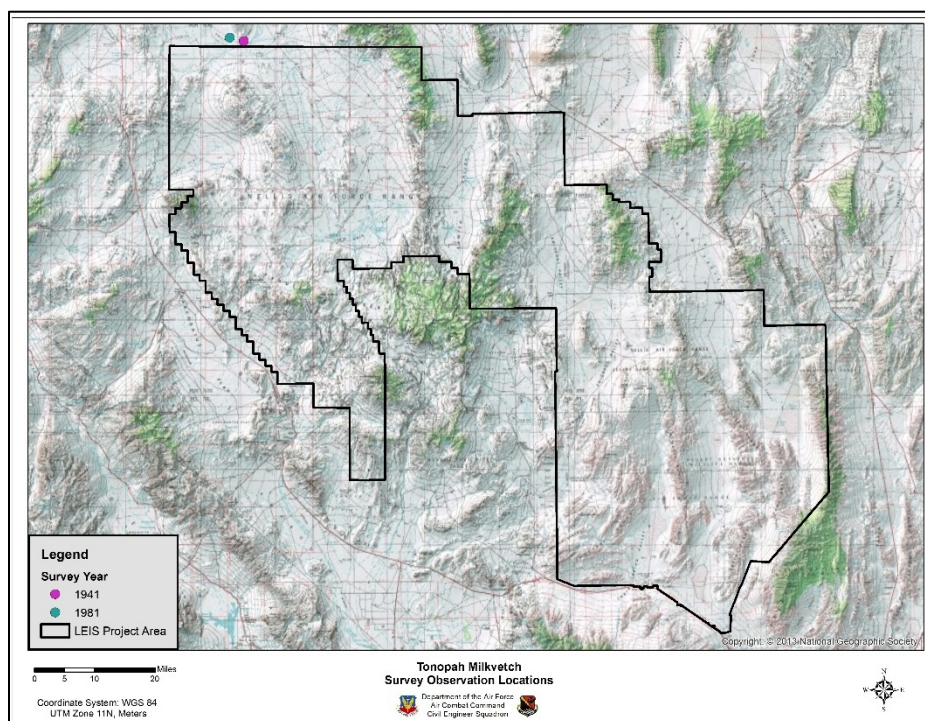


Figure 25. Location where the Tonopah milkvetch has been observed in and around the study area.



## PINYON ROCKCRESS (*BOECHERA DISPAR*)

### DESCRIPTION

The pinyon rockcress is a perennial with a woody base and short basal leaves that stay near the ground surface. The pinyon rockcress flowers between April and May with purple to lavender flowers (Baldwin, 2012). It prefers granite, gravelly soil among rocks in open forests and subalpine meadows (Flora of North America Editorial Committee, eds., 2009). It grows at elevations ranging from 4,921 to 7,545 ft. MSL (Flora of North America Editorial Committee, eds., 2009) in Joshua tree woodland, mojave desert scrub, and pinyon-juniper woodland (California Native Plant Society, Rare Plant Program, 2016).

### RECENT AND HISTORICAL OBSERVATIONS

No observations of the pinyon rockcress have been made within the study area. However, observations were made on the NNSS by the NNHP (Figure 26).

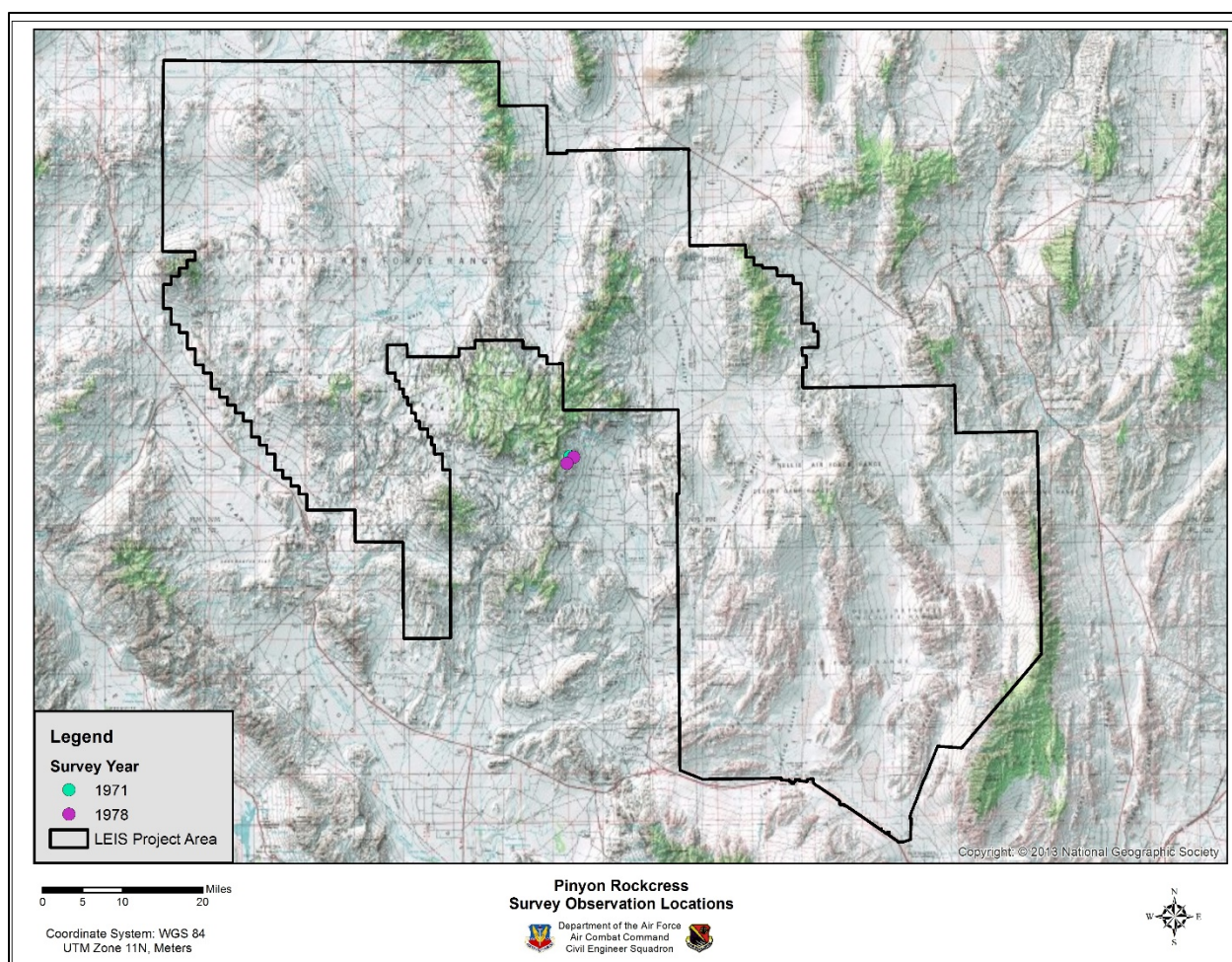


Figure 26. Locations where the Pinyon rockcress has been observed in and around the project area.



## SHOCKLEY'S ROCKCRESS (*BOECHERA SHOCKLEYI*)

### DESCRIPTION

Shockley's rockcress is located in rock outcrops (primarily dolomite) and gravelly soil in desert scrub, sagebrush, and pinyon-juniper woodlands at elevations of 3,937 to 7,217 feet (Dorn, 2003). This perennial herb blooms between May and June and has small lavender flowers with hairy sepals. It is most recognizable by its fruit, which are relatively long and curving (Baldwin, 2012).

### RECENT AND HISTORICAL OBSERVATIONS

No observations of Shockley's rockcress have been made within the study area in recent years. However, the NNHP does show records of the species on the NNSS and throughout the South Range Study Area. These populations were identified during surveys from 1960-1993 (Figure 27).



Shockley's Rockcress (Photo by Gregory Gust)

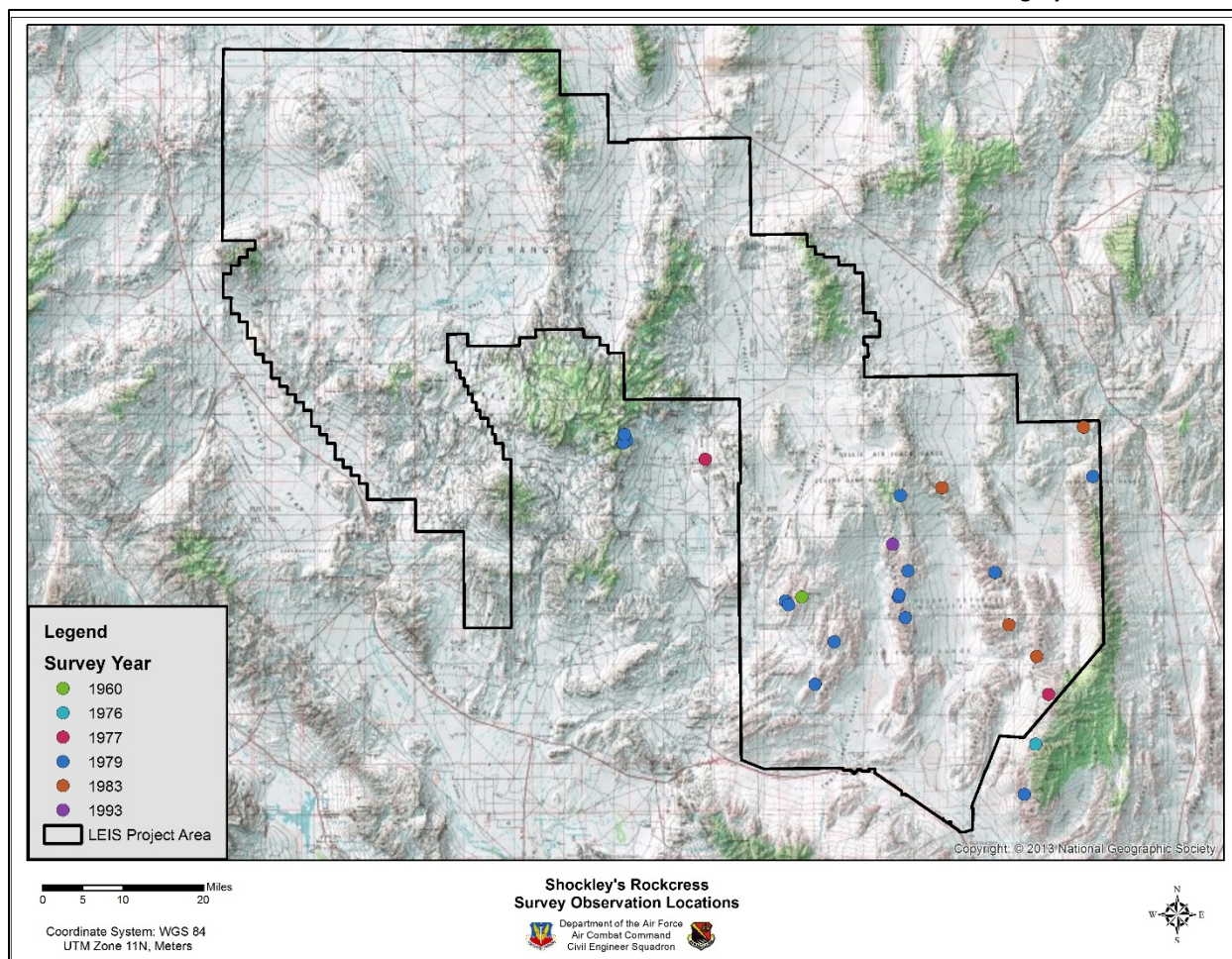


Figure 27. Locations where Shockley's rockcress was observed in and around the study area.



## CANE SPRING SUNCUP (*CAMISSONIA MEGALANTHA*)

### DESCRIPTION

The Cane Spring suncup has undergone several taxonomical changes. It was first classified as *Oenothera heterochroma* var. *megalantha*, then *Oenothera megalantha*, and finally introduced as its current name, *Camissonia megalantha*. The Cane Spring suncup typically inhabits, “dry, open, loose soils on sandy to gravelly flats, slopes, or scree” at elevations from 3380-6500 ft. MSL (Nevada Natural Heritage Program, 2001). The soils tend to be derived from “light-colored volcanic rocks” (Beatley, 1976). It has been found in outcrop crevices, washes, along roads, on slopes, and areas recovering from disturbances (Nevada Natural Heritage Program, 2001). The Cane Spring suncup reaches a height of 28 in. and has pubescent stems with fine lines that run the length of the stem and leaves. The plant’s leaves are 2.5 to 5.0 in. long and composed of eleven lanceolate-linear or linear leaflets with blunt tips (Baldwin, 2012).



Cane Spring Suncup  
(Photo by NNSS)

Typically, this plant grows among salt desert shrub communities (Nevada Natural Heritage Program, 2001). The only location recorded for the North Range Study Area by NNHP is in an area dominated by black sagebrush (*Artemisia nova*), several miles from the edge of a shadscale plant community. Other shrub associates include desert needlegrass (*Achnatherum speciosum*), shadscale saltbush (*Atriplex canescens*), and desert holly (*Atriplex hymenelytra*) (Beatley, 1976; Collins & O'Farrell, 1984).

This species is a Nevada endemic, primarily found in only a 23.8 mile range in southeastern Nye County, with a disjunction population near Cedar Pass (Nevada Natural Heritage Program, 2001). Its type population on the NNSS was monitored from 1960-1973 and is noted for having varied in size from dozens to over 4,000 plants (Beatley, 1976).

### RECENT AND HISTORICAL OBSERVATIONS

Although the only known population on the NTTR North Range is at Cedar Pass, this is an observation from 1977, is disjunct from other observations of the species, and is outside published habitats (Figure 28). Based on the latter, it is estimated that potential North Range Study Area locations could include

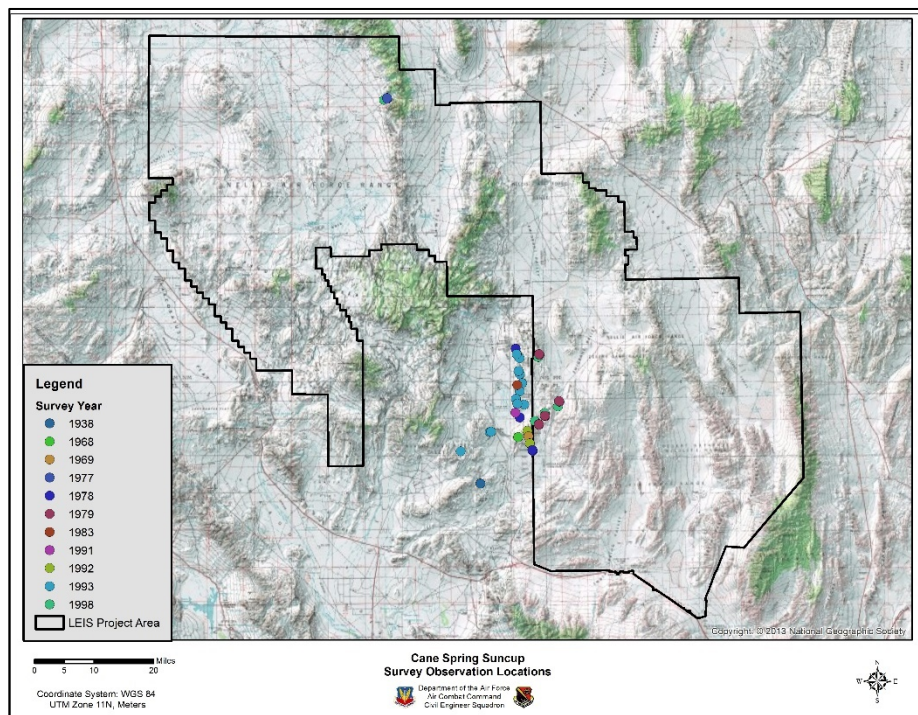


Figure 28. Locations where cane spring suncup has been observed in and around the study area.



the plant communities dominated by shadscale. However, because of the disjunct sighting at Cedar Pass and potentially incomplete knowledge about the species habitat requirements, we recommend extending all searches to include black sagebrush. Cane spring suncup has been observed in the north-east part of the North Range Study Area along Cedar Pass. It has been observed along the border of the NNSS and the South Range Study Area. The NNHP also documented three populations within the NNSS.

## CLOKEY'S PAINTBRUSH (*CASTILLEJA MARTINII* VAR. *CLOKEYI*)

### DESCRIPTION

Clokey's paintbrush is an herbaceous perennial growing from 12 to 32 in. tall and is a member of the figwort (Scrophulariaceae) family. The leaves have wavy-margins with 0 to 3 lobes. The inflorescence is bright red to yellowish, with 0 to 7 lobes. The plant's stickiness along with other minute differences, separate it from the more common red paintbrushes. Blooming is from late May to August (Cronquist A. , Holmgren, Reveal, & Holmgren, 1984; Baldwin, 2012). Typically, Clokey's paintbrush grows among pinyon-juniper and ponderosa-bristlecone pine vegetation communities, at elevations of 1,000 to 11,500 ft. MSL (Nevada Natural Heritage Program, 2001; Baldwin, 2012). This plant grows in soils that are typically gravelly (Cronquist A. , Holmgren, Reveal, & Holmgren, 1984).



Clokey's Paintbrush (Photo by Marc Kummel)

### RECENT AND HISTORICAL OBSERVATIONS

The NNHP database includes historical records (1968-1994) of the species in the North Range Study Area on Stonewall Mountain and the Belted Range and on the NNSS (Figure 29). The species was observed in 42 locations on the Sheep Range by Charlet in 2012 (Charlet, Leary, & Westenburg, 2013), but the data was not available for this report.

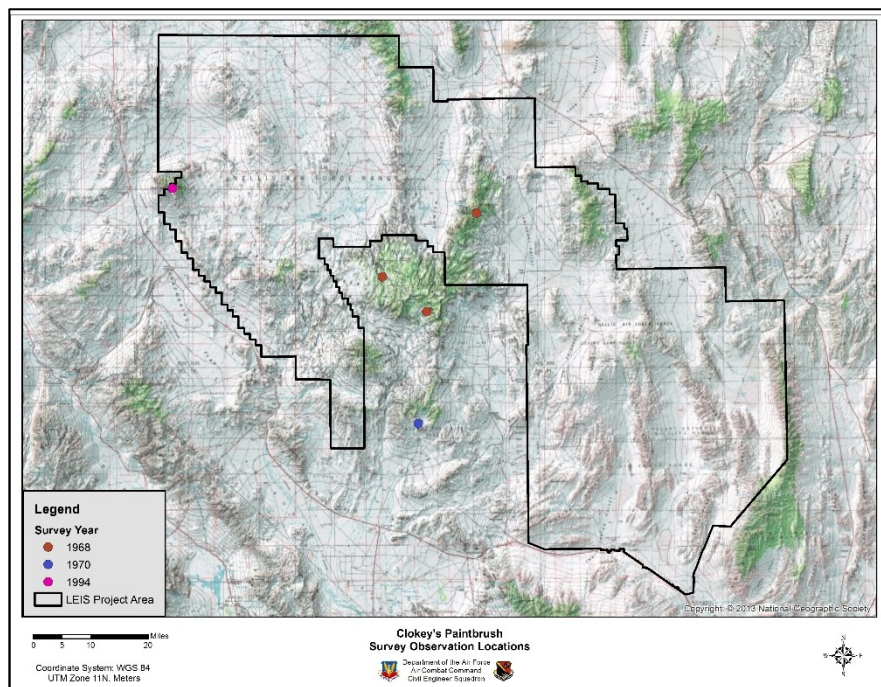


Figure 29. Locations where Clokey's paintbrush has been observed in and around the study area.

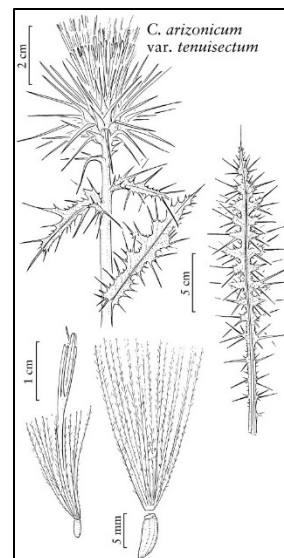
## KEYSTONE CANYON THISTLE (*CIRSIMUM ARIZONICUM* VAR. *TENUISECTUM*)

### DESCRIPTION

Keystone Canyon thistle is found within rocky slopes, drainages, roadsides, pine-oak-juniper woodlands, and montane coniferous forests with elevations ranging from 4,921 to 9,186 ft. MSL (Keil D. , 2016). The Keystone Canyon thistle has deeply divided, glabrous leaves that appear slightly cobwebby due to the many thin hairs on the leaves. The flowers are pink to red/purple and bloom from July to November (Baldwin, 2012).

### RECENT AND HISTORICAL OBSERVATIONS

No recent or historical observations of the Keystone Canyon thistle have been made within the study area, and no map of observations is needed. Observations of the plant have been made in the Spring Mountains in Clark County (Keil D. , 2016). The NNRP continues to search for this species during annual rare plant and vegetation surveys on the NTTR.



Drawing of Keystone Canyon Thistle (Keil D. , 2016)

## NEW YORK MOUNTAINS CATSEYE (*CRYPTANTHA TUMULOSA*)

### DESCRIPTION

New York Mountains catseye is a perennial herb only located naturally in California and Nevada in four counties. The plant has been specifically noted in the Spring Mountains in southwestern Nevada. It thrives in gravel, clay, granitic, or limestone type of soils and can be found at elevations between 3,000 and 6,990 ft. MSL. New York Mountains catseye has been found in elevations as high as 9,900 feet (Entrix, 2008).

New York Mountains catseye is a perennial with a woody base that grows anywhere between 3 to 10 in. tall (Baldwin, 2012). The leaves form a crowded basal rosette, with individual leaves being spoon shaped and appearing more gray than green due to dense, silky hairs. The leaves are oblanceolate to spoon-shaped with more located at the base of the plant. The flowers are fairly small and white in color with yellow appendages. The flowering period for the plant is between April and June. The fruit of this plant is considered a nutlet with both surfaces of the fruit being rough and back ridged down the middle, and the groove of the fruit is open-triangular (Baldwin, 2012).

*C. tumulosa* as it is very similar to both *C. virginensis* and *C. hoffmannii*. *C. tumulosa* can be distinguished from *C. hoffmannii* by its yellowish-brown or orangey trichomes, and a longer pedicel and calyx. *C. tumulosa* can be distinguished from *C. virginensis* by its prominently woody caudex and nutlets with a rounded dorsal ridge.

### RECENT AND HISTORICAL OBSERVATIONS

The New York Mountains catseye was recently observed on the South Range Study Area east of the Desert Range and near the south end of the Spotted Range by D. Charlet in 2010 and Adams Ecology botanists in



New York Mountain Catseye



2016. Another specimen was found in the southwest end of the Spotted Range by Adams Ecology botanists in 2016 (Figure 30).

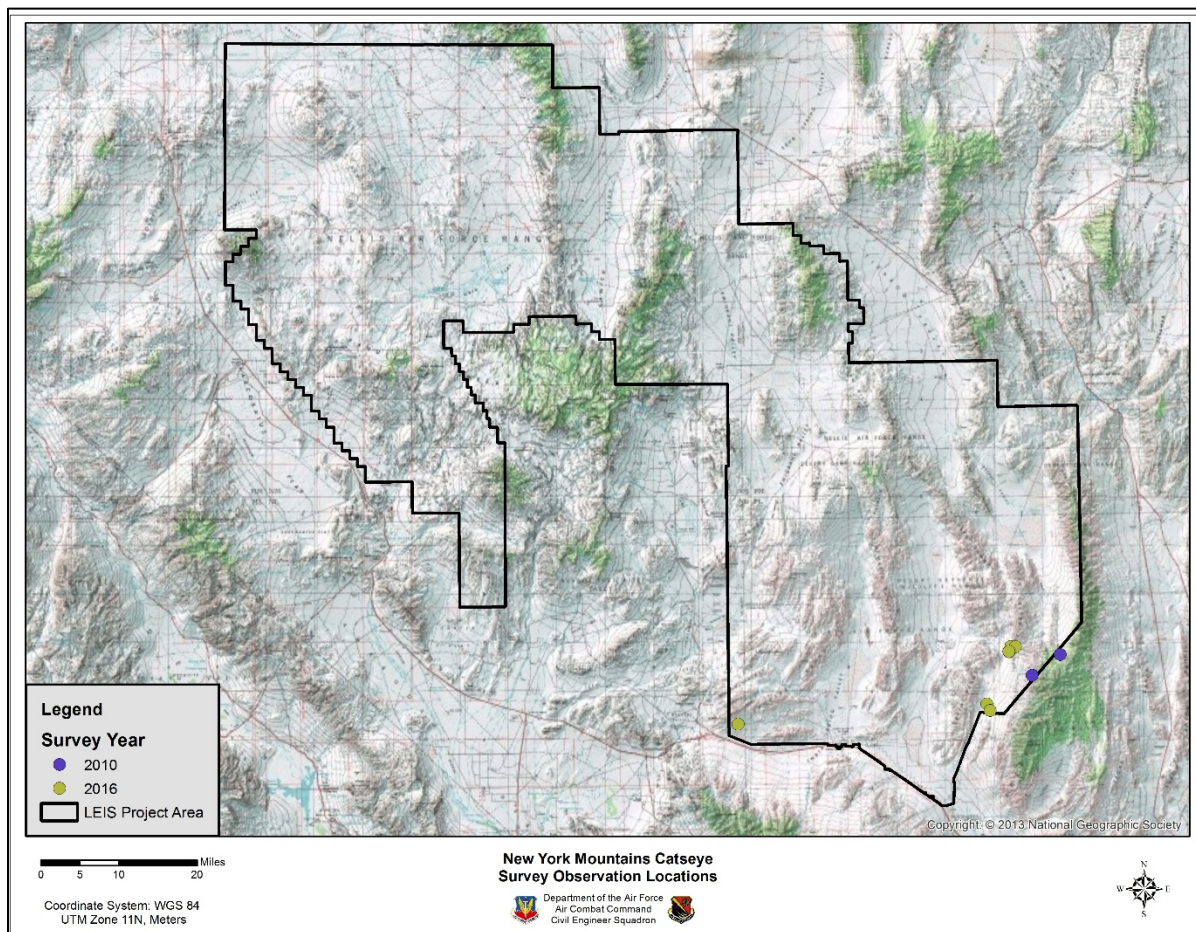


Figure 30. Locations where New York Mountains catseye was observed in and around the study area.

## RIPLEY'S BISCUITROOT (*CYMOPTERUS RIPLEYI* VAR. *RIPLEYI*)

### DESCRIPTION

Ripley's biscuitroot is located in loose sandy to gravelly, often somewhat alkaline soils on volcanic tuff deposits and mixed valley alluvium typically in small drainageways (Nevada Natural Heritage Program, 2001). The plant generally flowers in the spring. The plant is considered to be dependent on sand dunes or deep sands in Nevada. It is commonly found with *Atriplex confertifolia*, *A. canescens*, *Psoralea polydenia*, *Achnatherum hymenoides*, *Tetradymia* spp., *Astragalus callithrix*, *Sarcobatus vermiculatus*, *Chrysothamnus* spp., and *Grayia* spp. (Nevada Natural Heritage Program, 2001). Currently, botanists are not in agreement as to whether there are distinct varieties within



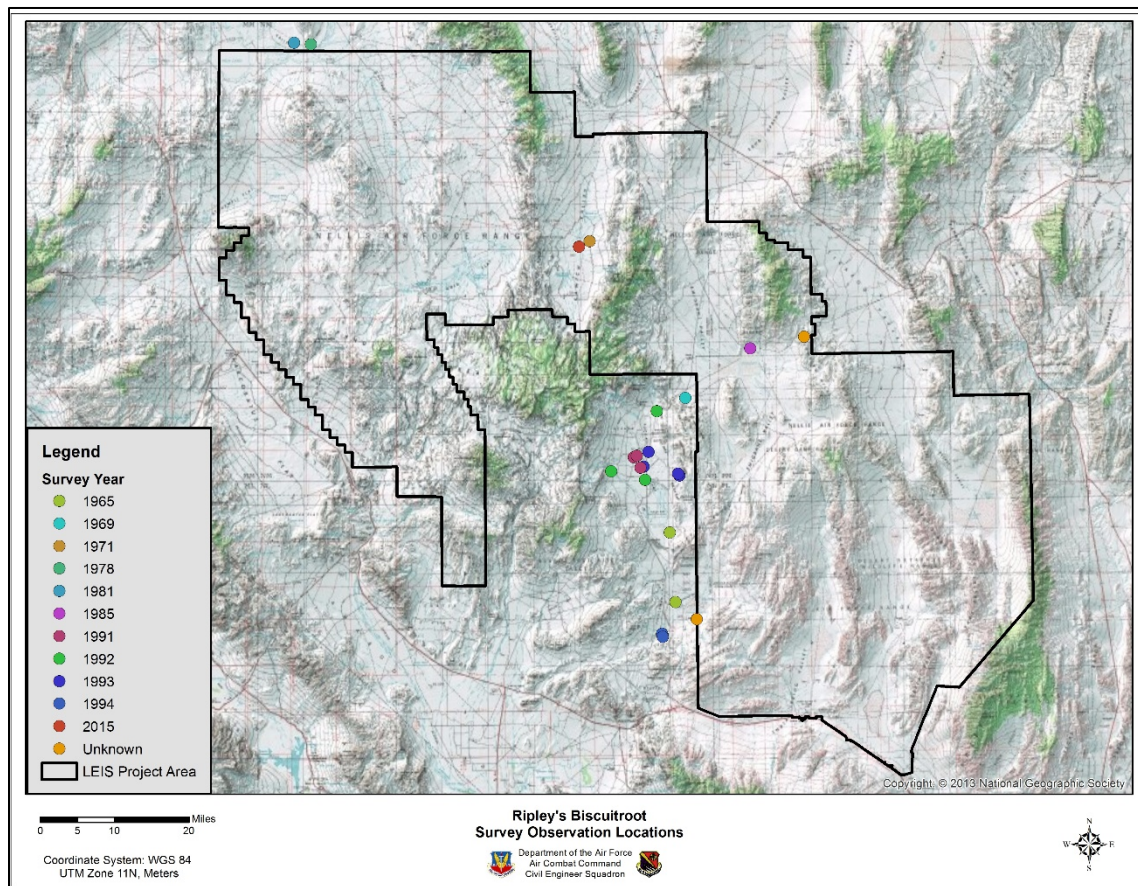
Ripley's Biscuitroot



*Cympterus ripleyi*. The two varieties listed in this report are not recognized by the USDA Plant Database (United States Department of Agriculture, 2016), Jepson (Baldwin, 2012), or Cronquist (Cronquist A. , Holmgren, Reveal, & Holmgren, 1984). Kartesz states that the var. *saniculoides* appears to be nothing more than a color phase of the species and is not distinct (Kartesz, 1988).

## RECENT AND HISTORICAL OBSERVATIONS

Ripley's Biscuitroot was observed throughout the study area. The NNHP also has recorded observations ranging throughout the study area and surrounding areas. Figure 31 includes observations of *Cympterus ripleyi* that were made on the study area that included var. *ripleyi* and observations where the varieties were not identified or separated.



**Figure 31.** Locations where Ripley's Biscuitroot has been observed in and around the study area. Note that these observations include some observations that did not differentiate between the two varieties of *Cympterus ripleyi* (var. *ripleyi* and var. *saniculoides*)



## SANICLE BISCUITROOT (*CYMOPTERUS RIPLEYI* VAR. *SANICULOIDES*)

### DESCRIPTION

Sanicle biscuitroot is a small, herbaceous perennial in the carrot (Apiaceae) family that arises from a subterranean crown (Nevada Natural Heritage Program, 2001). It was first discovered on sparsely vegetated white alkaline-calcareous gravel hills at the base of the Spotted Range towards Frenchman Flat at 3,200 ft. MSL (Barneby R. C., 1941). Interestingly, it was discovered before the variety was recognized because of the smaller heads, a longer and silvery thick pubescence, and geographic limitation (Barneby R. C., 1941). However, it is not considered to be a separate variety of the *ripleyi* species by either editions of the Jepson Desert Manual, or the voluminous work, Intermountain Flora (Constance & Wetherwax, 2011; Cronquist, Holmgren, & Holmgren, 1997).



Sanicle Biscuitroot

Similar to other species of desert *Cymopterus*, the above-ground portions of sanicle biscuitroot are present only during the growing season and not in poor years. Because little information is available on the sanicle biscuitroot, the following descriptions are of the parent species. The plant is generally 3.94 - 5.9 in. tall. The approximately round leaves are deeply lobed into three wedges, with the lobes again divided and 1.18 - 3.94 in. long. The flower has a purple or white corolla. Its fruit is 0.24 - 0.28 in. long with either a wedge-shape or obovate. The crowded fruit is villous-woolly and winged. Flowering occurs from either March or April to June (Nevada Natural Heritage Program, 2001; Constance & Wetherwax, 2011).

Sanicle biscuitroot grows in shadscale saltbush (Mozingo & Williams, 1980) and dune or incipient dune associations where the soils are loose-sandy and coarse surface particles are limited to scattered fine gravel (Cronquist, Holmgren, & Holmgren, 1997). Common associates found on the study area include fourwing saltbush (*Atriplex canescens*), Geyer's milkvetch (*Astragalus geyeri*), money buckwheat (*Eriogonum nummularie*), Torrey's blazingstar (*Mentzelia torreyi*), Steptoe Valley beardtongue (*Penstemon immanifestus*), lemon scurfpea (*Psoraleidium lanceolatum*), desert globemallow (*Sphaeralcea* sp.), and lit-tleleaf horsebrush (*Te-tradymia glabrata*) (Knight, Smith, & Pritchett, 1997). It has

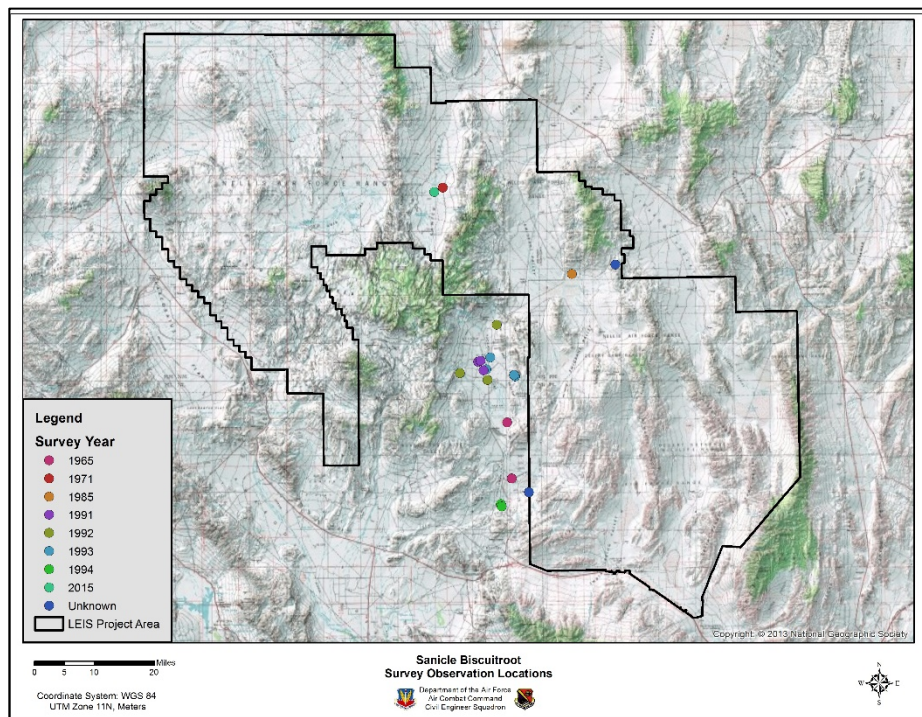


Figure 32. Locations where sanicle biscuitroot have been observed in and around the study area.

also been found among mormon tea (*Ephedra viridis*), white ratany (*Krameria grayi*), Shockley's golden-head (*Acamptopappus shockleyi*), Nevada dalea (*Psoralea polydenius*), Indian ricegrass (*Achnatherum hymenoides*), and birdcage evening primrose (*Oenothera deltoides*). The elevations for sanicle biscuitroot range from 2,970 to 6,720 ft. MSL (Constance & Wetherwax, 2011; Nevada Natural Heritage Program, 2001; Cronquist, Holmgren, & Holmgren, 1997).

## RECENT AND HISTORICAL OBSERVATIONS

To date, one recent observation of the sanicle biscuitroot has been made within the study area (Figure 32). This one observation was found on sand dunes within the Kawich Valley. Several observations of *Cymopterus ripleyi* have been made on the study area (Figure 31), but only one has been positively identified as the var. *saniculoides*. Currently, the NNHP is the only source that recognizes this plant as a separate variety of *Cymopterus ripleyi*.

## CHALK LIVEFOREVER (*DUDLEYA PULVERULENTA* SPP. *ARIZONICA*)

### DESCRIPTION

Chalk liveforever appears in cracks and crevices in rock outcrops of various soil compositions from limestone to granite and sometimes on rocky or sandy soils (Nevada Natural Heritage Program, 2001). It tends to be growing in the creosote-bursage, blackbrush, mixed-shrub, and lower pinyon-juniper vegetation communities, usually with other succulents such as agave, yucca, and other members of the family Cactaceae (Nevada Natural Heritage Program, 2001). Chalk liveforever gets its name from being covered in a dense, mealy powder or chalky wax to give it a chalk covered look (Baldwin, 2012). As the plant ages, it becomes more red thus distinguishing itself from other *Dudleya* species. It prefers elevations of 500 to 2,700 ft. MSL and blooms apricot-yellow to deep red flowers between April and June (The Jepson Herbarium, 2016).



Chalk Liveforever (Photo by Sonja Kokos, Nevada Native Plant Society)

## RECENT AND HISTORICAL OBSERVATIONS

No recent or historical observations of the Chalk Liveforever have been made within the study area and no map of observations is needed.

## DEATH VALLEY MORMON TEA (*EPHEDRA FUNEREA*)

### DESCRIPTION

Death Valley Mormon Tea is comprised of erect twigs which are gray-green when young and become gray and cracked with age. Tiny leaves grow at nodes along the twigs. Male plants produce pollen cones (approximately 0.3 in. long) at the nodes, and female plants produce seed cones which are slightly longer and may grow on stalks (Griffin, 1993). It prefers to grow in dry rocky slope areas within creosote-bush scrub vegetation communities between 1,181 and 5,577 ft. MSL (Baldwin, 2012).



Death Valley Mormon Tea (Photo by Dennis Stevenson)



## RECENT AND HISTORICAL OBSERVATIONS

The Death Valley Mormon tea was observed on the South Range Study Area on the Pintwater Range and Spotted Range in 2013 by NNRP botanists (Figure 33). Two populations were identified in 2001 on the south end of the Spotted Range. One plant was identified in 2016 near the south end of the Pahranaagat Range.

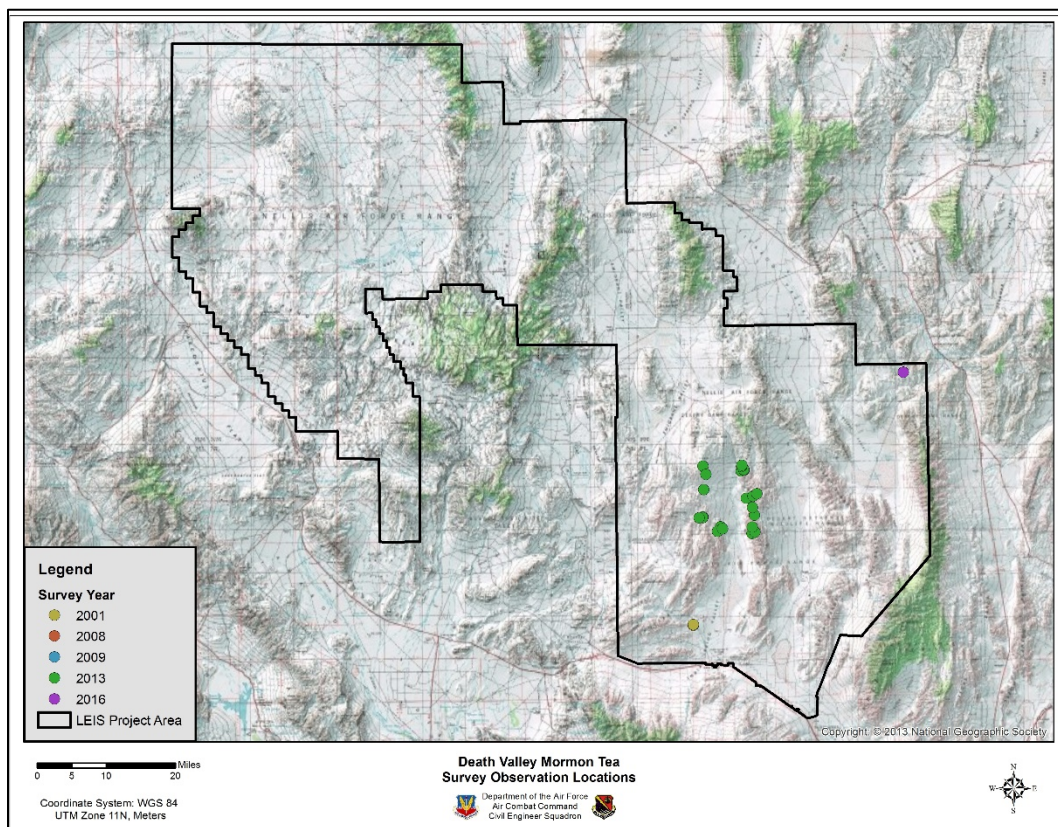


Figure 33. Locations where Death Valley Mormon tea was observed in and around the study area.

## ANTELOPE CANYON GOLDENBUSH (*ERICAMERIA CERVINA*)

### DESCRIPTION

Antelope Canyon goldenbush is a shrub, 0.4 to 1.5 in. tall, intricately branched and with leaves that often have ruffled margins. Yellow flower heads appear on the ends of the leafy branches in September and October. *Ericameria cervina* is located in rock crevices and talus in shadscale and Douglas-fir-bristlecone pine communities at 5,249 to 8,809 ft. MSL. It is often found on calcareous substrates and less commonly found on ash flow tuff (NatureServe, 2016).



Antelope Canyon Goldenbush (Photo by Mel Harte)



## RECENT AND HISTORICAL OBSERVATIONS

Two observations of the Antelope Canyon goldenbush have been documented within the study area. One observation was found in 2014 within Civet Cat Canyon on the North Range Study Area. A second population was identified on the Desert Range in 1987 (Figure 34).

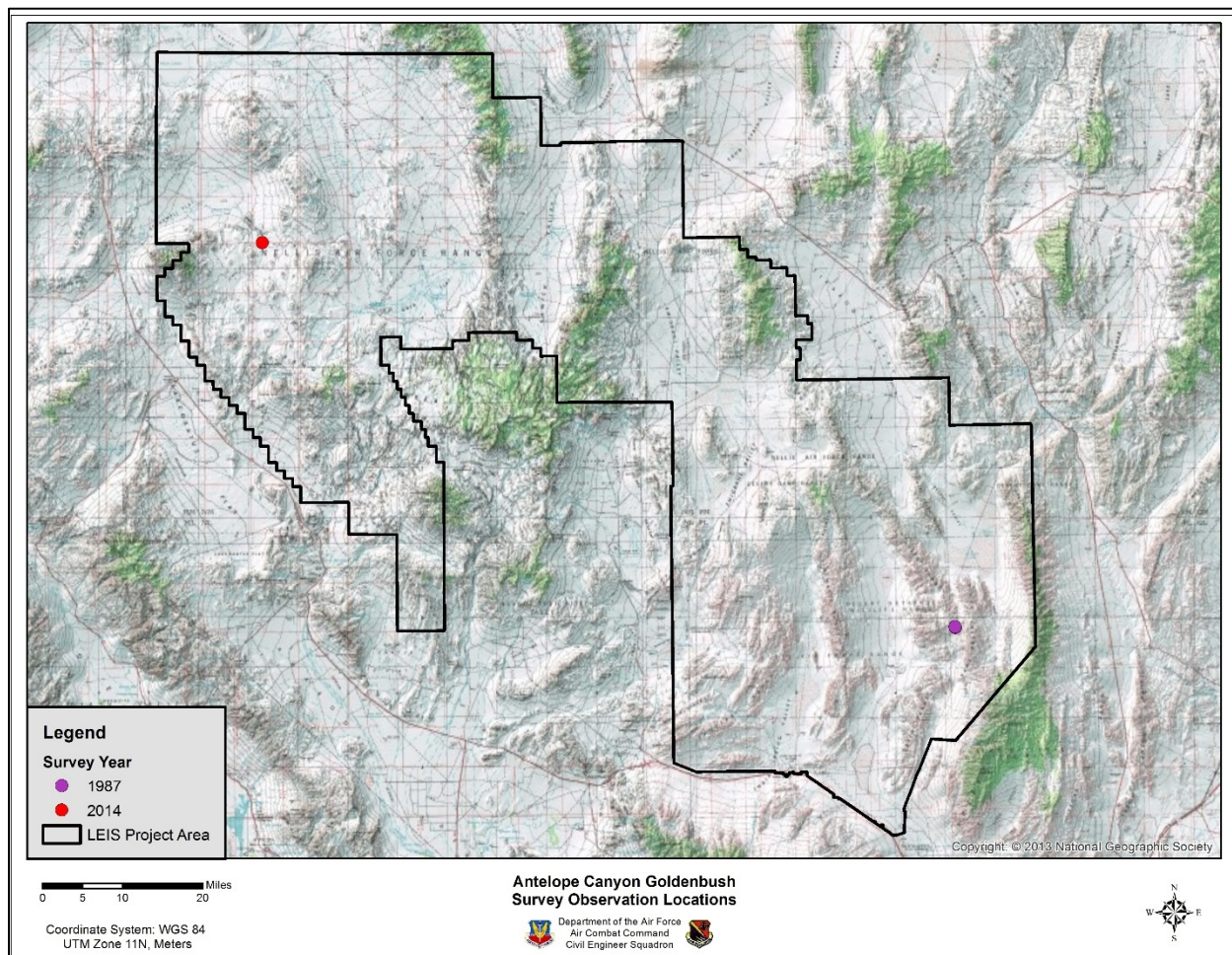


Figure 34. Locations where Antelope Canyon goldenbush has been observed in and around the study area.

## CHARLESTON GOLDENBUSH (*ERICAMERIA COMPACTA*)

### DESCRIPTION

The Charleston goldenbush is a perennial plant 6 to 20 in. tall erect to spreading. The plant is green when young but becomes tan with age. The plant is found on forested carbonate slopes, and adjacent ridges and low outcrops, in the subalpine and montane conifer vegetation communities including *Pinus longaeva*, *P. flexilis*, and *P. ponderosa* (Nevada Natural Heritage Program, 2001). It is a compact woody shrub with dark bark



Charleston Goldenbush (Photo by Bruce Lund, U.S. Forest Service)



and dense foliage that produces small yellow flower heads between August and September (Nevada Natural Heritage Program, 2001). It favors elevations between 7,808 and 9,776 ft. MSL on rocky to gravelly slopes in pine forests (Flora of North America, 2016).

## RECENT AND HISTORICAL OBSERVATIONS

To date, no recent observations of the Charleston goldenbush have been made within the study area. However, the NNHP does show one record of this species observed in 1978 near Hayford Peak in the Sheep Range just southeast of the South Range Study Area.

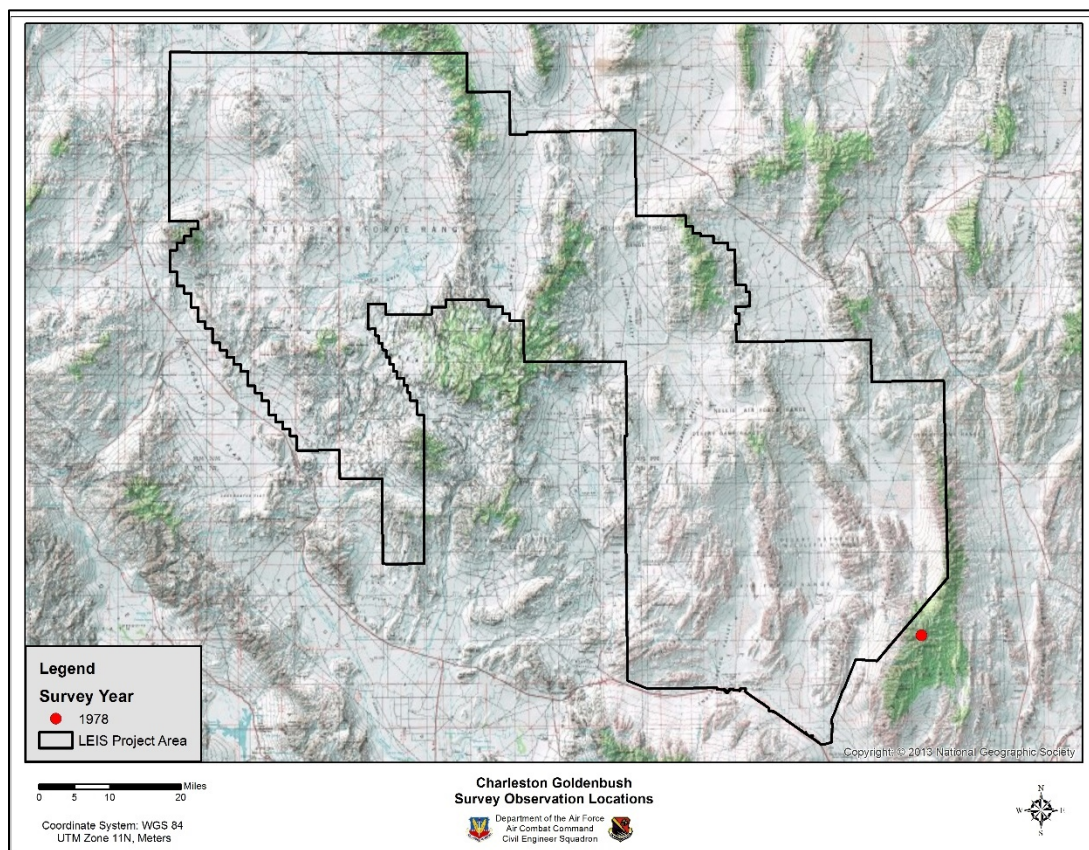


Figure 35. Locations where Charleston goldenbush has been observed in and around the project area

## WATSON'S GOLDENBUSH (*ERICAMERIA WATSONII*)

### DESCRIPTION

Watson's goldenbush is located on rock outcrops or desert scrub areas, mainly growing in pinyon-juniper and ponderosa pine communities. It is found in elevations ranging from 4,265 to 11,154 ft. MSL (Flora of North America, 2016). This perennial shrub flowers most frequently in the late summer to fall. It is found in Arizona, Nevada, and Utah (Flora of North America, 2016).

### RECENT AND HISTORICAL OBSERVATIONS

Currently, only one observation of the Watson's goldenbush within the study area and it occurred on Belted Peak on the Belted Range in 1995 (Figure 36).



Watson Goldenbush (Photo by Nevada Rare Plant Society)



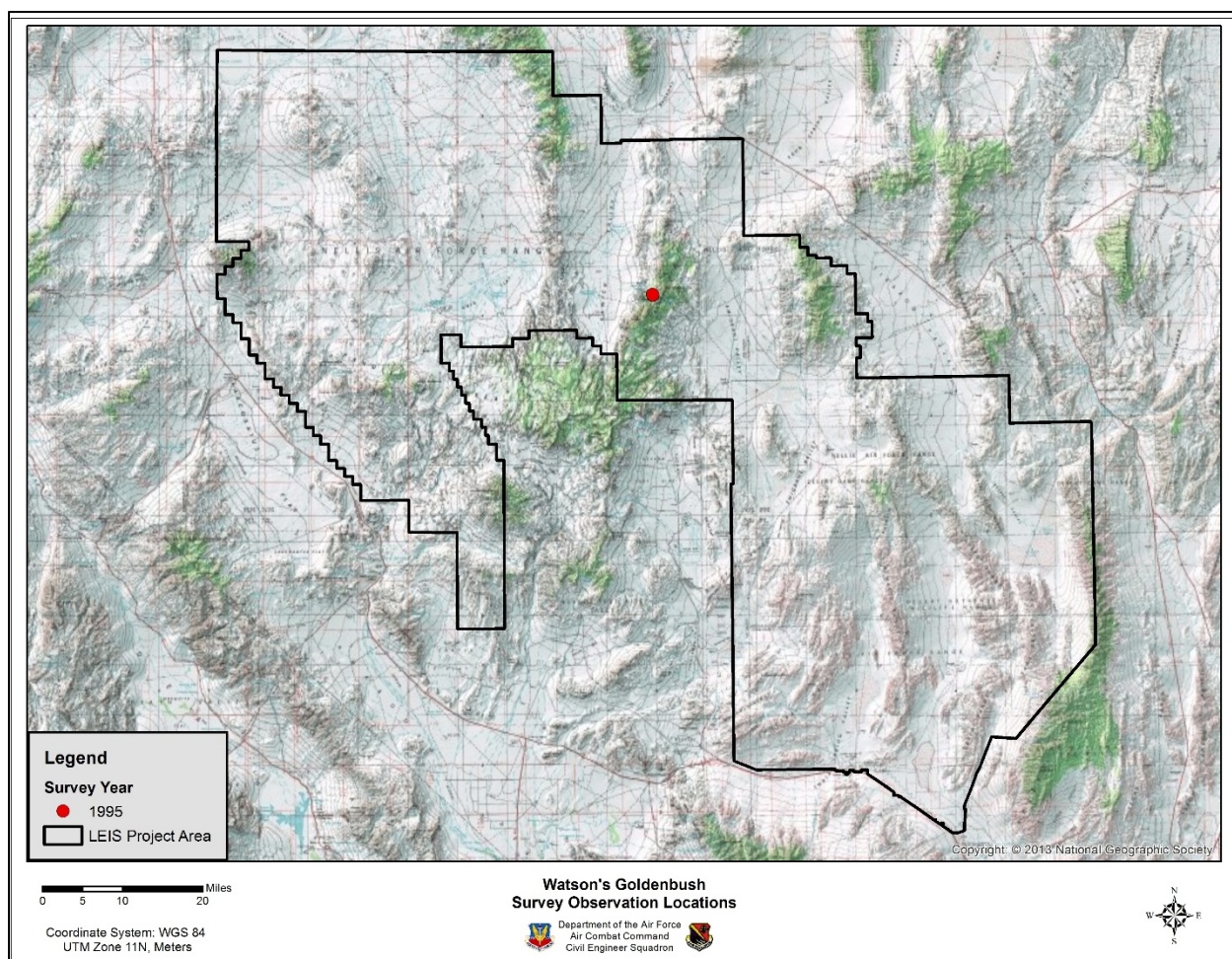


Figure 36. Locations where Watson's goldenbush has been observed in and around the project area.

## SHEEP FLEABANE (*ERIGERON OVINUS*)

### DESCRIPTION

Sheep fleabane was discovered under the name *Erigeron caespitosus* ssp. *anactis* in 1898 on Mt. Irish in Lincoln County, Nevada. It was classified as a separate species in 1947 because it lacks pistillate flowers and possesses a glandular and rigidly hairy involucre, and these characteristics are not typical of *E. caespitosus* (Cronquist A. , 1947).

Sheep fleabane is a perennial herb with relatively short, thick branches and a height that ranges from 2 to 6 in. tall. The stems are essentially erect and bent with non-glandular hairs. Leaves are persistent and basal, reaching a maximum size of 2.8 in. long by 0.5 in. wide. Basal blades are usually 3-nerved, shaped like a spatula and hairy. The inflorescence has no ray flowers and a disc corolla about 0.25 to 0.50 in. in diameter. The plant has been known to flower from June to October (Knight T. F., 1997).



Sheep Fleabane in Bloom by Tom Ackerman  
(Knight T. F., 1997)



This plant is found on, “limestone rock outcrops, the north side of cliffs, and at the base of cliffs” (Mozingo & Williams, 1980). It also occurs along ridgelines within the pinyon-juniper and montane coniferous zones from elevations 3,600 to 8,400 ft. MSL (Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

Multiple observations of Sheep Fleabane have been made within the study area. The total estimated number of individuals that have been identified are approximately 314. These occur at 15 locations throughout Nevada. Six observations were made in 2011 by D. Charlet on the west slope of the Sheep Range (Charlet, Leary, & Westenburg, 2013). One observation was made by NNRP botanists in 2010 on the Cactus Range. Several observations of the species were made in the Groom Range in 1984, 1985, and 1998. Last, several observations were made on the west side of the Sheep Range in 1940, 1962, 1973, and 1979 (Figure 37).

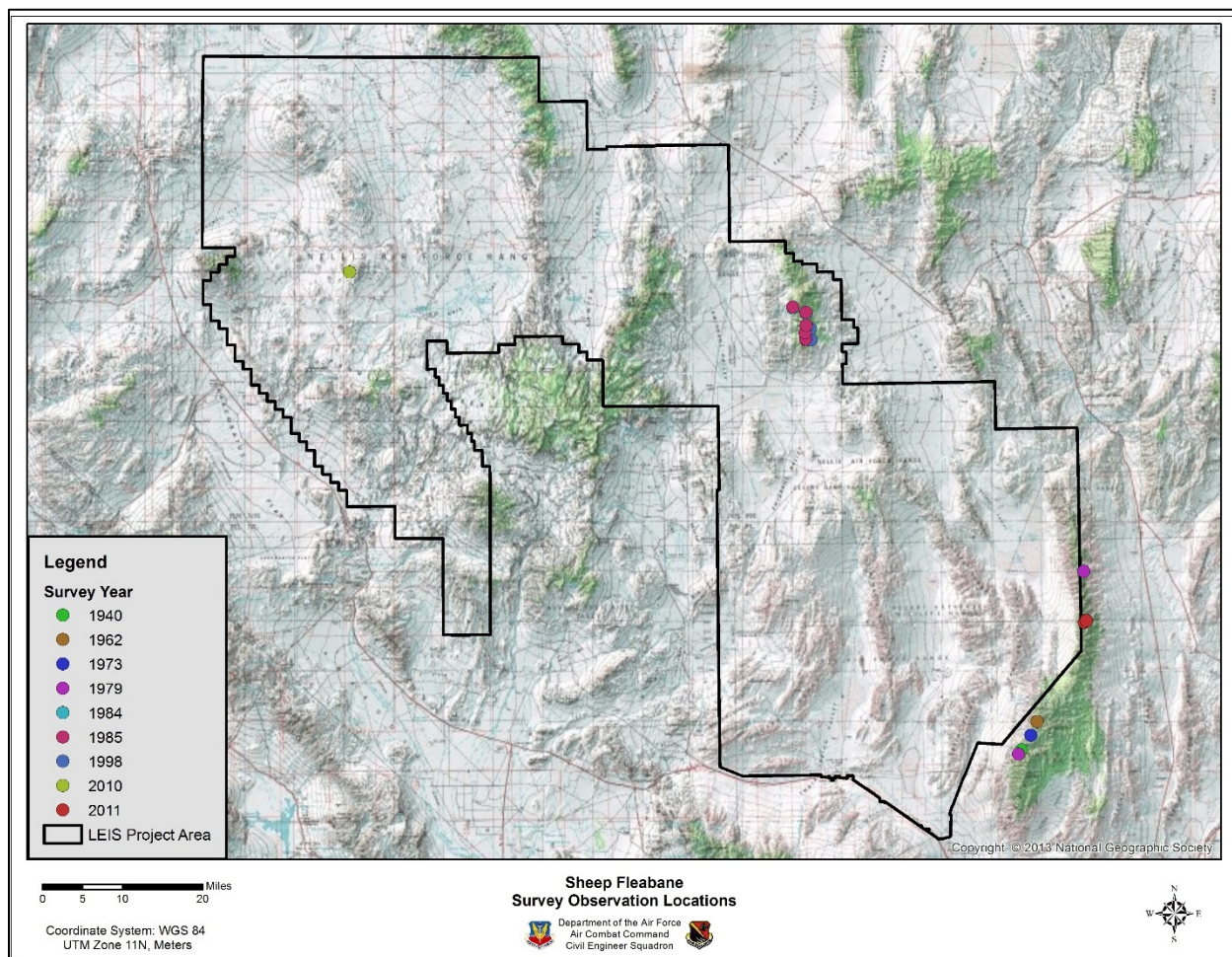


Figure 37. Locations where sheep fleabane was observed in and around the study area.

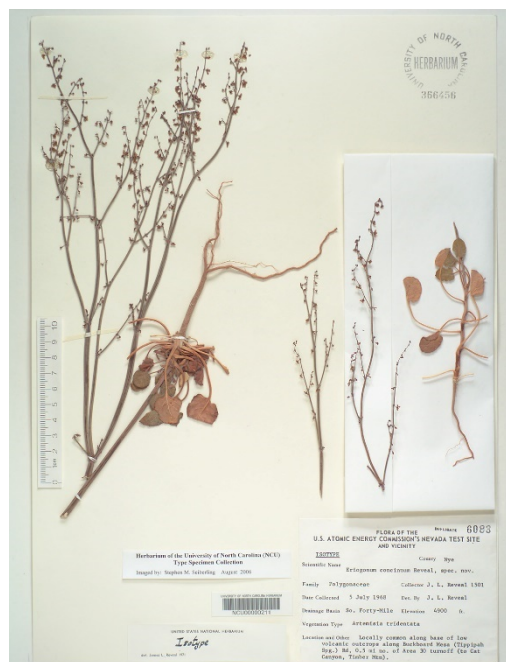


## DARIN'S BUCKWHEAT (*ERIOGONUM CONCINNUM*)

### DESCRIPTION

Darin's buckwheat is an annual herb with erect stems approximately 4 to 20 in. tall. The stems are usually hollow and glabrous. Leaves are covered with short hairs and have relatively long petioles with a subcordate blade. The leaves are usually basal, but may extend up the stem 0.5 to 2.5 in. Flowers are arranged in narrow, green to white cymes that bloom from late May to early September (Beatley, 1976).

The plant is commonly found on sandy to gravelly flats, washes, and slopes. The sands tend to be deep, loose and derived from light colored tuff or other volcanic rocks sometimes covered by talus or scree. The plant is often found in crevices, at the base of cliffs and outcrops. It is found in habitats associated with pinyon-juniper, big sagebrush and shadscale scrub. It has been noted that this plant is possibly dependent on sand dunes or deep sand. Elevations where plants have been observed range from 2,525 to 6,640 ft. MSL (Nevada Natural Heritage Program, 2001).



Darin's Buckwheat

### RECENT AND HISTORICAL OBSERVATIONS

Darin's buckwheat is found within both the North and South Range Study Areas. Plants have been collected from NTS in south and east Forty-mile Canyon, north Pahute Mesa, and west Emigrant Valley. On NTTR, the plant has been identified on Tolicha Peak and in Thirsty Canyon in 1998 and 2011, respectively. Several plants were identified during vegetation surveys on the DNWR in 2016 (Figure 38).

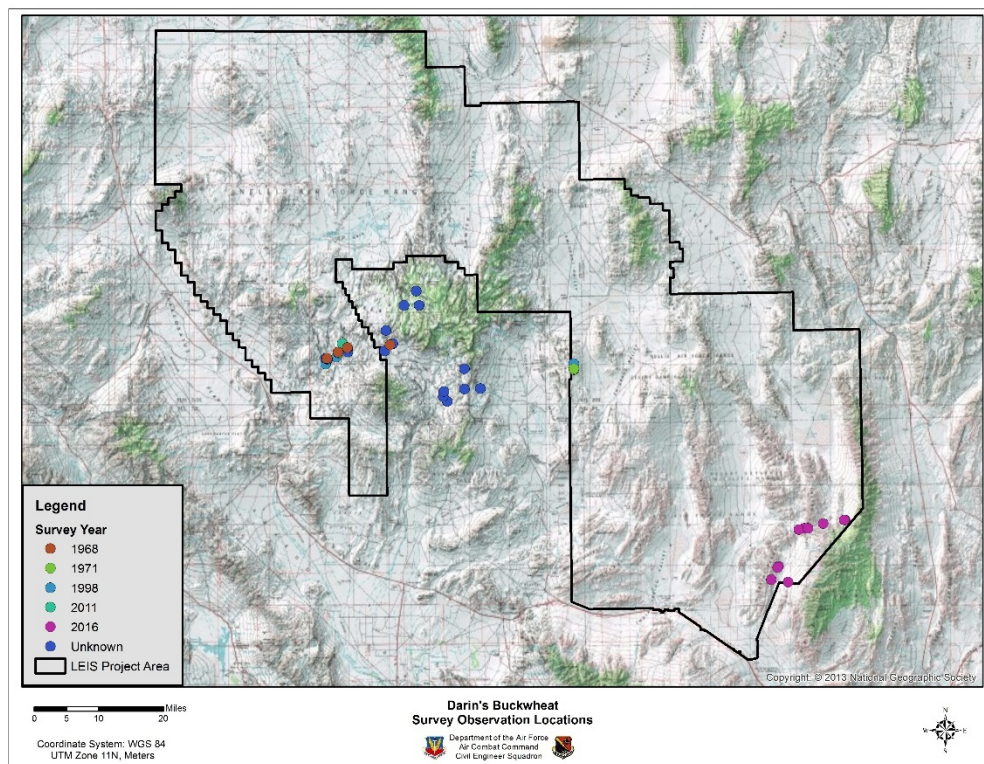


Figure 38. Locations where Darin's buckwheat was observed in and around the study area.



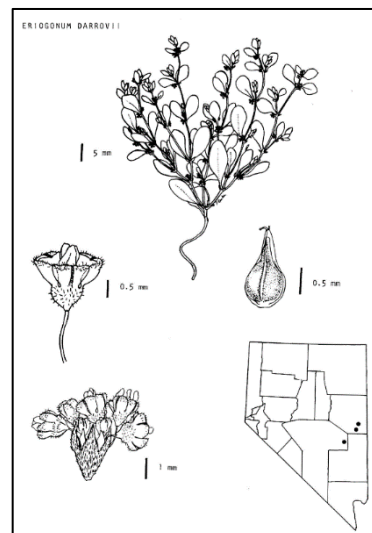
## DARROW'S BUCKWHEAT (*ERIOGONUM DARROWII*)

### DESCRIPTION

Darrow's buckwheat is an annual in the buckwheat (Polygonaceae) family. It is a compact, many-branched annual less than 4 in. tall. Unlike many *Eriogonum* species, the plant has no basal rosette and the leaves are spatulate to elliptical and about 1/3-in. long. This general form and leafiness further separate this species from other *Eriogonum* species. Blooming occurs from late July to August (Mozingo & Williams, 1980). Darrow's buckwheat grows in the pinyon-juniper community, from elevations of 6,100 to 6,500 feet. Soils are fine and hard, with limestone "chunks" (Mozingo & Williams, 1980). They are often found in washes and flats. Plant associations include Utah juniper (*Juniperus osteosperma*), rabbitbrush (*Chrysothamnus* spp.) and big sagebrush (*Artemisia tridentata*).

### RECENT AND HISTORICAL OBSERVATIONS

Only three observations of Darrow's buckwheat have been made in the study area. Two sightings occurred north of Black Mountain in the North Range Study Area, while the other single observation was south of the Spotted Range (Figure 39).



Darrow's Buckwheat Drawing  
(Mozingo & Williams, 1980)

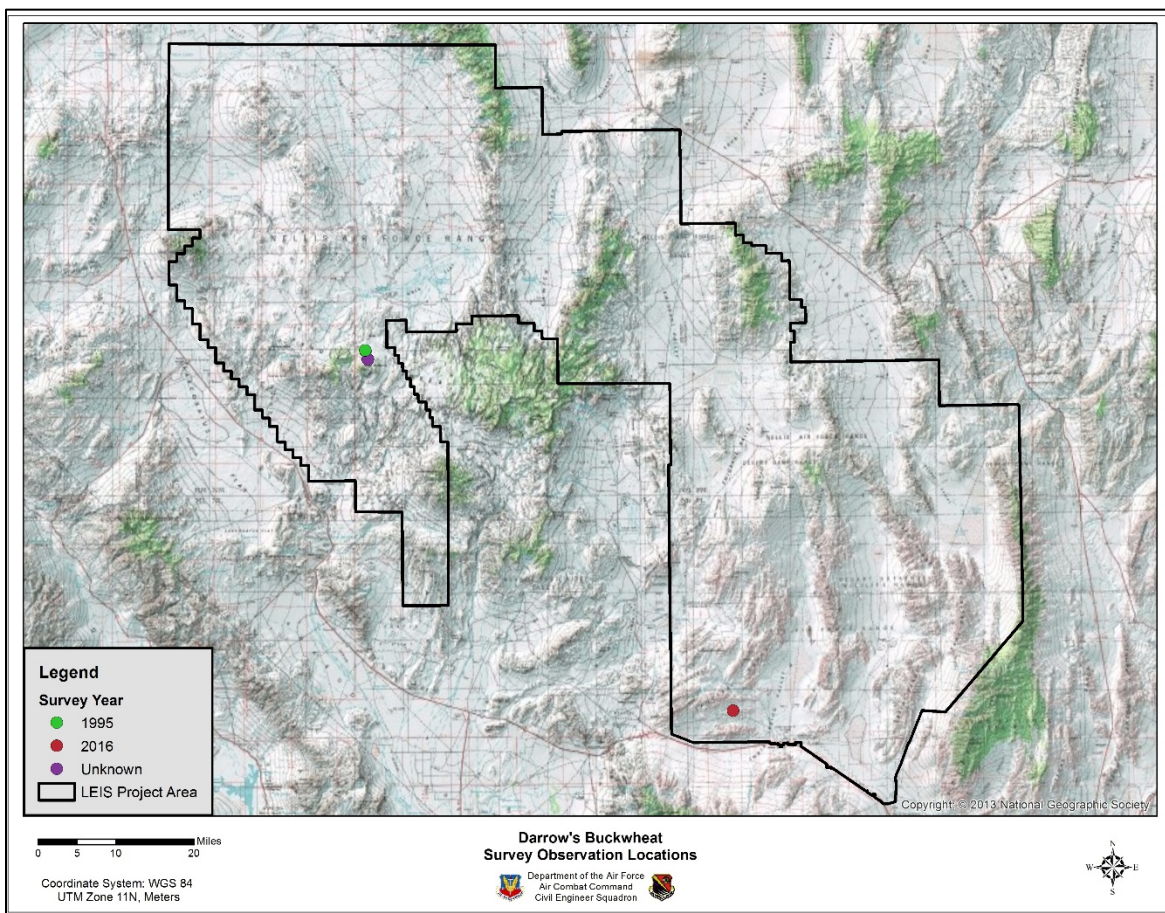


Figure 39. Locations where Darrow's buckwheat was observed in and around the study area.



## CLOKEY'S BUCKWHEAT (*ERIOGONUM HEERMANNII* VAR. *CLOKEYI*)

### DESCRIPTION

The Clokey's buckwheat habitat includes carbonate outcrops, gravelly washes, scree, talus, volcanic flats or limestone in saltbush, sagebrush, creosote and pinyon-juniper communities (Nevada Natural Heritage Program, 2001) (Reveal J. , 2003). It prefers elevations of 3,608 – 8,038 ft. MSL (Reveal J. , 2003). This plant is dense and compact with relatively erect branches and stems. Branches are slender, smooth, glabrous and whip-like with no spines. The flowers are small and white with flowering season between June and September (Reveal J. , 2003).



Clokey's Buckwheat (Photo by Trent M. Drape)

### RECENT AND HISTORICAL OBSERVATIONS

Clokey's buckwheat was observed at several locations on the study area and the NNSS (Figure 40). Many observations were also made of *Eriogonum heermannii* but not confirmed to be var. *clokeyi*.

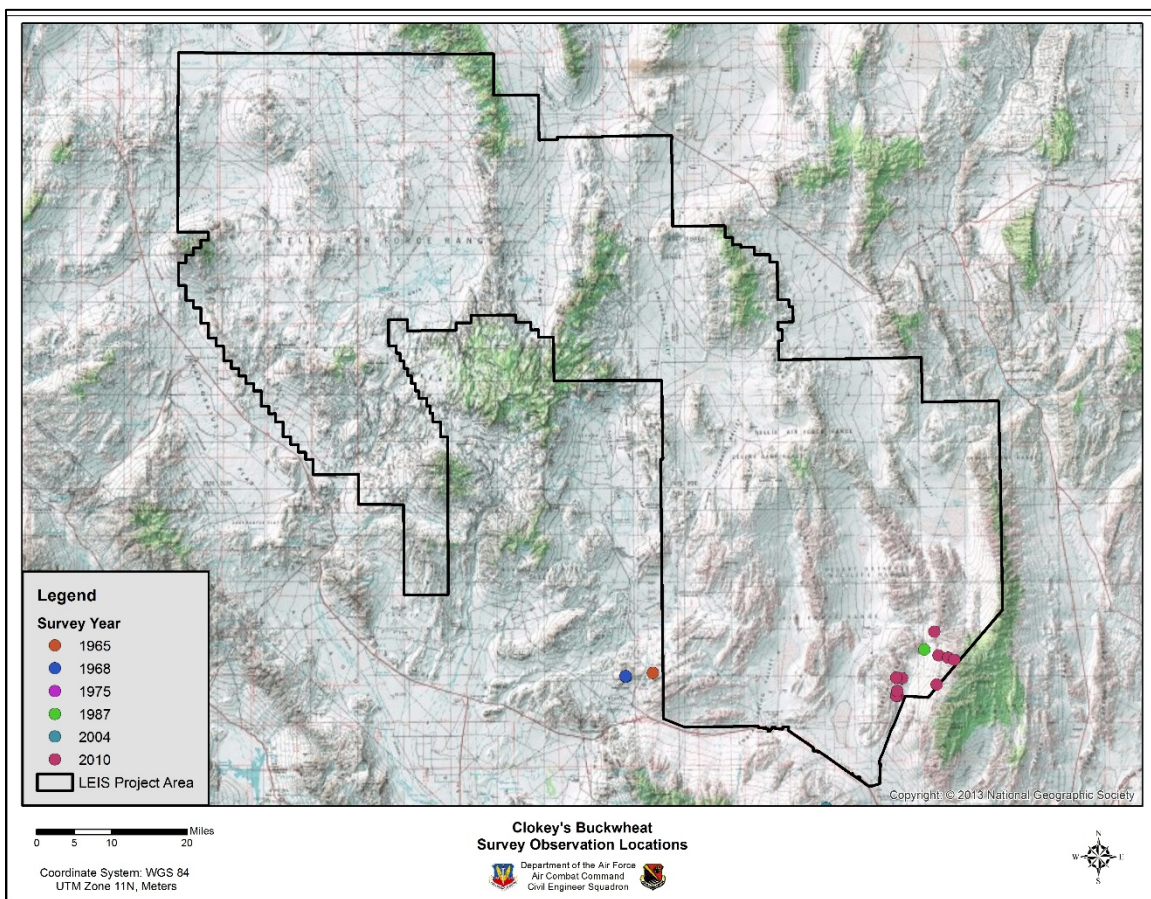


Figure 40. Locations where Clokey's buckwheat was observed in and around the study area.



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## MOUNT CHARLESTON SANDWORT (*EREMOGONE CONGESTA* VAR. *CHARLESTONENSIS*)

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### DESCRIPTION

Mount Charleston sandwort is located in dry, open, often calcareous rocky slopes, ridges, and crevices in the montane and subalpine conifer zones (Nevada Natural Heritage Program, 2001). This perennial has leaves that are sharply acute to spine-tipped with white small flowers being produced in June. It has been identified on sandy ridges at elevations of 7,217 – 8,202 ft. MSL (Baldwin, 2012; NatureServe Explorer, 2016). The plant is only known from southeastern California and southern Nevada. Only six occurrences have been documented nationwide and none have been recently observed (NatureServe, 2016).



Mount Charleston Sandwort

### RECENT AND HISTORICAL OBSERVATIONS

No recent or historical observations of the Mount Charleston Sandwort have been made within the study area and no map of observations is needed. Charlet et al. (2014) found the species in six locations on the Spring Mountains south of the study area.

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## MEADOW VALLEY SANDWORT (*EREMOGONE STENOMERES*)

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### DESCRIPTION

Meadow Valley sandwort is located on carbonate cliffs, ledges, canyon walls, and rocky slopes of all aspects, above the *Larrea tridentata* communities between elevations of 2,952 – 3,937 ft. MSL (Flora of North America, 2016; Nevada Natural Heritage Program, 2001). This long-lived perennial herb is clump forming, with stiff linear leaves, usually only growing to be between 1 to 2 cm tall (Nevada Natural Heritage Program, 2001). The Meadow Valley sandwort blooms between April and May with white flowers and with distinct long and pointed sepals (Nevada Natural Heritage Program, 2001).



Meadow Valley Sandwort

### RECENT AND HISTORICAL OBSERVATIONS

No observations of the Meadow Valley sandwort have been made within the study area and no map of observations is needed.

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## PAHUTE GREEN GENTIAN (*FRASERA PAHUTENSIS*)

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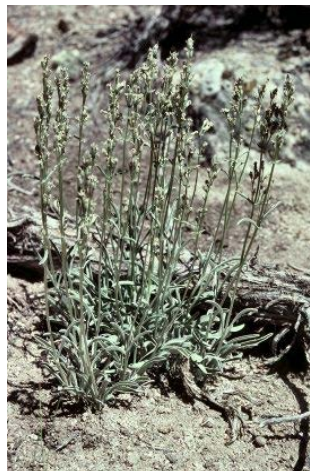
### DESCRIPTION

Pahute green gentian is a perennial herb that grows to a height of 12 in. It has one to a few stems originating from a branched caudex (Cronquist A. , Holmgren, Reveal, & Holmgren, 1984) and forms small colonies connected by rhizomes (Nevada Natural Heritage Program, 2001). The leaves are primarily basal and reduce in frequency and size as they progress up the stem. Leaves are white-margined and narrowly

oblanceolate. The inflorescence is narrow, less than 0.8 in. broad. The corolla is typically green-white, though it may be a pale blue, and has purple flecks. Flowering occurs from late May to June (Cronquist A. , Holmgren, Reveal, & Holmgren, 1984).

The NNHP describes the habitat as follows:

*Relatively non-specific habitats within the pinyon-juniper and lower montane scrub zones, but most frequent in relatively deep, stable, sandy or sandy-rocky soils on or near protected (wooded or north-sloping) exposures and/or in micro-drainage, or on more open, south-sloping exposures at higher elevations, mostly derived from rhyolitic, granitoid, or andesitic parent materials, mostly on flat to very gentle slopes but sometimes sloping up to 25 degrees, sometimes colonizing disturbances adjacent to undisturbed source populations, with Pinus monophylla, Juniperus osteosperma, Leptodactylon pungens, Opuntia erinacea, Elymus elymoides, Stipa comata, Astragalus purshii, Eriogonum caespitosum, E. umbellatum, Stenotus acaulis, Phlox hoodii, etc. (Nevada Natural Heritage Program, 2001).*



Pahute Green Gentian (James Morefield, NNHP)

## RECENT AND HISTORICAL OBSERVATIONS

The Pahute green gentian is known to occur primarily in Nye County, Nevada (Mozingo & Williams, 1980). A large population has been reported on the southeast rim of the Pahute Mesa located on NNSS (Beatley, 1976). Disjunct from this are two adjacent observations on Pahute Mesa on the NNSS. No recent or historic observations of the Pahute green gentian have been documented within the study area and no map of observations is needed.

## COCHRANE'S GILIA (*GILIA HETEROSTYLA*)

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### DESCRIPTION

The Cochrane's gilia occurs in deep alluvial sands on valley floors and lower slopes of north to south trending basin and range valleys of northern Nye County, Nevada. This small annual plant grows in open areas and under shrubs in Great Basin vegetation typical of sandy valley floor habitats dominated by *Atriplex canescens* and *Achnatherum hymenoides* (NatureServe, 2016). It prefers to grow at an elevation of 4,800 to 5,998 ft. MSL. Cochrane's gilia produces pink-violet or white with pink-violet streaked flowers (NatureServe, 2016).



Cochrane Gilia (Photo by Janel Johnson, U.S. Forest Service)

### RECENT AND HISTORICAL OBSERVATIONS

No recent observations have been made of the Cochrane's gilia on the study area. In 1968, the plant was observed in the Kawich Valley on the North Range Study Area (Figure 41).



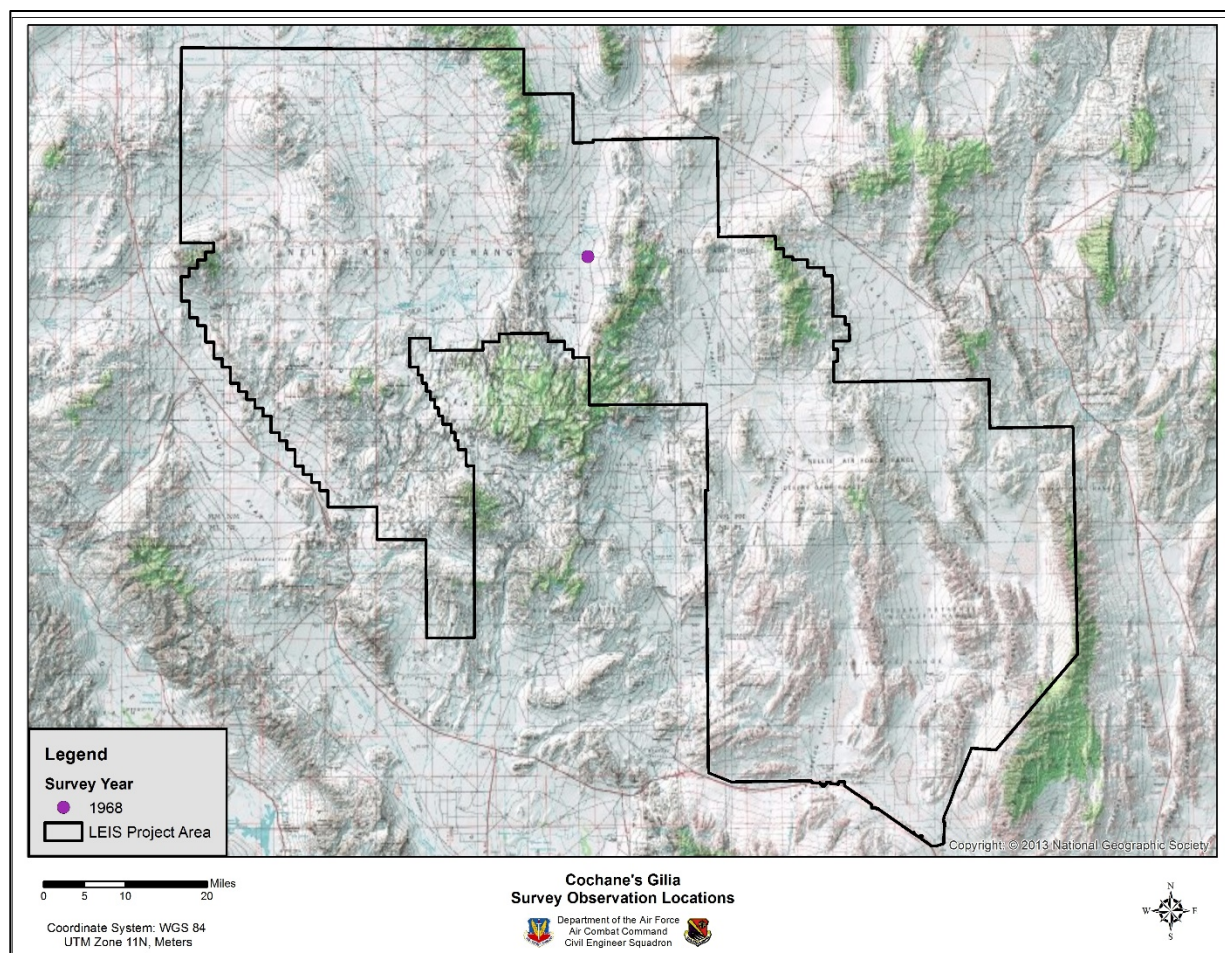


Figure 41. Locations where Cochran's gilia were observed in and around the study area

## NYE GILIA (*GILIA NYENSIS*)

### DESCRIPTION

Nye gilia is an annual of the phlox (Polemoniaceae) family. Growing to 12 in. tall, it has stalked glands throughout its structure. The leaves are primarily basal although they do not form a basal rosette. The flowers are pink to magenta with a yellowish to yellow throat. Flowering is in May and June, sometimes continuing into the summer (Nevada Natural Heritage Program, 2001). This species grows in sandy soils in the pinyon-juniper and big sagebrush zones. Habitat has been described as “deep loose sandy soil often derived from light-colored tuff or other volcanic rocks, often at base of cliffs or outcrops”. The soil in these habitats may be covered by talus or scree. The plants are also found in washes, road cuts, or other disturbances crossing such habitats and may be restricted to sand dunes or deep sand (Nevada Natural Heritage Program, 2001).



Nye Gilia (Photo by James L. Reveal)



## RECENT AND HISTORICAL OBSERVATIONS

Most of the observations of Nye gilia occurred on the NNSS in 1968, 1969, and 1979. No recent observations have occurred on the study area (Figure 42).

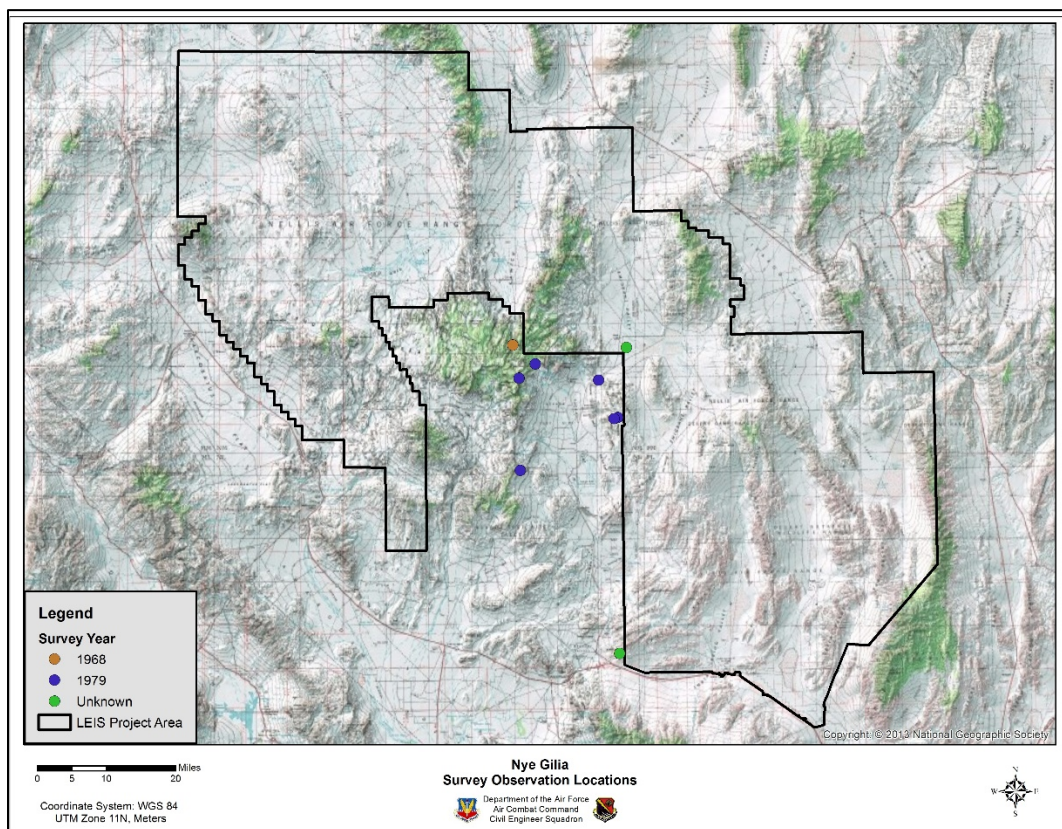


Figure 42. Locations where Nye Gilia has been observed in and around the study area.

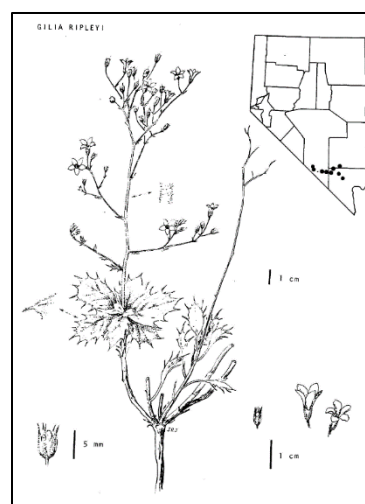
## RIPLEY'S GILIA (*GILIA RIPLEYI*)

### DESCRIPTION

Ripley's gilia grows in exposed crevices of steep south-facing limestone cliffs, at elevations of 3,001 to 5,003 ft. MSL (Nevada Natural Heritage Program, 2001). It is occasionally found in loose talus or gravelly slopes below cliffs. Populations are very small and the distribution of this small plant is limited. Associated plants include *Haplopappus brickellioides*, *Perityle megaloccephala* var. *intricata*, *Penstemon petiolatus*, *Gilia scopulorum*, and *Buddleja utahensis*. The small perennial herb has holly-shaped leaves and flowers that are bright rose-colored to pale pink (Nevada Natural Heritage Program, 2001).

### RECENT AND HISTORICAL OBSERVATIONS

Ripley gilia has been observed across the South Range Study Area in the Sheep, Desert, Pintwater, and Spotted Ranges. Most of the observations occurred during the period from 1968 to 1993 (Figure 43).



Ripley's Gilia (Mozingo & Williams, 1980)



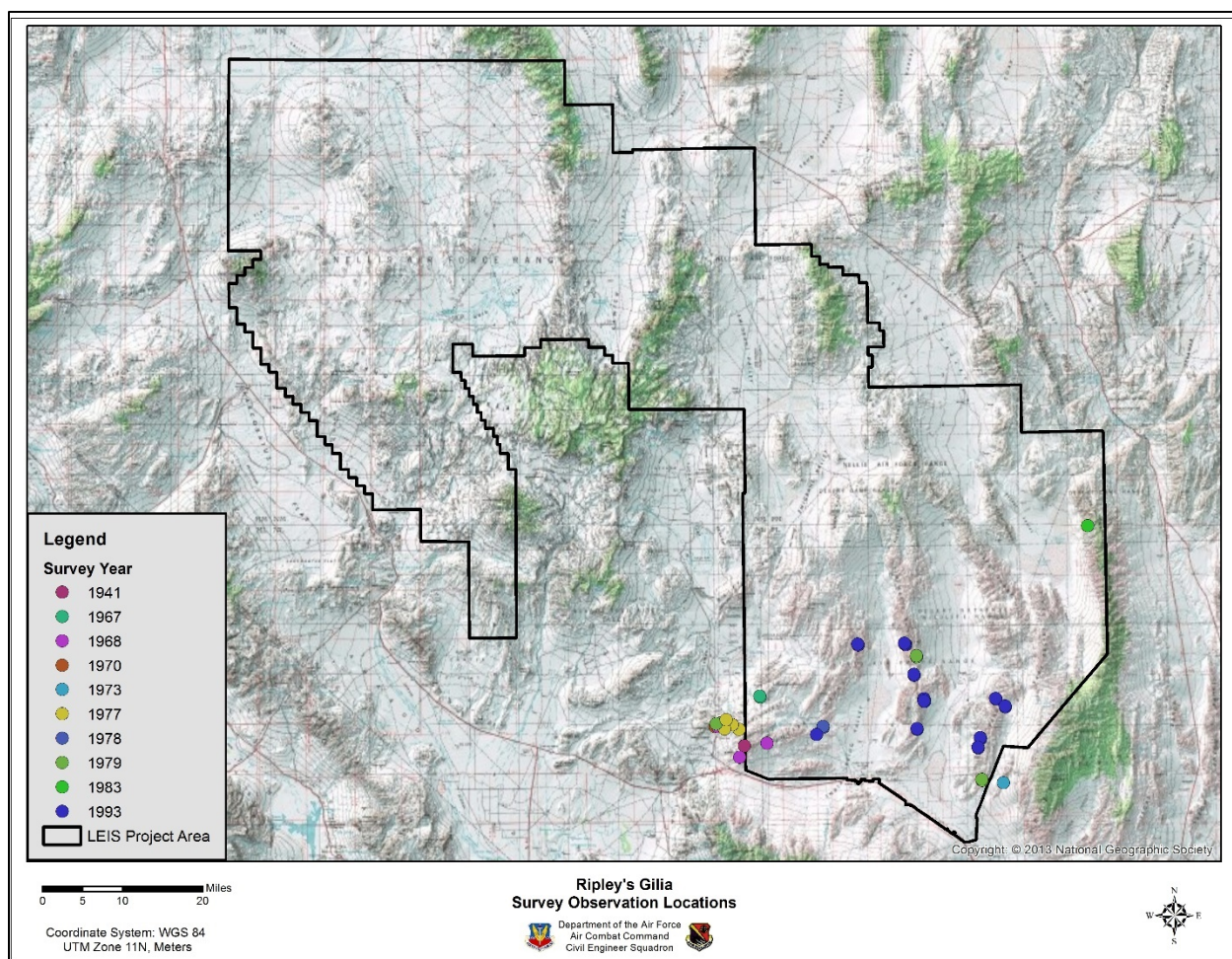


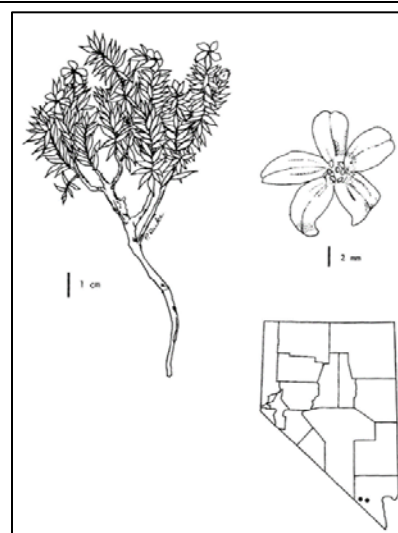
Figure 43. Locations where Ripley's gilia has been observed in and around the study area.

## SMOOTH DWARF GREASEBUSH (*GLOSSOPETALON PUNGENS* VAR. *GLABRUM*)

### DESCRIPTION

The smooth dwarf greasebush is a matted perennial which grows to a height of 1.97 to 7.87 in. The leaves vary in shape from narrowly elliptic to oblanceolate, ranging from 0.24 to 0.39 in. in length and covered with prominent veins that are abaxial. The flowers have acuminate sepals with 2 to 3 of the sepals having spines at their tip. The petals are 0.24 to 0.31 in. long and the flower usually has ten stamens. The fruit is one light brown seed less than 0.04 in. long (Baldwin, 2012). The flower blooms from April to July (Nevada Natural Heritage Program, 2001).

This plant occurs in "crevices of carbonate cliffs and outcrops, generally avoiding southerly exposures, in the pinyon-juniper, mountain mahogany and montane conifer zones" (Nevada Natural Heritage Program, 2001).



Smooth Dwarf Greasebush (Mozingo & Williams, 1980)

Smooth dwarf greasebush is one of two varieties of the *G. pungens* species, both of which are on the NNHP Sensitive List. Taxonomical distinction is questionable because the classification of these two varieties is based upon one characteristic--the presence of hairs on the body of the plant. The smooth dwarf greasebush does not possess the hairs that are found on the rough dwarf greasebush (*G. pungens* var. *pungens*). Based upon this distinction, the smooth dwarf greasebush has been determined to be significantly segregated in geography from its sibling (Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

Though the species occurs in areas of California, the variety appears restricted to the Spring and Sheep ranges in Clark County, Nevada. The total population of this variety is estimated at over 203 individuals at four locations. The most recent survey for the smooth dwarf greasebush was in 1979. No known photographs of this plant are available (Nevada Natural Heritage Program, 2001). No recent or historical observations of the smooth dwarf greasebush have been made within the study area, and no map of observations is needed.

## ROUGH DWARF GREASEBUSH (*GLOSSOPETALON PUNGENS* VAR. *PUNGENS*)

### DESCRIPTION

The rough dwarf greasebush is a matted perennial which can be described as the same characteristics as smooth dwarf greasebush but possesses hairs on leaves and stems. Please refer to the smooth dwarf greasebush for more details.

### RECENT AND HISTORICAL OBSERVATIONS

To date, three observations of rough dwarf greasebush have been documented on the study area. One occurred in the North Range Study Area in Civet Cat Canyon in 2014 and the other two sightings occurred on the South Range Study Area on the Sheep Range in 2016 (Figure 44).

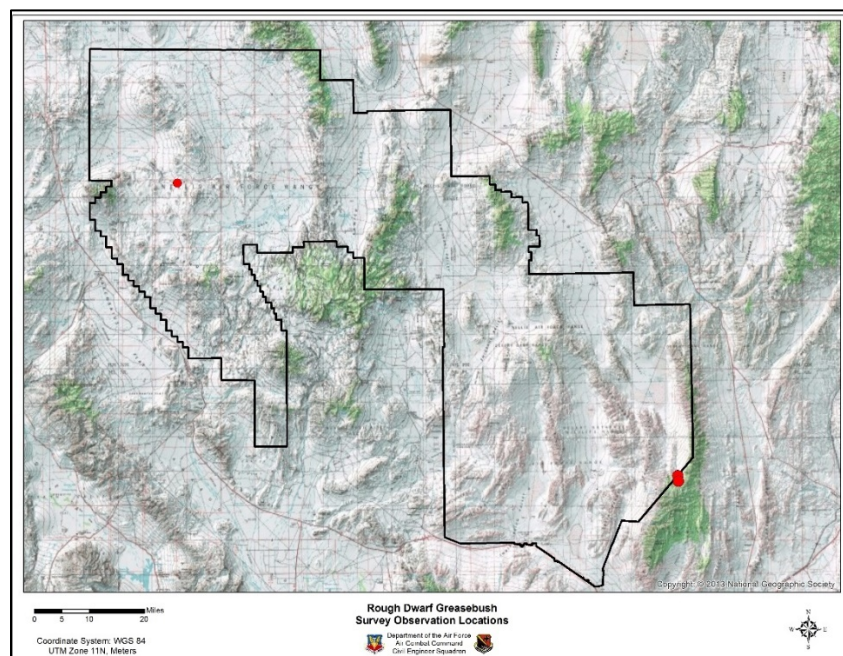


Figure 44. Locations where rough dwarf greasebush has been observed in and around the study area.



## INYO HULSEA (*HULSEA VESTITA* SSP. *INYOENSIS*)

### DESCRIPTION

Inyo hulsea is a herbaceous perennial or biennial in the Asteraceae family. Like all species in the *Hulsea* genus, it is self-incompatible, cross-compatible, and its hybrids tend to be fertile (Wilken, 1975). Furthermore, the “flower morphology suggests a generalist insect pollinator” (White, 1998). Inyo hulsea shares many similarities to other varieties in this species, but is primarily distinguished by the number and size of ray flowers it produces. Inyo hulsea develops 18 to 32 yellow ray flowers that range in length from 0.47 to 0.71 in. (Wilken, 2011; Baldwin, 2012).



Inyo Hulsea (Hall, 1991)

This plant reaches a length of 28 in. and is very leafy in the basal portion, with a few reduced leaves on the stem. The basal leaves are spatulate, lobed, and woolly, and the leaf “stem” is longer than the blade (Baldwin, 2012). The uppermost leaves in Inyo hulsea are lanceolate, glandular, and sparsely villous; they are dentate to entire and have margins that range from crenate to lobed (Wilken, 1975; Baldwin, 2012). One to a few flower heads are produced per stem with the inflorescence being yellow with 18 to 32 ray flowers each 0.5 to 0.7 in. long (Baldwin, 2012). The “disk flowers are perfect, generally campanulate to cylindrical with a slender tube” and vary in width from 0.4 to 1 inch (Wilken, 1975; Baldwin, 2012). Blooming typically occurs from May to June and from September to October (Baldwin, 2012).

### RECENT AND HISTORICAL OBSERVATIONS

The Inyo hulsea has been observed multiple times on the NNSS. Two observations were located just within the study area north of the NNSS. All observations were made from 1959 – 1998. No recent observations have been made on the study area (Figure 45).

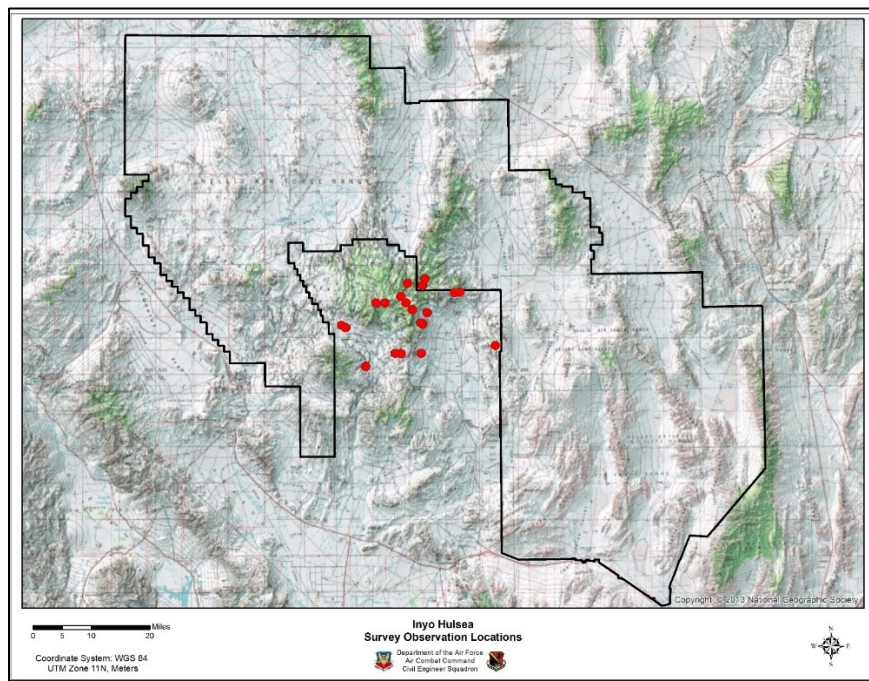


Figure 45. Locations where Inyo Hulsea has been observed in and around the study area.

## BULLFROG HILLS SWEETPEA (*LATHYRUS HITCHCOCKIANUS*)

### DESCRIPTION

Bullfrog Hills sweetpea is a blueish-green perennial herb. The flower stalks bear 1 to 4 lilac-purple flowers, with a broad upper petal 0.5 in. long and 0.3 in. wide. The leaflets are narrowly lanceolate to linear tapering and are mostly in 2 or 3 pairs. This plant booms in June (Baldwin, 2012).

Bullfrog Hills sweetpea is found in open, dry to slightly moist gravels of rocky drainage bottoms in canyons and on upper alluvial slopes, or washes, often at the bases of boulders or canyon walls. The plant typically climbs through shrubs, in areas of volcanic tuff or carbonate rocks, or sandy soils in the mixed shrub, sagebrush, and pinyon-juniper zones from 4,000 - 6,990 ft. MSL (Blomquist, et al., 1995; Nevada Natural Heritage Program, 2001).

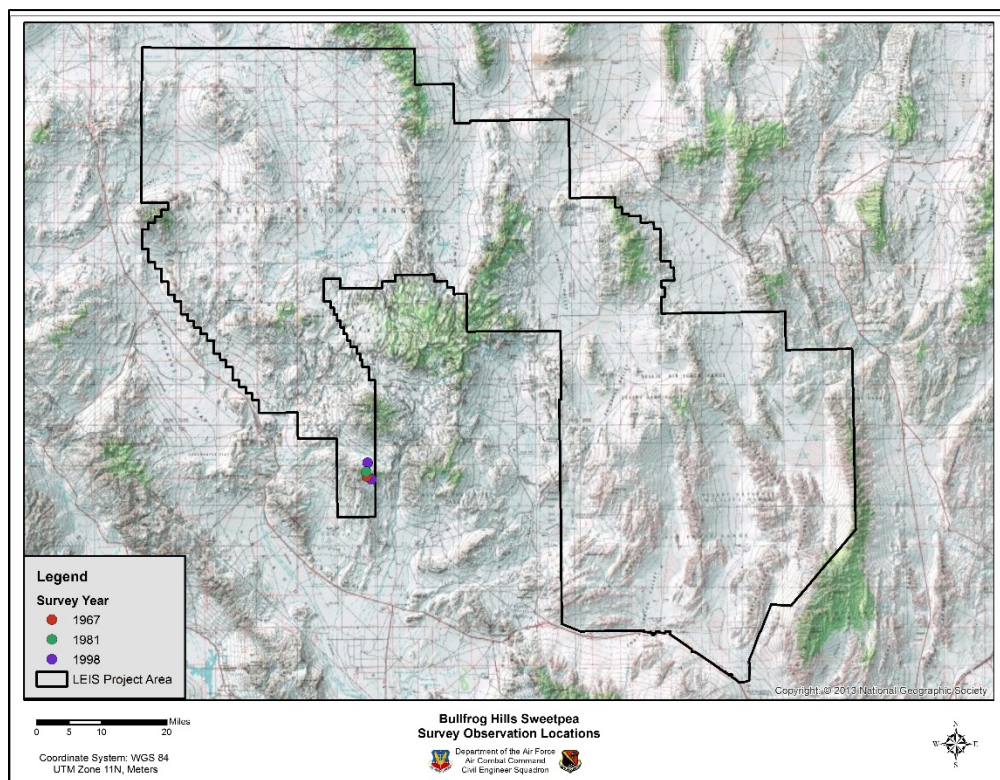
This species is found in Nye County, Nevada, and the Grapevine Mountains of Inyo County, California (Baldwin, 2012). Plant associations include purple sage (*Salvia dorrii* spp.), desert bitterbrush (*Purshia glandulosa*), Mormon tea (*Ephedra viridis*), spiny hopsage (*Grayia spinosa*), shadscale saltbush (*Atriplex confertifolia*), and rabbit thorn (*Lycium pallidum* var. *oligospermum*) (Blomquist, et al., 1995).



**Bullfrog Hills Sweetpea (Photo by Nevada Native Plant Society)**

### RECENT AND HISTORICAL OBSERVATIONS

The Bullfrog Hills sweetpea has been observed in the southern part of the North Range Study Area near Yucca Mountain in 1967, 1981, and 1998. No recent observations of the species have been made on the study area.



**Figure 46. Locations where Bullfrog Hills sweetpea has been observed in and around the study area.**



## RAYLESS TANSY ASTER (*MACHAERANTHERA GRINDELIODES* VAR. *DEPRESSA*)

### DESCRIPTION

Rayless tansy aster occurs in carbonate or calcareous soils, nearly barren rocky, rocky clay, and clay soils on ridges, slopes, low hills, and badlands in the upper blackbrush, sagebrush, pinyon-juniper, mountain mahogany, and lower subalpine conifer vegetation communities (Nevada Natural Heritage Program, 2001). It is found in elevations of 4,265 – 6,561 ft. MSL (SEINet: Arizona-New Mexico Chapter, 2016). This plant grows in dense tufts or clumps and have leaves that are mostly crowded at the base of their stems with obvious white bristles on each leaf (SEINet: Arizona-New Mexico Chapter, 2016). The flowers bloom in the summer and will often bloom again after summer rains (Nevada Natural Heritage Program, 2001).



Rayless Tansy Aster

### RECENT AND HISTORICAL OBSERVATIONS

The rayless tansy aster has been identified multiple times throughout the South Range Study Area. NNHP documented observations in these same areas and one observation in the Sheep Range (Figure 48).

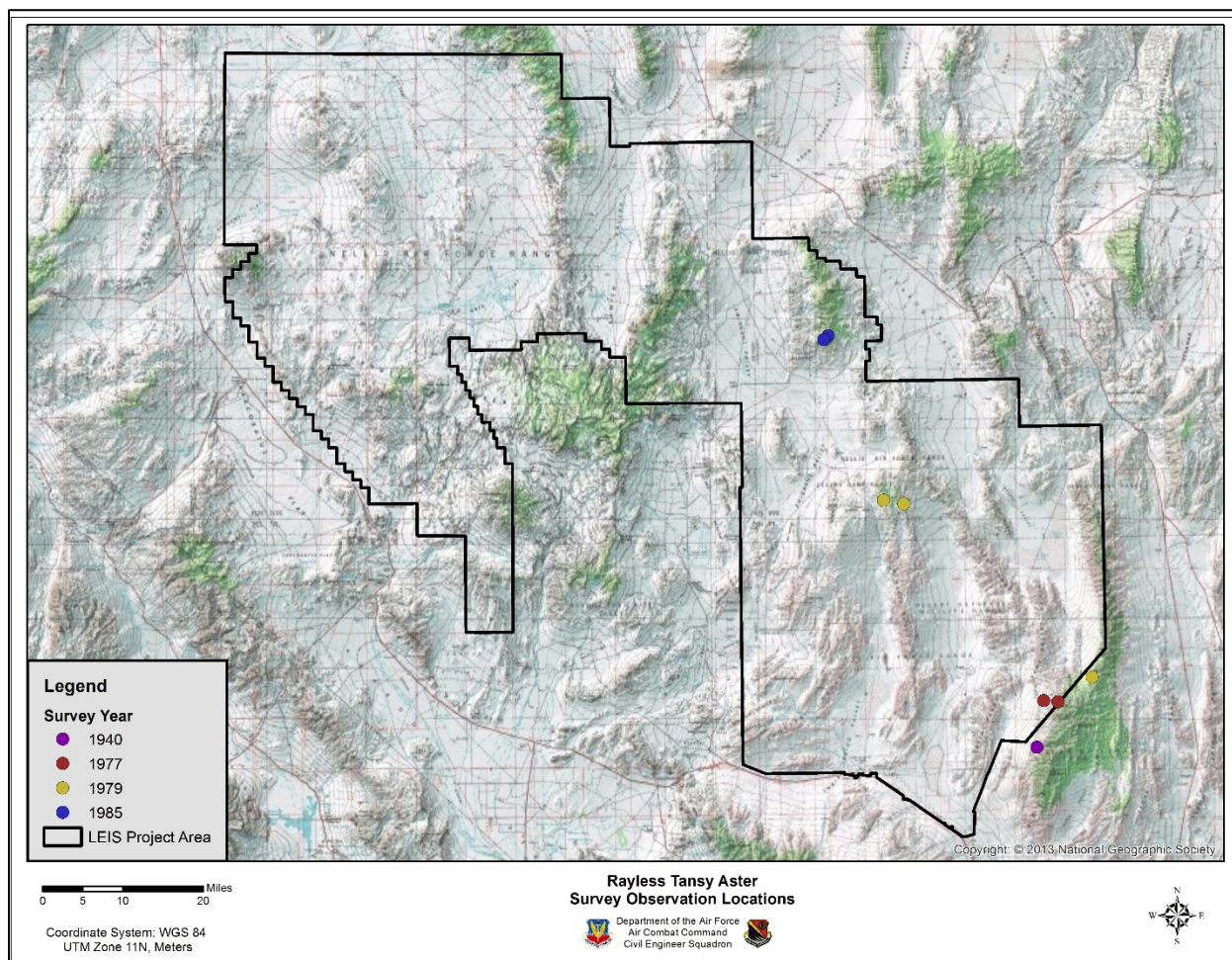


Figure 47. Locations where the rayless tansy aster has been observed in and around the study area



## BASHFUL FOUR-O'CLOCK (*MIRABILIS PUDICA*)

### DESCRIPTION

Bashful four-o'clock occurs in dry, open often calcareous valley bottoms and slopes, in gravelly carbonate alluvial, loose sand. It is often most abundant on silty alkaline playas or road cuts or other areas recovering from disturbances where competition from other vegetation is minimal. The plant also mixes well with the zonal vegetation, in the mixed-shrub, blackbrush, shadscale, and upper creosote bush zones (Nevada Natural Heritage Program, 2001). It has been observed at elevations of 984 to 7,545 ft. MSL. Bashful four-o'clock has strongly ascending narrow, ovate leaves, and flowers that will point downwards, giving the plant a "bashful" appearance. The flowers are usually cream to white colored and bloom in the mid-spring to early summer (Nevada Natural Heritage Program, 2001).



Bashful Four-O'Clock (Photo by Gregory Gust, SEINET)

### RECENT AND HISTORICAL OBSERVATIONS

Multiple observations of bashful four-o'clock have been made within the South Range Study Area. Most of the sightings have occurred near the northside of the Sheep Mountain Range. J. Tiehm recorded one plant in 1987. David Charlet made several observations in 2011 and 2012 during his plant surveys on the DNWR. Adams Ecology biologists also identified the species in three different locations in 2016 (Figure 49).

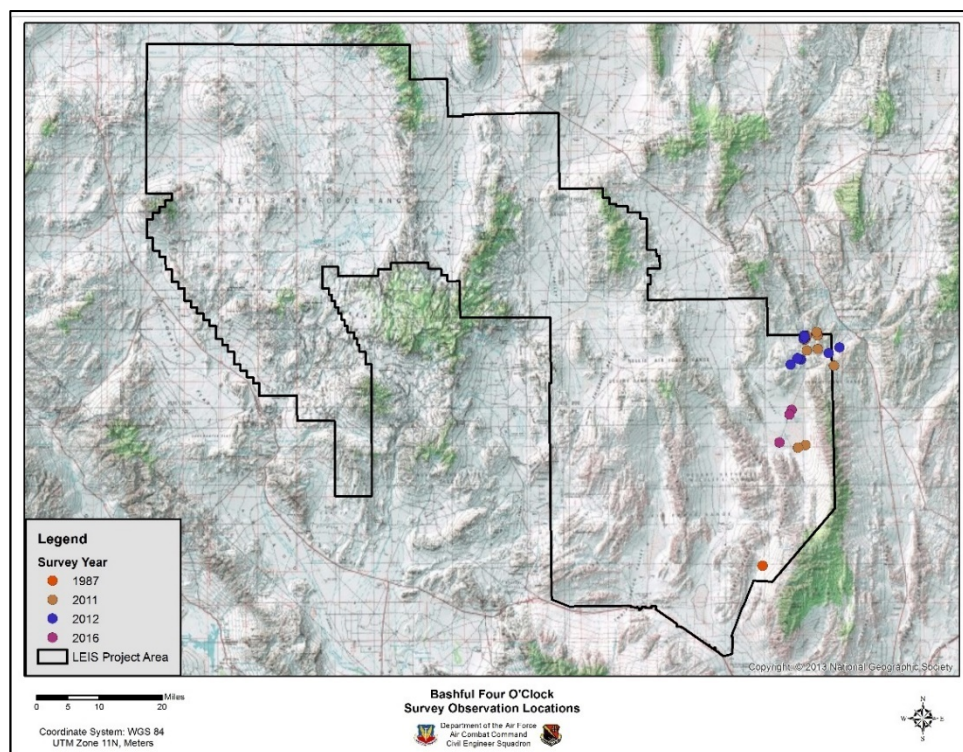


Figure 48. Locations where bashful four o'clocks have been observed on the study area.



## CHARLESTON PINWOOD LOUSEWORT (*PEDICULARIS SEMIBARBATA* VAR. *CHARLESTONENSIS*)

### DESCRIPTION

Charleston pinewood lousewort is a hemi-parasitic, perennial plant in the Figwort family (Scrophulariaceae) (Vorobik, 1993). Charleston pinewood lousewort is a Nevada endemic known to occur in Clark County found at elevations from 7,200 to 9,700 ft. MSL. The more common subspecies of this species is *semibarbata*, which has been found Washoe County to Clark County Nevada. The Charleston subspecies is found on dry slopes of pinyon-juniper to higher elevation where red fir is the dominant tree. This subspecies is known from various locations in the Spring Mountains and Sheep Range. The subspecies *charlestonensis* has a slightly large corolla with pinnules not cut to the midrib (Kartesz, 1988).



Charleston pinewood lousewort (Photo by Bruce Lund)

### RECENT AND HISTORICAL OBSERVATIONS

To date, no recent observations have been made of the Charleston pinewood lousewort on the study area. One observation was made of the species in 1976 on Hayford Peak on the Sheep Range at 7,500 ft. MSL. Charlet et al. (2013) found 42 locations with this species in the Sheep Range, but the locations of the observations were not available for this report (Figure 50).

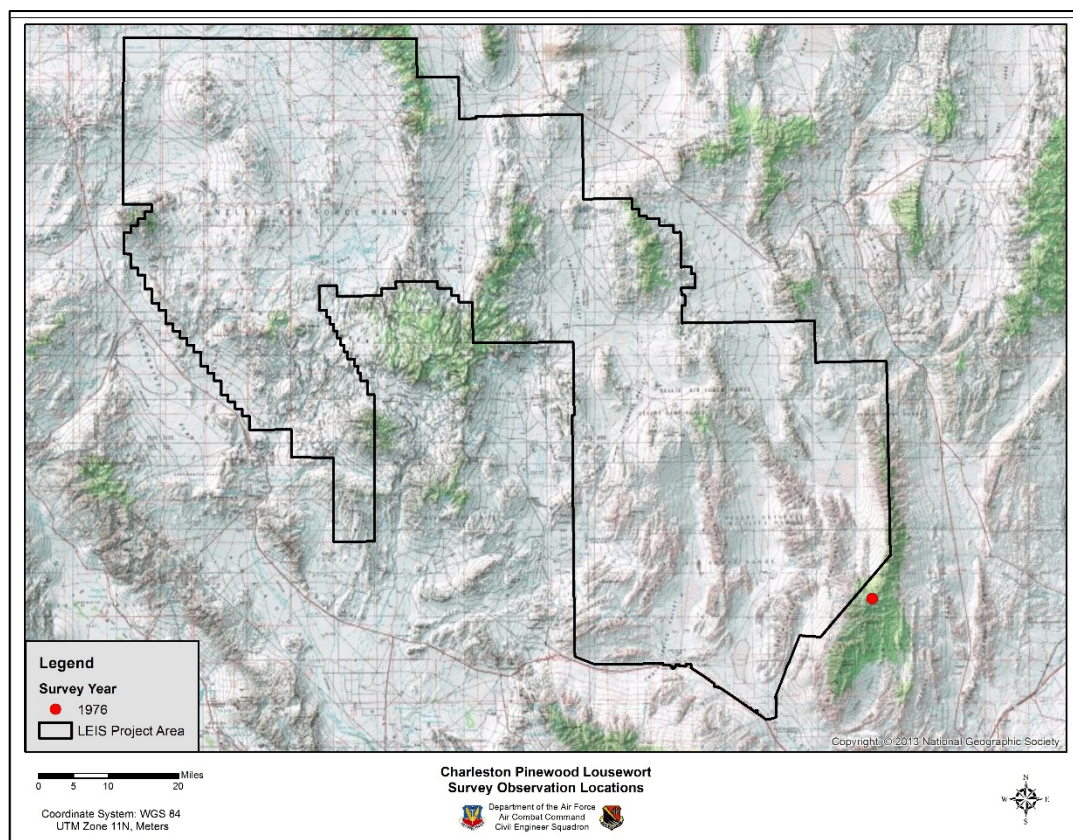


Figure 49. Locations where the Charleston pinewood lousewort has been observed in and around the study area.

## BEAVER DAM BREADROOT (*PEDIOMELUM CASTOREUM*)

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### DESCRIPTION

Beaver Dam breadroot occurs on sandy soils within creosote bush scrub and Joshua tree woodland communities (Calflora, 2016). The plant is a low growing, single stem, perennial plant with glabrous stems supporting 4 to 5 palmately compound leaves. This small, unarmed perennial has roots that extend deep into the soil and become larger in diameter near the ground surface. It has small, purple flowers with a white banner ranging 3.5 – 5 in. long. The plant typically blooms from April to May (Baldwin, 2012).

### RECENT AND HISTORICAL OBSERVATIONS

No recent or historical observations of the Beaver Dam breadroot have been made within the study area and no map of observations is needed.



Beaver Dam Breadroot (Photo by Jim Andre, CA Native Plant Society)

## NEVADA DUNE BEARDTONGUE (*PENSTEMON ARENARIUS*)

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### DESCRIPTION

Nevada dune beardtongue is a perennial herb which grows from a buried root crown (Nevada Natural Heritage Program, 2001). It was discovered in 1886 in present day Mineral County, Nevada (Mozingo & Williams, 1980). It received the name *arenarius* because that word means “growing on sand”. Though Nevada dune beardtongue prefers sandy soil, it has also been found occasionally on dark gravel pavement (Nevada Natural Heritage Program, 2001; Mozingo & Williams, 1980). It is found in association with fourwing saltbush (*Atriplex canescens*), littleleaf horsebrush (*Tetradymia glabrata*), greasewood (*Sarcobatus vermiculatus*), Bailey’s greasewood (*S. baileyi*), rabbitbrush (*Chrysothamnus* spp.), Nevada jointfir (*Ephedra nevadensis*), Nevada dalea (*Psoralea polydenius*), sand gilia (*Gilia leptomeria*), Nuttall’s crinklemat (*Tiquilia nuttallii*), indian ricegrass (*Oryzopsis hymenoides*), birdcage evening primrose (*Oenothera deltoides*), and purplemat (*Nama demissum*) (Nevada Natural Heritage Program, 2001; Mozingo & Williams, 1980).



Nevada Beardtongue (Photo by Gary Monroe, Nevada Native Plant Society)

Nevada dune beardtongue may be distinguished from other similar species by “its conspicuous glandular pubescence...along with the bearded sterile stamen and circular anther sacs” (Nevada Natural Heritage Program, 2001). The funnel-shaped flowers of the Nevada Dune Beardtongue bloom from May to June of each year and they are white to purple in color with magenta stripes (Nevada Natural Heritage Program, 2001).

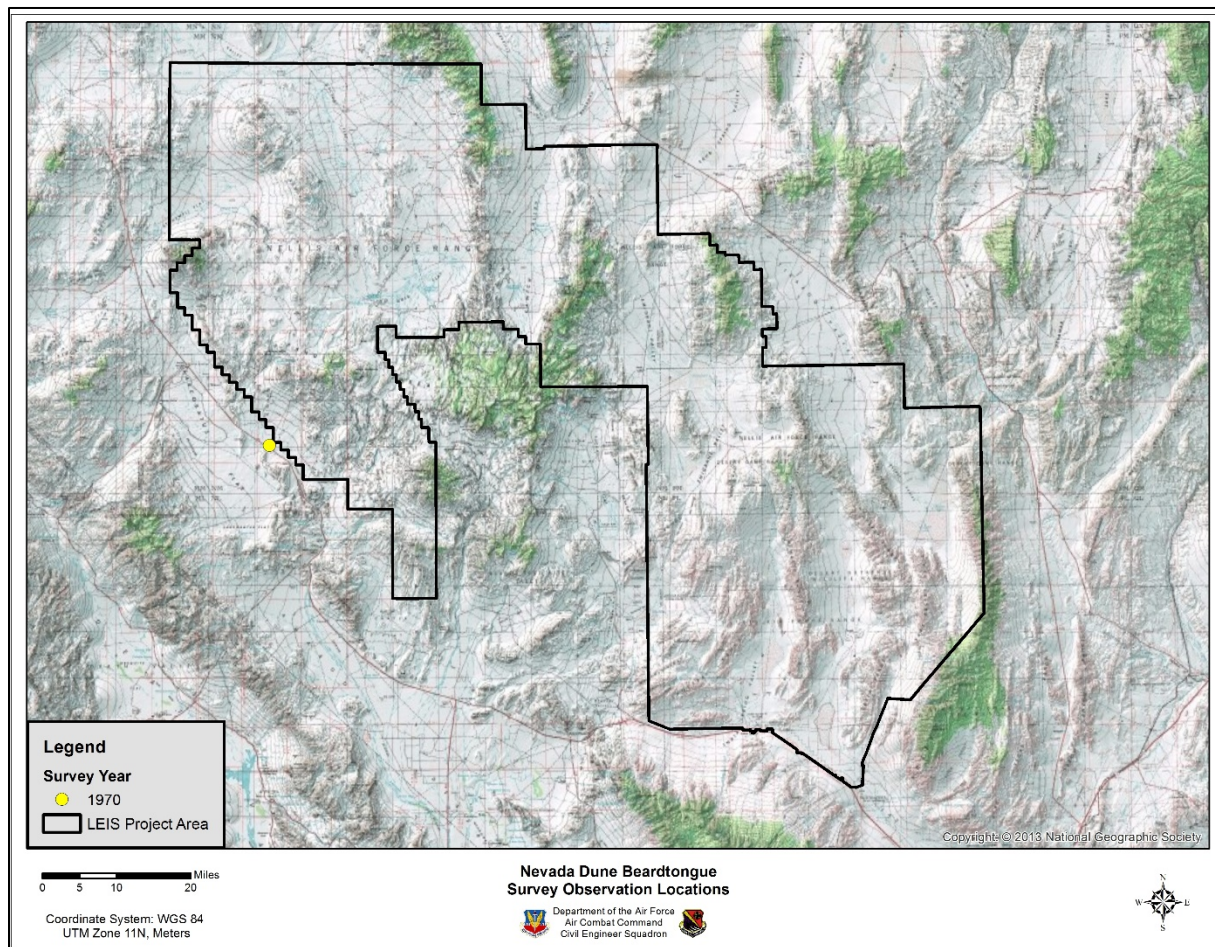
Habitat includes sandy areas, occasionally with dark gravel pavement, in deep sandy soils typically found in valley bottoms, Aeolian deposits, and dune skirts. It establishes populations in alkaline areas, sometimes on road banks and other recovering disturbed areas. The plants usually occur in the shadscale



zone 3,920 - 5,960 ft. MSL (Cronquist A. A., 1997). Nevada Dune Beardtongue is found in Churchill, Mineral, and Nye Counties and is listed as a Nevada endemic. The species was historically observed near Tonopah (Cronquist A. A., 1997) with one record in Sarcobatus Flat (Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

Historic documents and maps indicate that Nevada dune beardtongue populations have become established near Tonopah outside of the study area. No recent observations have been recorded within the study area. One observation was made in 1970 west of Tolicha Peak in Ancram Basin in the Sarcobatus Flats (Figure 51).



**Figure 50.** Location where Nevada dune beardtongue was observed just outside of the study area.

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## YELLOW TWOTONE BEARDTONGUE (*PENSTEMON BICOLOR SPP. BICOLOR*)

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### DESCRIPTION

Yellow twotone beardtongue is located within calcareous or carbonate soils in washes, roadsides, rock crevices, outcrops, or similar places receiving enhanced runoff, in creosote-bursage, blackbrush, mixed shrub, and lower juniper vegetation communities. It is commonly found at elevations of 2,296 to 4,921 ft. MSL (Nevada Natural Heritage Program, 2001). This perennial can grow to be as tall as 6 ft. with glabrous herbage. This species has cream flowers that bloom in May (Baldwin, 2012).

### RECENT AND HISTORICAL OBSERVATIONS

No recent or historical observations of the yellow twotone beardtongue have been made within the study area and no map of observations is needed.



Yellow TwoTone Beardtongue  
(Photo by Jim Morefield,  
NNHP)

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## ROSY TWOTONE BEARDTONGUE (*PENSTEMON BICOLOR SPP. ROSEUS*)

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### DESCRIPTION

Rosy Twotone Beardtongue is located within rocky calcareous, granitic, or volcanic soils in washes, roadsides, scree at outcrop bases, rock crevices, or similar places receiving enhanced runoff, in the creosote-bursage, blackbrush, and mixed shrub communities (Nevada Natural Heritage Program, 2001). It is found in elevations of 1,801 – 4,084 ft. MSL. The possible differences between the two subspecies of *P. bicolor* have been described as the following: *Penstemon bicolor* spp. *roseus* “may be lumped with ssp. *bicolor* in the future, as yellow- (ssp. *bicolor*) and rose- (ssp. *roseus*) colored flower forms are now believed to be simply allelic variants. The Jepson Manual also does not recognize subspecies within *P. bicolor*. Nevertheless, the taxa appear distinct in Nevada and have distinct (incompletely overlapping) ranges, casting potential doubt on the allelic variant hypothesis. In addition, the yellow-colored form (ssp. *bicolor*) is both more limited and more threatened, suggesting that the taxa should be treated separately from a conservation perspective.” (NatureServe, 2016)



Rosy TwoTone Beardtongue (Photo  
by Gary Monroe, Nevada Native Plant  
Society)

### RECENT AND HISTORICAL OBSERVATIONS

No recent or historical observations of the Rosy twotone beardtongue have been made within the study area and no map of observations is needed.



## DEATH VALLEY BEARDTONGUE (*PENSTEMON FRUTICIFORMIS* SSP. *AMARGOSAE*)

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### DESCRIPTION

Death Valley beardtongue is primarily found in the Death Valley area of California, but has been identified east of Death Valley into Nevada (NatureServe, 2016). This subshrub is known to grow within creosote-bush scrub communities (Baldwin, 2012). This plant will grow to be between 12 – 24 in. with its leaves approximately 1.0 – 2.5 in. long and linear to narrowly lanceolate in shape. The Death Valley beardtongue has flowers that are pale pink to white and are strongly lined. They will bloom between the months of May and June (Baldwin, 2012).



Death Valley Beardtongue (Photo by Wes Niles, UNLV)

### RECENT AND HISTORICAL OBSERVATIONS

No observations of the Death Valley beardtongue have been made within the study area and no map of observations is needed. This species was identified on NNSS between 1991 in 1995 in the mountains northwest of Amargosa Valley on the NNSS southern boundary during a survey for candidate plant species (Blomquist, et al., 1995).

## PAHUTE MESA BEARDTONGUE (*PENSTEMON PAHUTENSIS*)

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### DESCRIPTION

Pahute Mesa beardtongue is a member of the figwort (Scrophulariaceae) family. It was discovered on the Pahute Mesa Road on the NNSS in Nye County, Nevada in 1968 (Mozingo & Williams, 1980). It is similar to *P. speciosus*, but differs through shorter sepals “and the beard on the upper inner portion of the corolla” (Mozingo & Williams, 1980). There is an estimated population of over 5,048 individuals in an area of approximately 3,435 acres (Nevada Natural Heritage Program, 2001).

This perennial has multiple stems that grow from a root crown to a height that ranges from 6 to 30 in. The leaves at the base are oblanceolate or elliptical and may be 2 to 4 in. long and petiolate. The leaves on the stem are typically sessile and reach the same length as the basal leaves, which are narrow-oblanceolate to narrow-lanceolate. The leaves become smaller as they ascend the stem. All the leaves are thickly textured and smooth. The inflorescence has 6 to 13 clusters of flowers that are pinkish-lavender to bluish-lavender. The sepals are 0.8 to 1-inch-long and have a narrow tube at the base that is 0.2 to 0.31 in. long. The corolla is bearded either white or yellow at the upper portion. Its stamen is covered densely with golden yellow



Pahute Mesa Beardtongue (Photo by Susan Cochrane)

hairs (Mozingo & Williams, 1980). Pahute beardtongue produces its flowers from either May or June to mid-July (Mozingo & Williams, 1980; Knight, Smith, & Pritchett, 1997).

## RECENT AND HISTORICAL OBSERVATIONS

The geographic range of the species includes California and Nevada, although it is rare in California (Holmgren & Wetherwax, 2011). In Nevada, it has been found in Nye County (Mozingo & Williams, 1980). Specific locations on the NNSS include the canyons of Shoshone Mountain, Eleana Range, and the southern Belted Range (Beatley, 1976). On the NTTR, one population has been identified at Stonewall Mountain (Knight, Smith, & Pritchett, 1997; Beatley, 1976). This population was estimated to contain over 100 individuals (Knight, Smith, & Pritchett, 1997). Several other populations were documented by the NNHP in 2005 and were found on Pahute Alpha and Bravo. The bulk of the documented populations are found within the boundaries of the NNSS. The NNRP identified populations on the west side of the Kawich Range in 2014 and in Thirsty Canyon in 2007. Populations were found on Stonewall Mountain in 1994 and 1998 (Figure 52).

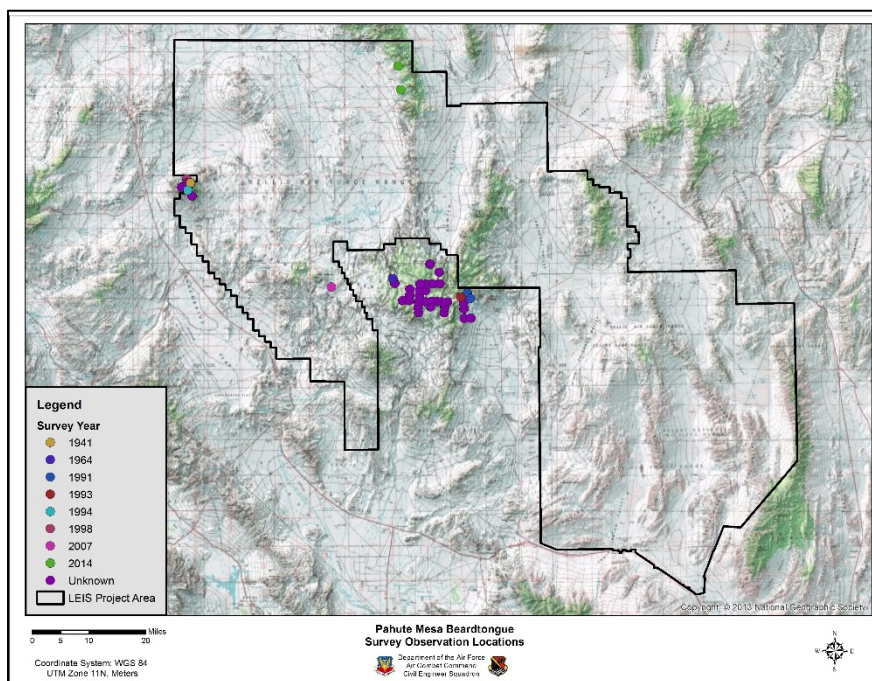


Figure 51. Locations Pahute Mesa beardtongue has been observed in and around the study area.

## JAEGER'S BEARDTONGUE (*PENSTEMON THOMPSONIAE* SSP. *JAEGERI*)

### DESCRIPTION

Jaeger's Beardtongue is a matted semi-woody perennial herb that flowers late-spring to summer (May to August). It has relatively few stems, and has a blue violet corolla that is about 0.5 in. long.

This plant is endemic to Nevada and known from Clark County, Nevada. The documented range of Jaeger's beardtongue is documented as from the Spring Mountains east to the Sheep Range. According to the NNHP, the habitat consists of gravelly limestone soils on knolls and slopes, in drainages, and under conifers, from the pinyon-juniper to the subalpine conifer zones (Nevada Natural Heritage Program, 2001). The documented elevation is from



Flower of Jaeger's Beardtongue (Photo by Jan Nachlinger, The Nature Conservancy)



5,600 to 11,100 ft. MSL (Nevada Natural Heritage Program, 2001). Within the study area, this coincides with sagebrush and lower montane woodland habitat. The species is also found in montane and subalpine habitat which are rare in the study area.

Plants found in association with Jaeger beardtongue are Single leaf pinyon pine (*Pinus monophylla*), Utah juniper (*Juniper osteosperma*), sagebrush (*Artemisia spp.*), mountain mohogany (*Cercocarpus spp.*), cushion phlox (*Phlox condensata*), Hitchcock bladderpod (*Lesquerella hitchcockii*), Jones' Townsend daisy (*Townsendia jonesii* var. *tumulosa*), Clokey's fleabane (*Erigeron clokeyi*), Clokey's sage (*Salvia dorrii*) (Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

Three observations of Jaeger Beardtongue were made from 1947 – 1968 in the Sheep Range at elevations ranging from 6,800 ft. to 7,900 ft. MSL. More recently, David Charlet identified the species in two locations on the Sheep Range in 2012 at around 6,400 ft. MSL (Figure 53).

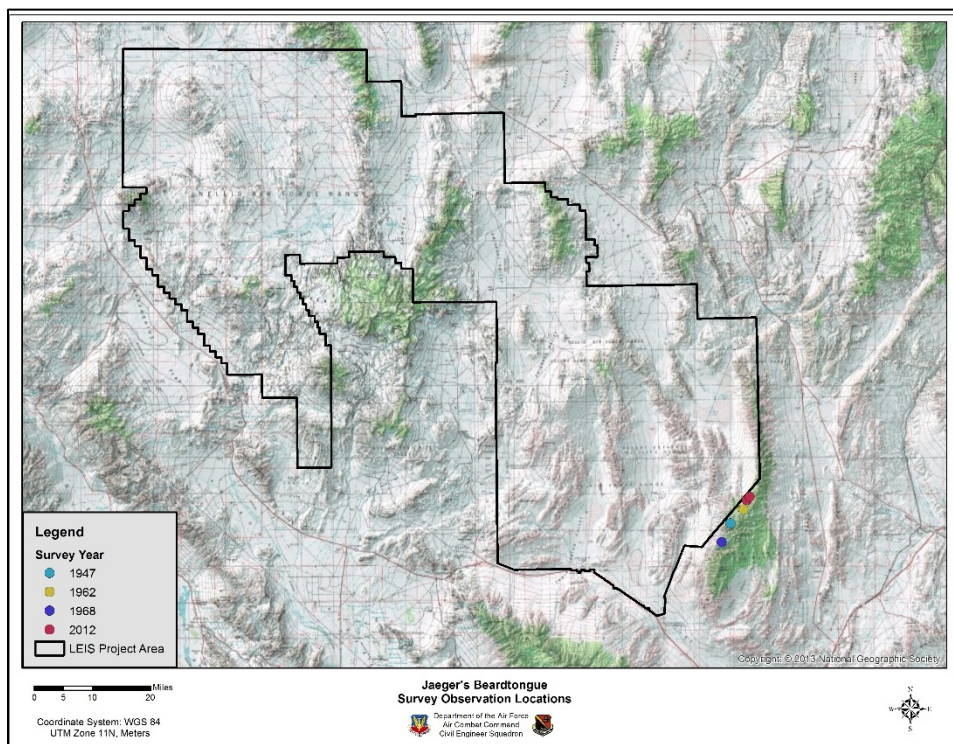


Figure 52. Locations where Jaeger beardtongue was observed in and around the study area

## DESERT ROCKDAISY (*PERITYLE INTRICATA*)

### DESCRIPTION

Desert rockdaisy is a short, hairy perennial or subshrub that grows to be 5 – 15 in. tall (Baldwin, 2012). This rockdaisy lacks ray flowers, but has yellow disk flowers that bloom between June and November (Baldwin, 2012). Desert rockdaisy prefers rock crevices, dry slopes, and rubble of carbonate outcrops in the shadscale, blackbrush, and mixed shrub communities (Baldwin, 2012). The Nevada Native Plant Society recently dropped the plant from their list of special status species (Nevada Natural Heritage Program, 2001).

### RECENT AND HISTORICAL OBSERVATIONS

Several observations of desert rockdaisy have been made on the Spotted, Pintwater, and Desert ranges on the South Range Study Area. Historically, several observations were made in 1993 by Knight and Smith and recorded by the NNHP. Earlier observations were made in 1959 –



Desert rock daisy (Desert Botanical Garden)

1979 (Cochrane, Ackerman, Beatley, or Tiehm). More recently, David Charlet identified the plant in several locations on carbonate and limestone formations from 2010 – 2012. NNRP biologists identified the species in a canyon in Range 64A in 2013 (Figure 54).

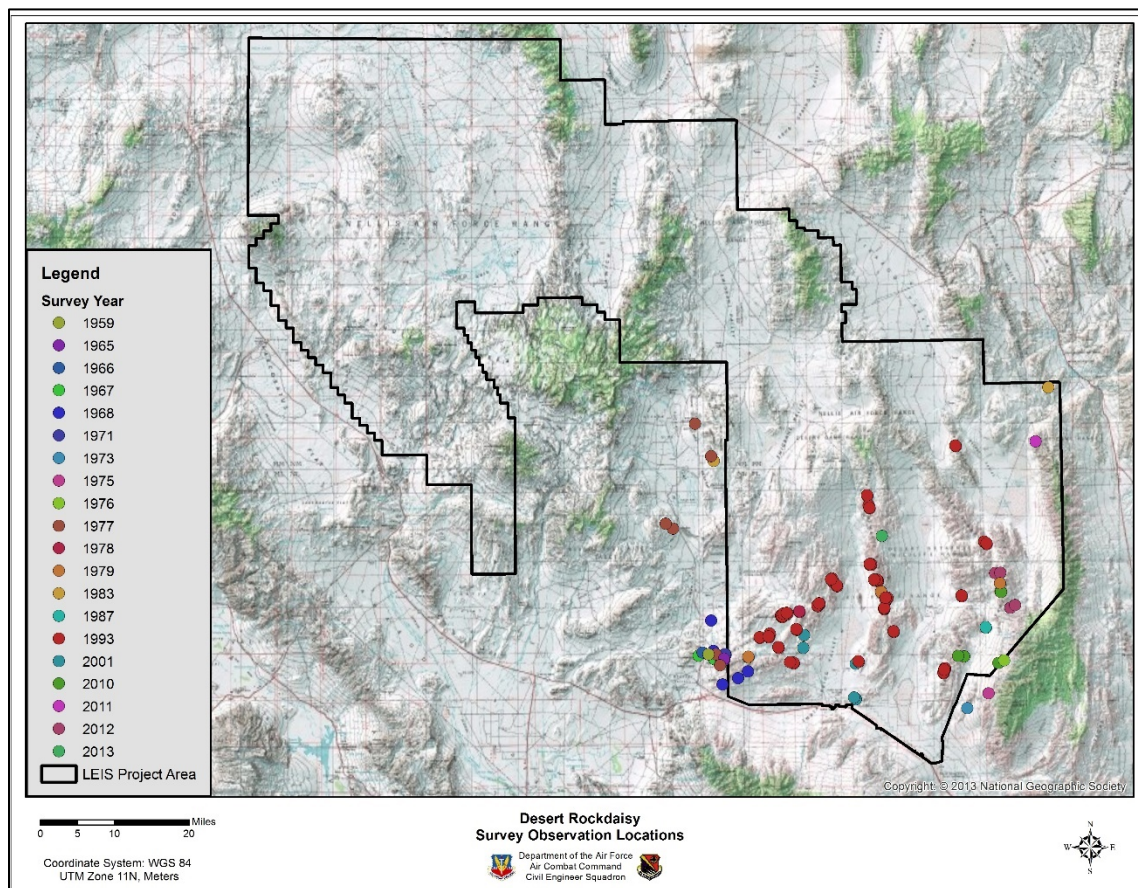


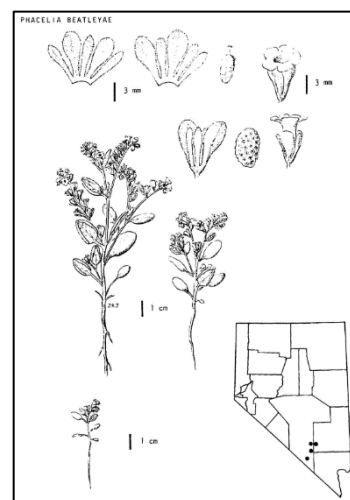
Figure 53. Locations where desert rockdaisy has been observed in and around the study area.

## BEATLEY'S SCORPIONFLOWER (*PHACELIA BEATLEYAE*)

### DESCRIPTION

Beatley's scorpionflower was first classified as a species in 1971. Though previous encounters were documented, these specimens were considered to be *P. parishii*, a closely related and physically similar species. The type was discovered on the south face of French Peak between 4,000 and 4,500 ft. MSL in the Massachusetts Mountains, a range within in the NNSS (Reveal & Constance, 1972).

Beatley's scorpionflower is primarily distinguished from *P. parishii* by "the lack of a basal rosette and the erect habit of the former contrasts strikingly with the rosulate foliage and low, spreading habit of the latter" (Reveal & Constance, 1972). This annual is endemic to Nevada and, based upon extensive surveys, a population of over 40,000 individuals occupying an area of 1,191 acres is estimated (Nevada Natural Heritage



Beatley's Scorpionflower  
(Mozingo & Williams, 1980)



Program, 2001). Generally, this plant flowers from April to July (Nevada Natural Heritage Program, 2001; Mozingo & Williams, 1980).

The habitat for Beatley's scorpionflower is "gravel or volcanic tuff; along washes in canyons, or on loose talus, or on steep barren slopes" (Mozingo & Williams, 1980). Beatley described the habitat locale as light-brown tuffaceous bedrock areas and white gravel talus on a hillside in NNSS (Beatley, 1976). Associated plants include blackbrush (*Coleogyne ramosissima*), burrobush (*Ambrosia dumosa*), creosote bush (*Larrea tridentata*), desert holly (*Atriplex hymenelytra*), shadscale saltbush (*Atriplex confertifolia*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), and juniper (*Juniperus* spp.) (Mozingo & Williams, 1980). It also occurs "in the mixed-shrub, blackbrush, shadscale, and upper creosote-bursage zones" (Nevada Natural Heritage Program, 2001). The range for the Beatley's scorpionflower includes Lincoln and Nye Counties, Nevada (Nevada Natural Heritage Program, 2001) at elevations of 2,500 to 5,800 ft. MSL (Mozingo & Williams, 1980).

## RECENT AND HISTORICAL OBSERVATIONS

Beatley's scorpionflower has been observed on the South Range Study Area near the eastern border of the NNSS. One plant was observed by A. Karl on Pahute Mesa about 4.5 miles northeast of Scotty's Junction in 2010. The majority of observations were made during various surveys along the Halfpint Range on the east side of NNSS and west side of the South Range Study Area from 1968 to 1998 (Figure 55).

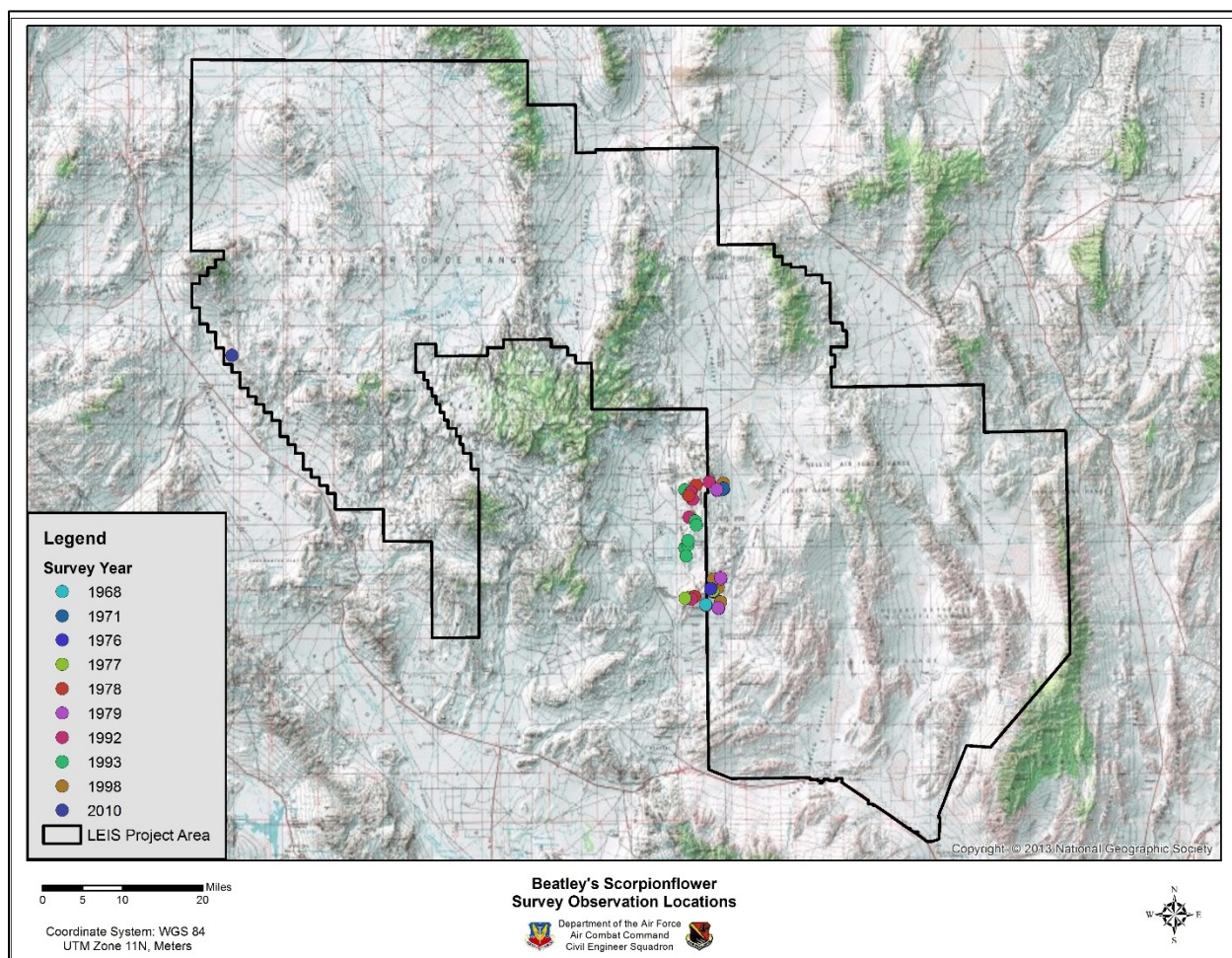


Figure 54. Locations where Beatley's scorpionflower was observed in and around the study area.



## CLARKE'S PHACELIA (*PHACELIA FILIAE*)

### DESCRIPTION

Clarke's phacelia is an annual from 1-2 in. tall with branches at or near the base. The plant's stems are curved upward and the leaves are mostly basal, with the blade ovate, elliptic, or oblong, entire to few toothed (NatureServe, 2016). The flowers are purple and bloom in late April to early June, generally only in wet years (Nevada Natural Heritage Program, 2001). Clark's phacelia occurs in Clark, Lincoln and Nye Counties, Nevada. It is closely related to *Phacelia parishii* and *Phacelia beatleyae* (Atwood, 2002). The plant tends to be found on light-colored outcrops and soils of calcareous and sometimes gypsiferous sandstone, siltstone, tuffaceous claystone, or limestone. It occurs on foothills and Valley floors above playas in creosote-bursage, shadscale, mixed shrub, and blackbrush zones. The plant is often associated with shadscale saltbush (*Atriplex confertifolia*) (Nevada Natural Heritage Program, 2001).



Clarke Phacelia (SEINet)

### RECENT AND HISTORICAL OBSERVATIONS

Early observations of this plant were made from 1940 – 1987 on the South Range Study Area and the NNSS. From 1993-1998, Atwood, Smith, and Knight made several observations of this species on the playas and bajadas of Indian Springs Valley, Three Lakes Valley, and Desert Valley. No other documented observations have been made on the study area since 1998 (Figure 56).

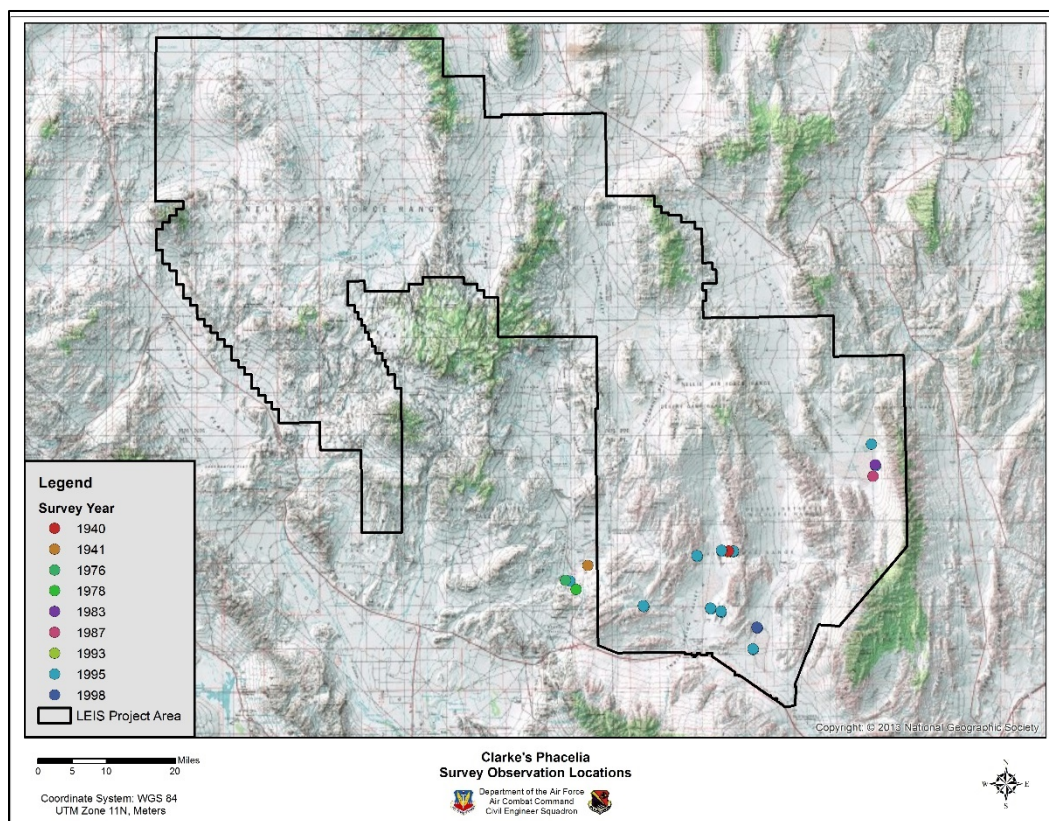


Figure 55. Locations where Clarke Phacelia has been observed in and around the study area.



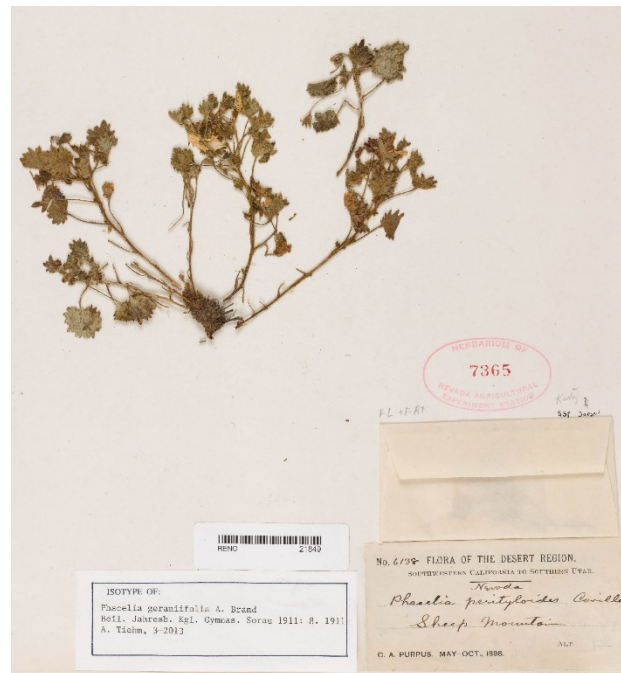
## JAEGER'S PHACELIA (PHACELIA GERANIIFOLIA)

### DESCRIPTION

Jaeger's phacelia occurs in deep or protected crevices in carbonate rocks in canyons, rock-crevices, or on north facing cliffs (Nevada Natural Heritage Program, 2001) often on bare rock, talus, or scree (NatureServe, 2016). It is found predominantly within pinyon-juniper woodland communities, including pinyon-littleleaf mahogany and sagebrush-pinyon-juniper assemblages, and ponderosa-white fir communities, at elevations between 2,600 and 8,000 ft. MSL. In Nevada, associated species include *Ericameria* spp. and *Larrea* spp. (NatureServe, 2016).

### RECENT AND HISTORICAL OBSERVATIONS

One observation of Jaeger's phacelia was recorded in 1962 near Hayford Peak on the Sheep Range in the DNWR just outside the study area. In 2011, David Charlet identified the species east of the South Range Study Area on limestone cliffs and talus of the Sheep Mountain Range.



Jaeger's Phacelia (SEINet)

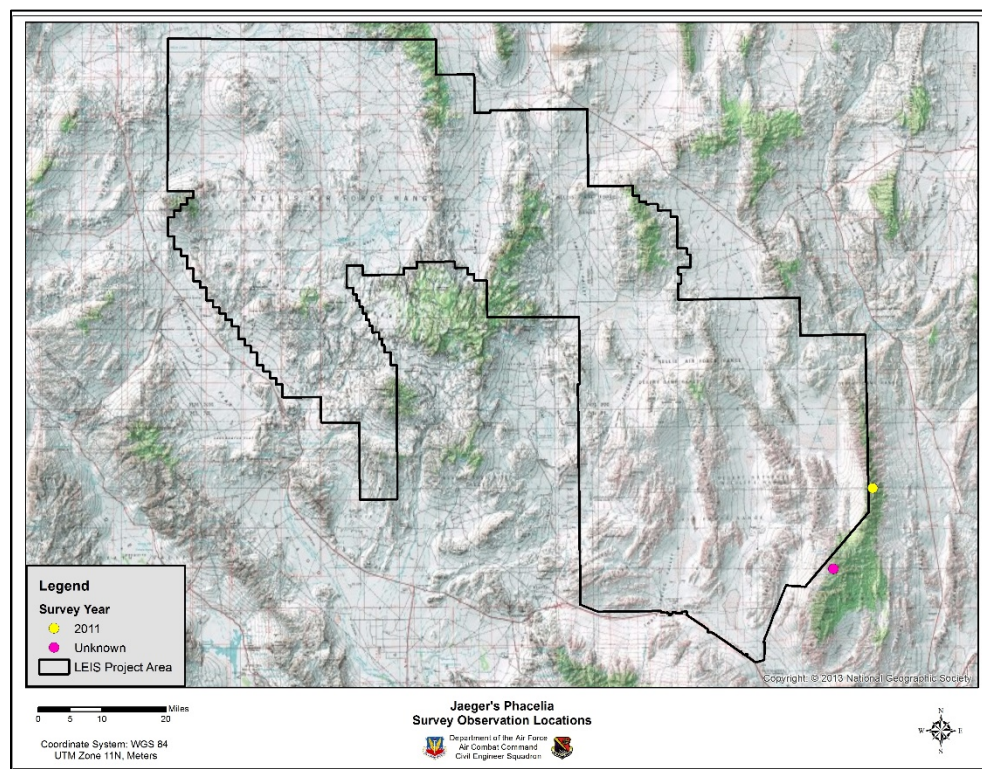


Figure 56. Locations where Jaeger Phacelia was observed in and around the study area.





## PARISH'S PHACELIA (*PHACELIA PARISHII*)

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### DESCRIPTION

Parish's phacelia is a species in the waterleaf family (Hydrophyllaceae). It is very similar to Beatley's phacelia (*Phacelia beatleyae*) and the two may be confused. For nearly 90 years, the Beatley's phacelia was not distinguished from the Parish's phacelia. The primary difference between the two is that Beatley's phacelia lacks basal rosettes and leaves that are entire (Mozingo & Williams, 1980). Parish's phacelia is a low annual that branches near the base and spreads. The stems may reach a length of about 5.9 in. long. Its elliptical leaves are typically basal, but have been known to grow elsewhere on the stem. Its leaves may also be elliptic-ovate with entire or coarsely few-toothed margins. The corolla is small and is barely longer than the calyx with a lavender flower with a pale-yellow base. The plant blooms from April to June (Knight, Smith, & Pritchett, 1997). Parish's Phacelia is seen on clay or alkaline soils, and the margins of dry lake beds (Baldwin, 2012). It grows at elevations of 1,771 to 3,937 ft. MSL (Baldwin, 2012).



Flower of Parish's Phacelia

Parish's phacelia prefers "moist to superficially dry, open, flat, mostly barren, often salt-crusted silty-clay soils on valley bottom flats, lake deposits, and playa edges". It is often found near seepage areas and sometimes among gypsum saturated areas (Nevada Natural Heritage Program, 2001). Plant communities



Parish's Phacelia

associated with this plant include saltbush scrub vegetation consisting of shadscale saltbush (*Atriplex confertifolia*), fourwing saltbush (*A. canescens*), silverscale saltbush (*A. argentea*), sandberg bluegrass (*Poa secunda*), Nuttall's povertyweed (*Monolepis nuttalliana*), Fremont's phacelia (*Phacelia fremontii*), yellow pepperweed (*Lepidium flavum*), and greasewood (*Sarcobatus vermiculatus*). This plant seems to be wetland dependent and is often found growing around water sources (Nevada Natural Heritage Program, 2001).

First referenced in 1884, the Parish's phacelia was found near Rabbit Springs by S. B. and W. F. Parish (Gray, 1884). It has since been found

in Clark, Lincoln, Nye, and White Pine Counties in Nevada, as well as in Arizona and California (Nevada Natural Heritage Program, 2001). The bulk of the plant's population in Nevada exists on NTTR. During the 1995 survey conducted by The Nature Conservancy, Parish's phacelia was found growing on playas in Three Lakes Valley and Indian Springs Valley. The largest of these populations was at the Indian Springs Valley location with an estimated 30 million plants (Knight, Smith, & Pritchett, 1997). The location at Three Lakes Valley was estimated to contain over 1 million plants (Knight, Smith, & Pritchett, 1997).

The NNHP estimates a total population of over 37,000,000 covering a total estimated area of over 4,500 acres, but it is believed to be in decline (Nevada Natural Heritage Program, 2001). Rainfall appears to

greatly affect the population. In years where rainfall is high, many plants are seen in contrast to drier years. It has been noted that surveys performed during dry years are less likely to find plants; a situation that may lead to a falsely negative evaluation (Knight, Smith, & Pritchett, 1997).

## RECENT AND HISTORICAL OBSERVATIONS

Large populations of Parish's phacelia have been observed historically and recently on the South Range Study Area during wet seasons within three different valleys--Indian Spring Valley, Three Lake Valley and Desert Valley (Figure 59).

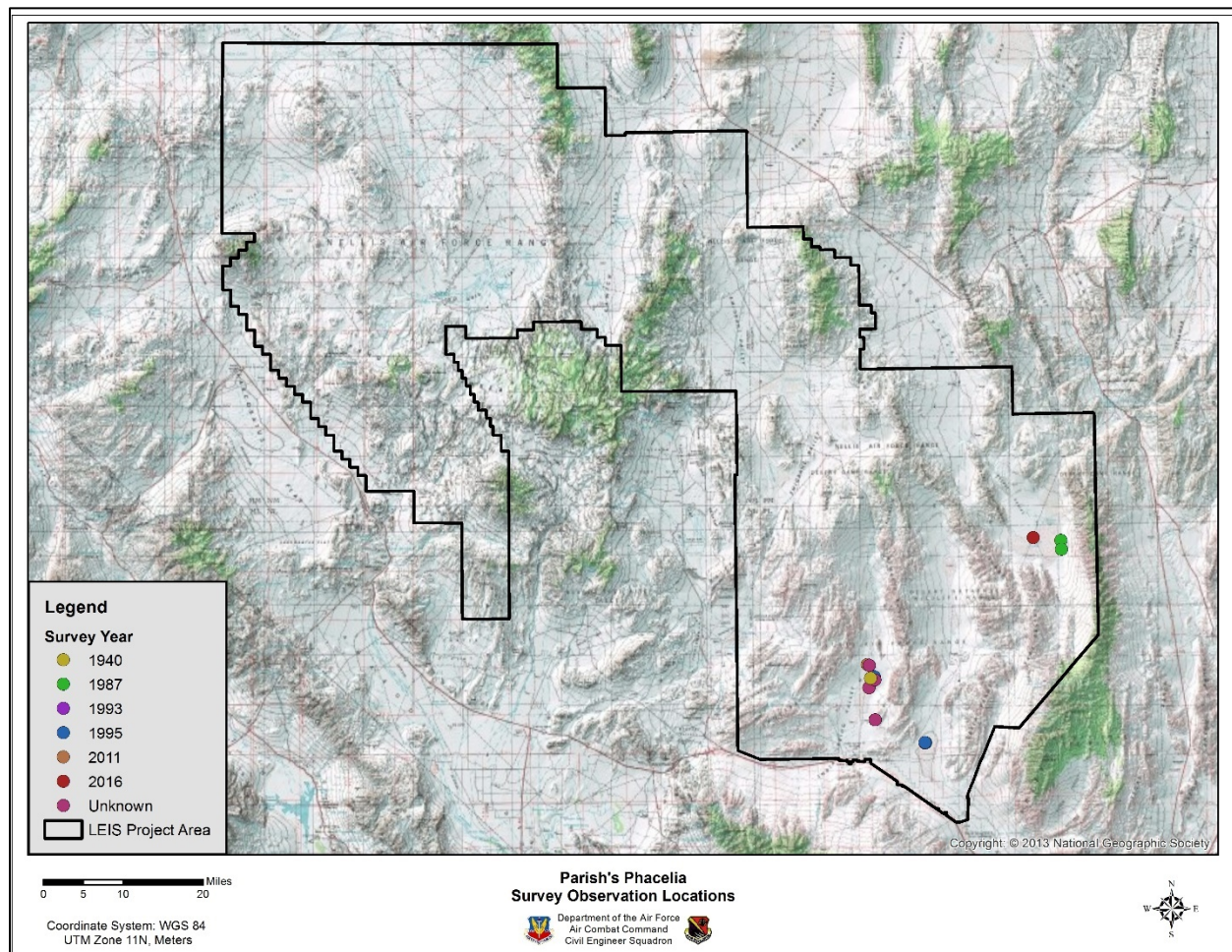


Figure 58. Locations where Parish's phacelia has been observed in and around the study area.



## ROCK PHACELIA (*PHACELIA PETROSA*)

### DESCRIPTION

The rock phacelia is closely related to *Phacelia crenulata* and *Phacelia ambigua* (Nevada Natural Heritage Program, 2001). This small herb is identified by the shape of its seeds and the appearance of the seed coats. Rock phacelia will bloom between mid-April to mid-May. It is observed growing in scree, talus and outcrops of carbonate in foothills, washes and canyon bottoms within mixed-scrub, creosote-bursage, and blackbrush communities (Nevada Natural Heritage Program, 2001). It has been identified in Nevada, northern Arizona, and southern Utah (NatureServe, 2016).

### RECENT AND HISTORICAL OBSERVATIONS

No recent or historical observations of rock phacelia have been made within the study area and no map of observations is needed.



Rock Phacelia

## HITCHCOCK'S BLADDERPOD (*LESQUERELLA HITCHCOCKII* VAR *HITCHCOCKII*)

### DESCRIPTION

Hitchcock's bladderpod was first observed in 1966 by James Reveal on the Spring Mountains. He was able to study the subspecies in more detail on the Spring Mountains and Sheep Range in 1968. Basically, this subspecies is similar to all other subspecies, except that it is smaller with few, short, closely branched stems and only a few flowering crowns (Reveal J. , 1970). The plant is a perennial that establishes scattered populations across slopes and ridges in association with black sagebrush, pinyon-juniper-littleleaf mountain mahogany, ponderosa, and bristlecone at elevations of 7,000 to 9,900 ft. MSL (Ackerman T. L., 2003).

### RECENT AND HISTORICAL OBSERVATIONS

To date, only been one observation of Hitchcock's bladderpod was documented within the study area in 1977 on the Sheep Range (Figure 60).



Hitchcock Bladderpod (Species only, not subspecies)

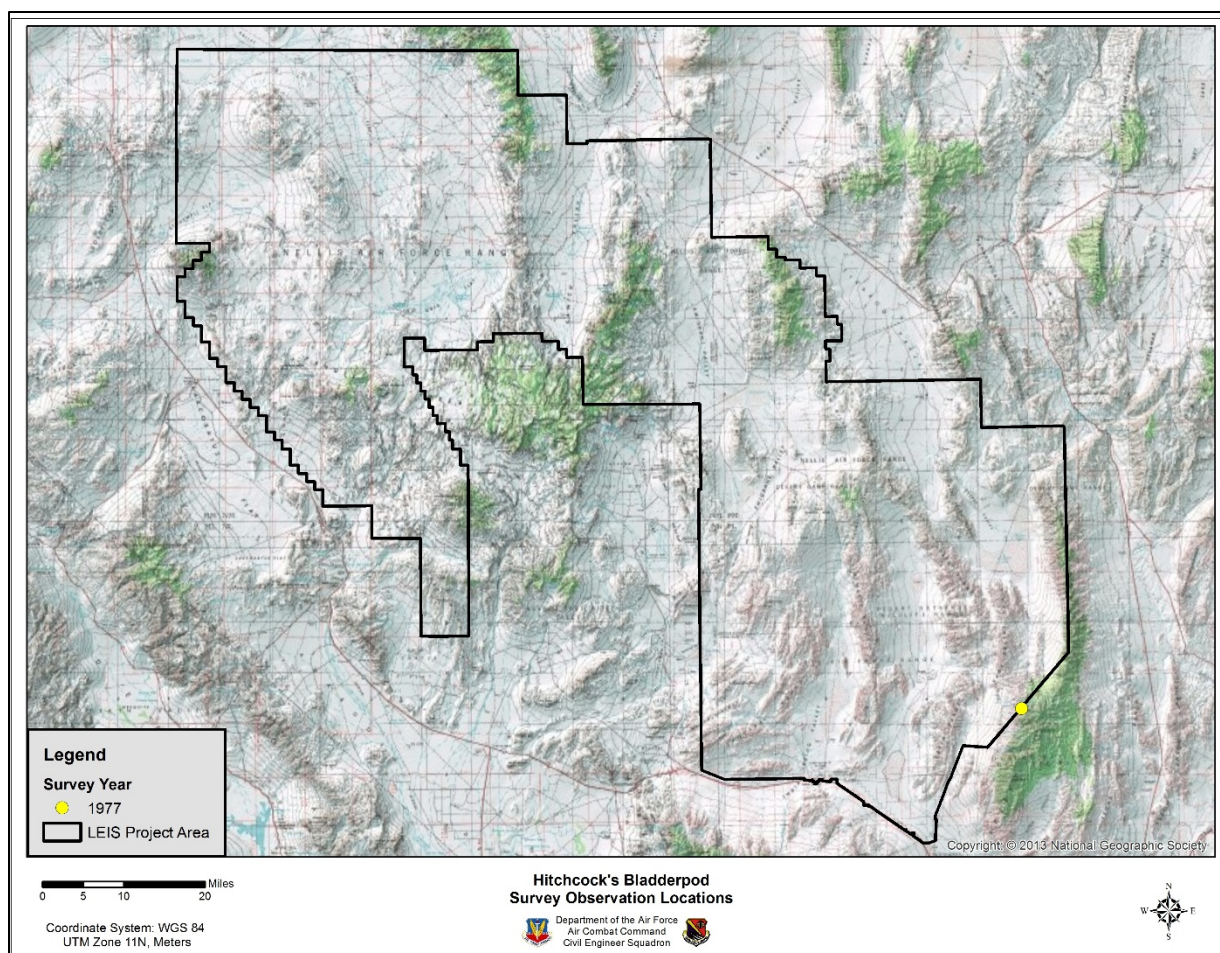


Figure 59. Locations where Hitchcock's bladderpod was observed in and around the study area.

## NOTCH-BEAK MILKWORT (*POLYGALA HETERORHYNCHA*)

### DESCRIPTION

Notch-beak milkwort is an understory shrub forming rounded open cushions approximately 2 to 8 in. tall. The root of this plant is very hard and woody. The stems of this plant tend to die back to the ground each year. Leaves are alternate, firm, spatulate to elliptical, and 0.5 to 1 inch long and 0.1 to 0.5 in. wide. Leaves are either sessile or supported by a short petiole. Flowers are bright pink purple with a yellow keel. Stems have spines that are approximately the same length as the leaves (Cronquist, Holmgren, & Holmgren, 1997). The plant is typically found on plains and dry hillsides with sagebrush or pinyon-juniper. It is most commonly found at elevations of 5,200 to 6,000 ft. MSL (Kartesz, 1988).

### RECENT AND HISTORICAL OBSERVATIONS

To date, a total of six observations of the notch-beak milkwort have been documented within the study area. Most of the observations occurred around the Groom Range in 1985. One observation was made in the North Range Study Area near Sarcobatus Flats.



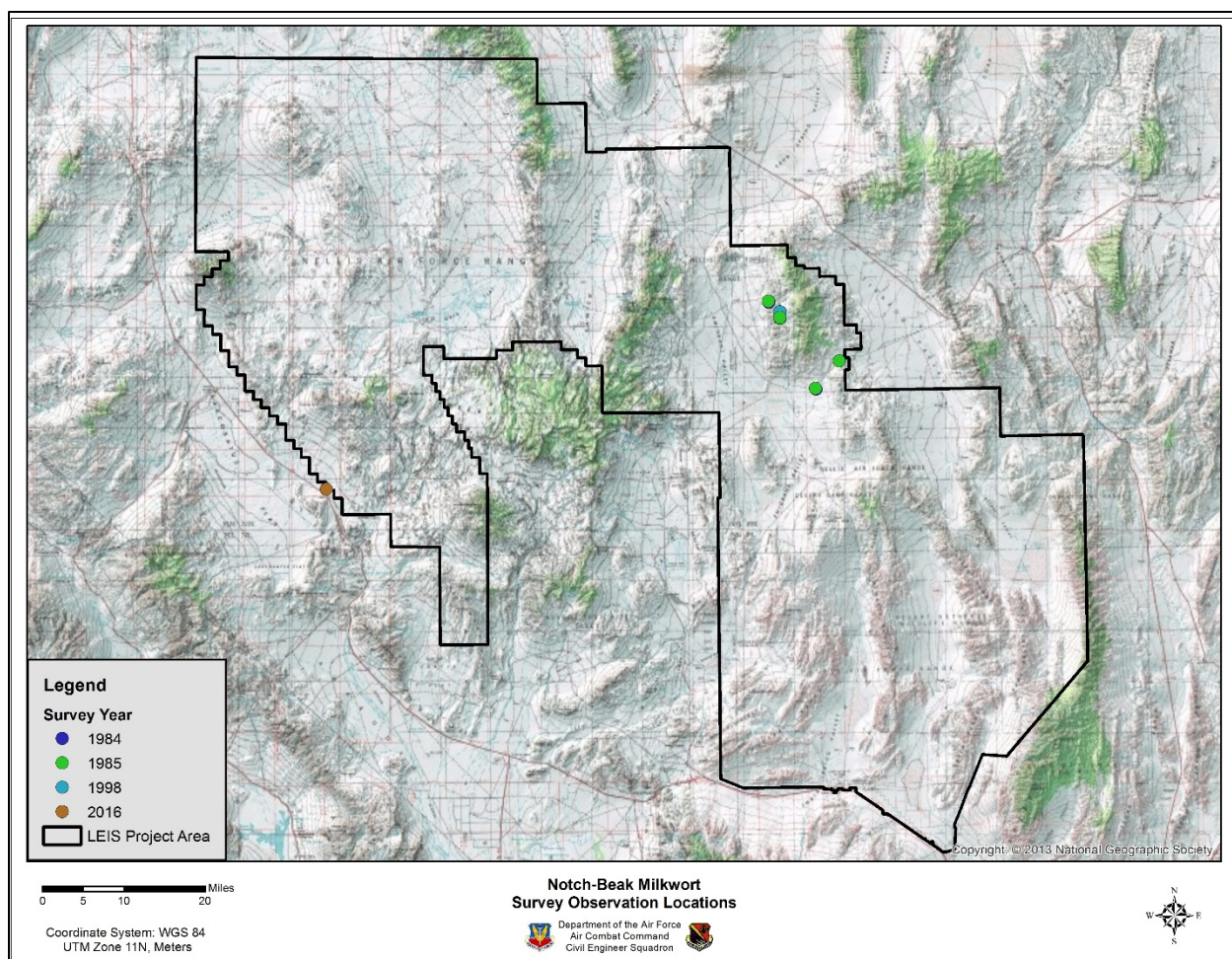


Figure 60. Locations where notch-beak milkwort has been observed in and around the study area.

## PYGMY PORELEAF (*POROPHYLLUM PYGMAEUM*)

### DESCRIPTION

Pygmy poreleaf is a recent addition to the *Porophyllum* genus. Discovered in 1987 on the DNWR, this perennial herb is noted for its strong aroma. The plant is endemic to Nevada, though it is closely related to the species *P. greggii* which is found in west Texas and *P. tridentatum*, a species in Baja California (Keil & Morefield, 1989). The pygmy poreleaf grows from a thin woody root to a height of 2 to 6 in. tall and 0.25 in. in diameter. It may produce one or many simple or branched stems. It is very leafy and noticeably purple near the base. The entire leaves are linear, nearly round and 0.4 to 0.6 in. long and 0.25 in.



Pygmy Poreleaf (Photo by James Morefield, NNHP)



wide. Oil glands and pores are prominent on the leaves. The pale-yellow corollas are 0.30 in. long and often have a green or red tinge. Dark veins can be seen on the corollas and the corolla tube is 0.17 in. long. The flowers are yellow, solitary, discoid, and do not produce ray flowers. This plant blooms beginning in April and continues until May (Knight T. F., 1997).

This species is found in dry, open, relatively deep, rocky carbonate soils of alluvial fans and hillsides; often in slight depressions (Keil & Morefield, 1989). It is also found on moisture-enhanced micro habitats in elevations from 4,200 - 6,800 ft. MSL (Knight T. F., 1997). Pygmy poreleaf is found in association with the blackbrush, mixed shrub, and lower pinyon-juniper zones. It may be found among Shockley's goldenhead (*Acamptopappus shockleyi*), Bigelow sage (*Artemisia bigelovii*), budsage (*A. spinescens*), Nevada joint fir (*Ephedra nevadensis*), Torrey's jointfir (*E. torreyana*), and Joshua tree (*Yucca brevifolia*), among many others (Knight T. F., 1997).

The habitat range of this plant includes the Desert and Sheep Range within Clark and Lincoln County, Nevada. It occurs mostly outside NTTR in the DNWR. However, three populations have been located on the South Range Study Area (Knight T. F., 1997).

## RECENT AND HISTORICAL OBSERVATIONS

The pygmy poreleaf has been seen multiple times on the South Range Study Area on the Desert and Sheep ranges. Historically, the species was identified in various locations from 1977 – 1996. David Charlet identified the species in seven different locations in 2010 and 2012. Alice Karl observed three populations of pygmy poreleaf during rare plant surveys in 2008 (Figure 62).

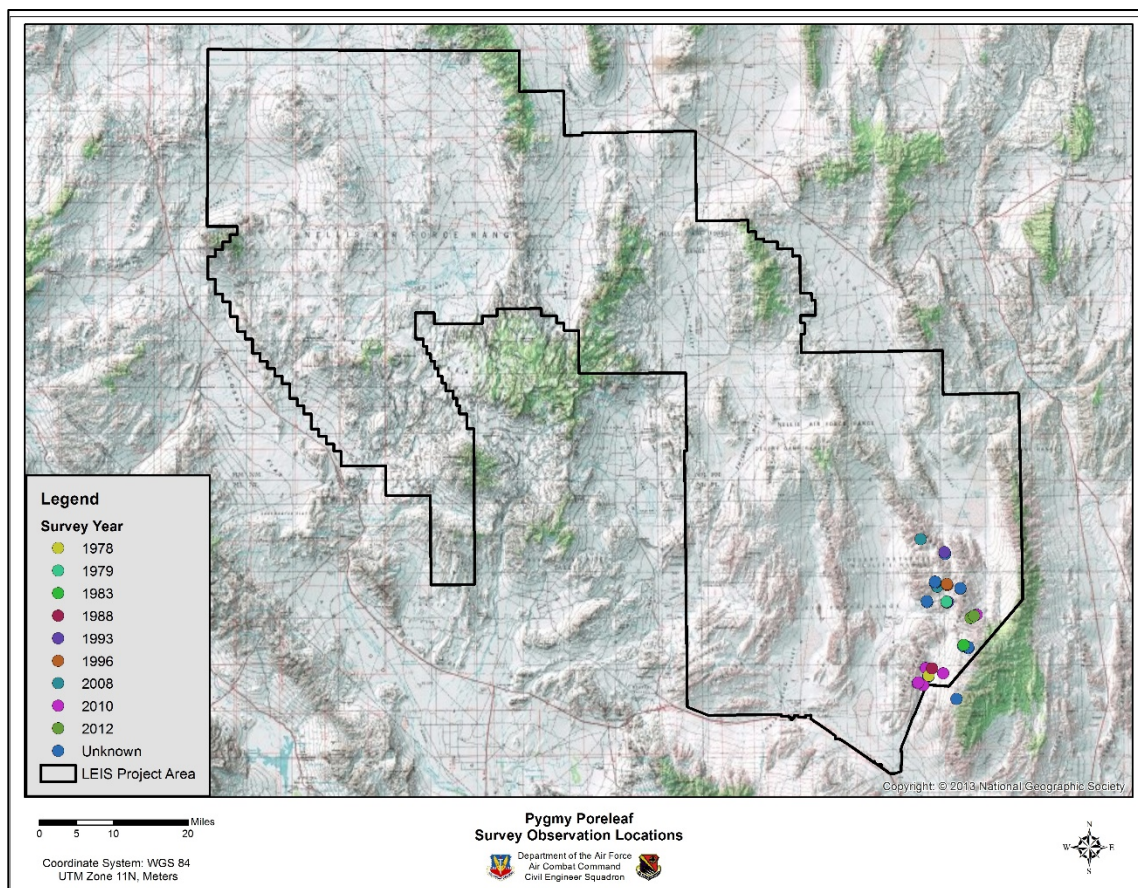


Figure 61. Locations where pygmy poreleaf was observed in and around the study area.



## CLOKEY'S MOUNTAIN SAGE (*SALVIA DORRII* VAR. *CLOKEYI*)

### DESCRIPTION

The Clokey's mountain sage is one of four varieties in the *Salvia dorrii* species. It is distinguished by its “gradually narrowed leaf blades, short flowering branches and spreading, mat-forming habit” (Strachan, 1982). It blooms from May to June (Strachan, 1982). This short shrub typically grows to a height of 8 in. tall and a foliage diameter of 16 in. The leaves are spatulate and reach a length of 0.9 in. and a width of 0.6 in. The leaves appear pale green when young and become somewhat silvery upon maturation. Its calyx is somewhat pubescent and 0.5 in. long and 0.25 in. wide. The corolla is 0.6 in. long with a 0.35-inch-long tube and a stamen that extends 0.2 in. outside of the corolla (Strachan, 1982).



Clokey Mountain Sage (Bruce Lund, NNHP)

The habitat of Clokey's mountain sage is described as “shallow, rocky to gravelly carbonate soils on ridges, slopes and drainages” (Nevada Natural Heritage Program, 2001) or “limestone outcrops at high elevations” (Strachan, 1982). The Clark County Multiple Species Habitat Conservation Plan (CCMSHCP) indicates that the plant grows on “limestones, dolomites, and sandstones” (RECON, 2000). It occurs at elevations ranging from 7,000 - 10,000 ft. MSL (Strachan, 1982). Associated plants include mountain mahogany species (*Cercocarpus* sp.), bristlecone (*Pinus aristata*) and singleleaf pinyon pine (*Pinus monophylla*), and juniper (*Juniperus* sp.) (Nevada Natural Heritage Program, 2001; RECON, 2000).

The range of *Salvia dorrii* extends throughout the western United States from Oregon to Mexico (Strachan, 1982). However, the Clokey's mountain sage variety is known primarily to occur in Clark County, Nevada. Most of the locations lie in the Spring Mountains and include “Macks, Lee, and Kyle Canyon, Deer Creek area, Harris Saddle, and [the] summit of Mount Wilson” (RECON, 2000). The CCMSHCP indicates six populations in the Sheep Mountains near the NTTR (RECON, 2000).

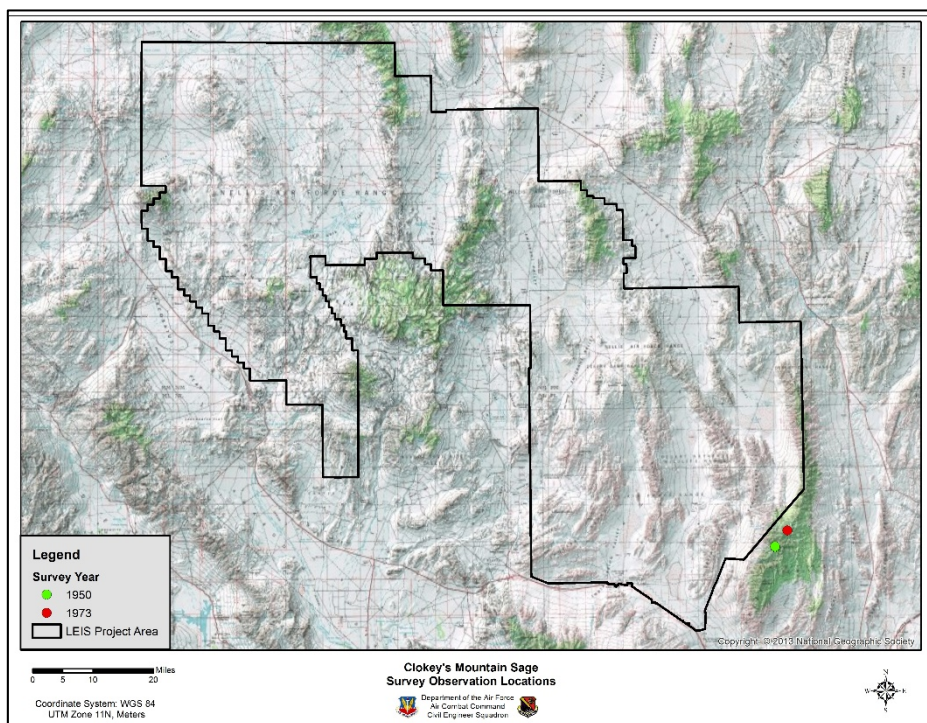


Figure 62. Locations where Clokey's mountain sage has been observed in and around the study area.

## RECENT AND HISTORICAL OBSERVATIONS

Clokey's mountain sage was observed on the Sheep Range in 1950 and 1973. In 2013, Charlet et al. recorded the species in 51 different locations in the Sheep Range (Figure 63). Charlet also identified the species in about 50 locations in the Spring Mountains (Charlet, Damar, & Leary, 2014). The locations of those observations were not available for this report.

## CHARLESTON GROUNDDAISY (*TOWNSENDIA JONESII* VAR. *TUMULOSA*)

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### DESCRIPTION

Charleston grounddaisy is a small matted short-lived perennial herb in the Asteraceae family (Nevada Natural Heritage Program, 2001). It is one of two varieties in the *T. jonesii*. This variety was discovered in 1968 by James Reveal on the Spring Mountains (Reveal J. L., 1970). Previous specimens were classified as *T. arizonica* (Mozingo & Williams, 1980). It differs from the var. *jonesii* because its leaves are shorter and wider. Also, the peduncles are shorter and the bracts are more obtuse in var. *tumulosa* (Mozingo & Williams, 1980).



Charleston Grounddaisy (Photo by James Morefield, NNHP)

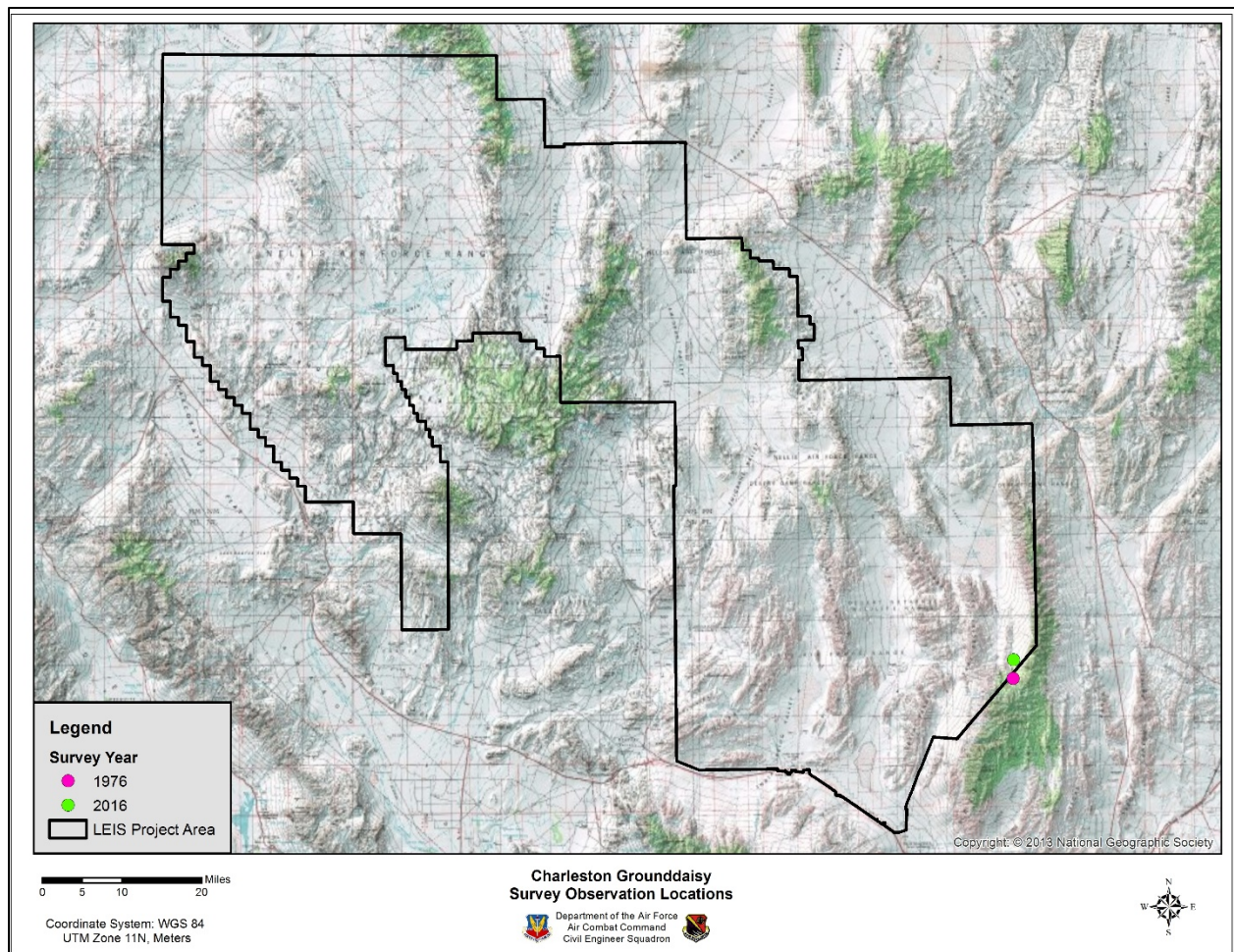
The plant forms rosettes with acute leaves that are uniformly hairy, entire and oblanceolate or spatulate. The leaves reach a length of 1 in. and vary from 0.08 to 0.16 in. wide. It has flowering heads with short peduncles and an involucre with lanceolate or obovate bracts. These bracts have thin, dry, and hair-fringed margins and may be glabrous or slightly hairy. When it blooms, the plant produces flowers with 13 to 21 ray flowers that are white to violet, 0.31 to 0.47 in. long, and approximately 0.04 in. wide. The disk flowers are yellow, but purplish at the tip. The plant blooms from March to June (Mozingo & Williams, 1980).

This species is known from Clark and Nye counties, and has been identified as inhabiting the Spring Mountains. The habitat has been described as "open, sparsely vegetated calcareous areas, on shallow gravelly carbonate soils on slopes and exposed knolls in forest clearings mostly in the montane conifer zone with *Pinus ponderosa*, extending to the pinyon-juniper, mountain mahogany, and lower subalpine conifer zones, recurring on knolls of white, alkaline, calcareous, silty lacustrine deposits in the upper shade-scale/mixed shrub and lower sagebrush zones." It is recorded in elevations from 5,200 - 11,060 ft. MSL (Nevada Natural Heritage Program, 2001).

## RECENT AND HISTORICAL OBSERVATIONS

The Charleston grounddaisy has been found on the Sheep Range in the DNWR (Mozingo & Williams, 1980). In 1976, Charleston grounddaisy was observed on Deadhorse Trail in the Sheep Range. Recently, Adams Ecology botanists identified the species just inside the southeast boundary of the South Range Study Area in 2016 (Figure 64).





**Figure 63. Locations where Charleston groundaisy has been observed in and around the study area.**

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