Study of the Serpentine Endemic
Streptanthus glandulosus subsp. *josephinenesis* (bristly jewel flower)

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USDA Forest Service, Region 6
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EXECUTIVE SUMMARY

The annual vascular plant *Strepthanthus glandulosus* subsp. *josephinensis* (bristly jewel flower) is a member of the Brassicaceae family. Little was known about the serpentine adapted endemic species. With a very restricted range it is the only subspecies of *Strepthanthus glandulosus* that is found in Oregon. Aside from vouchers and information from previous collections there was only one known occurrence in southern Oregon's Josephine County. This occurrence is on BLM lands and documented in GeoBOB.

This project relocated and collected data on the one previously known occurrence on BLM lands. Then 892 suitable habitat acres were surveyed. Efforts yielded the discovery of 7 new populations with 15,000-25,000 individuals located on Forest Service, BLM, and private lands. Two of the populations were found in the adjacent Del Norte County, California. Data was collected on the plants, their habitat, and associated plant species. The plants habitat was found to include dry serpentine open areas, serpentine shrub areas, rock outcrops, and disturbed areas. Elevation ranged from 2125 feet to just over 3,000 feet.

During survey and inventory efforts a population of another rare plant species was discovered. *Phacelia leonis* (Siskiyou phacelia), the focus of a 2010 ISSSSP project, was discovered in Waldo, Oregon on BLM lands. A voucher was identified by Dr. Richard Halse of Oregon State University Department of Botany.

INTRODUCTION

This project was designed to relocate a known occurrence of *Streptanthus glandulosus* (common jewel flower) and investigate the species to determine the morphology, species characteristics, habitat, and subspecies differentiation. Another component was to survey for the plant in suitable habitat on both Forest Service lands and other public lands. The goal of this project was to produce adequate information on the species to later guide agency botanists on identifying the taxon, conducting surveys, analyzing project effects, implementing restoration measures, providing protection, designing mitigations, and performing monitoring for the species.

BACKGROUND

Strepthanthus glandulosus is an annual plant belonging to the Brassicaceae family. The species is found only in California and in Josephine County, Oregon. *Strepthanthus glandulosus* and subspecies are found on serpentine areas. There are 7 subspecies in California (with one possibly extirpated). The species has been vouchered from Southern Oregon, Josephine County, since 1910. *Strepthanthus glandulosus* subsp. *josephinensis* (bristly jewel flower) was newly described in 2008 (I. Al-Shehbaz & M. Mayer) as an Oregon subspecies.

Little was known about the species in Oregon. Hoffman in 1948 collected the type specimen for subsp. *josephinensis* on serpentine soils in Josephine County 6.9 miles north of the California-Oregon border on the Happy Camp/O'Brien road. Arthur R. Kruckeberg in the 1950s and 1960s had documented, observed, and collected the species in Josephine County near Obrien. The

species is presently on the Rogue River-Siskiyou National Forest and the Medford BLM sensitive plant lists; however botanist from both agencies were unfamiliar with the species. It is important for agency personnel to learn and know the dynamics of the species; its morphology, habitat requirements, extent of occurrences, and potential range of the species and subsp. The International Union for Conservation of Nature (IUCN) status for *Strepthanthus glandulosus* subsp. *josephinensis* is critically imperiled.

Kruckeberg has postulated that serpentine ecosystems are edaphic serpentine island ecosystems, surrounded by large non-serpentine areas. These islands have a restricted or isolated gene flow resulting in divergence of species. This can lead to morphological and genetic diversity within the species. It appears that *Strepthanthus glandulosus* and the eight disjunct subsp. may have evolved this way. The subspecies are narrow endemics with small populations. The Josephine County individuals are the farthest north occurrences of this species.

DESCRIPTION

From "Flora of North America"

"Streptanthus glandulosus Hooker subsp. ***josephinensis*** Al-Shehbaz & M. S. Mayer, Novon. 18: 280. 2008.

Stems moderately hirsute proximally, glabrous distally, 1.7-3.8 dm. Cauline leaves: blade flat distally, margins dentate, surfaces sparsely hirsute. Racemes secund; rachis straight. Fruiting pedicels 5-10 mm, glabrous or sparsely pubescent. Flowers: sepals white or cream, 3-5 mm, glabrous or sparsely pubescent; petals white (with purple veins), 7-8 mm; adaxial filaments 5-6 mm. Fruits divaricate-ascending, straight or curved inwards; valves glabrous or sparsely pubescent.

Flowering Jun-Jul. Serpentine areas; of conservation concern; Oreg.

Subspecies *josephinensis*, known from Josephine County, is disjunct from the white-flowered Californian subspecies. R. C. Rollins (1993) and R. E. Buck et al. (1993) attributed the Oregonian plants to subspp. *Glandulouss*and *secundus,* respectively."

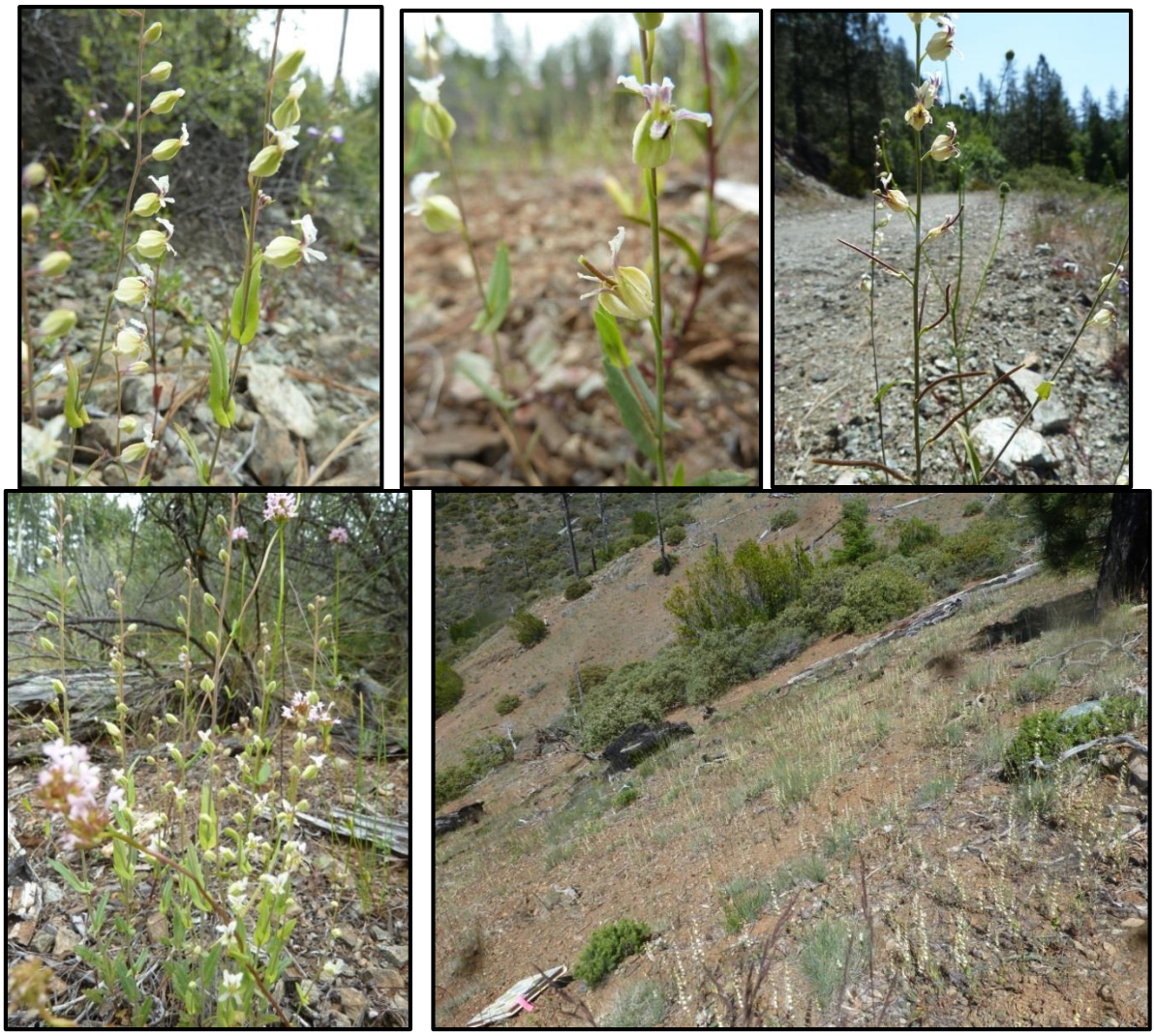
From "The *STREPTANTHUS GLANDULOSUS* Complex" (Al-Shehbaz and Mayer)

"**1d. *Streptanthus glandulosus*** subsp. ***josephinensis*** Al-Shehbaz & M. Mayer, subsp. nov. TYPE: U.S.A. Oregon: Josephine Co., serpentine soil 6.9 mi. N of California–Oregon line on Happy Camp–O'Brien rd., 9 July 1948, *F. W. Hoffman 2311* (holotype, MO; isotypes, GH, UC).

Annual herbs; stems 1.7–3.8 dm, moderately pubescent abaxially, glabrous adaxially. Cauline leaves sparsely pubescent, upper ones flat, dentate. Racemes secund; rachis straight; fruiting pedicels 5–10 mm, glabrous or sparsely pubescent. Flowers: sepals white or cream, 3–5 mm, glabrous or sparsely pubescent; petals white with purple veins, 7–8 mm; adaxial filaments 5–6 mm. Fruits glabrous or sparsely pubescent, straight or curved inward, divaricate-ascending."

During the project data was recorded on 279 plants from different populations. We found plants ranged from 7cm to 57cm with an average of 24cm in height. Stems were sparsely hairy. Plants ranged from having 1 to 30 with an average of 5.33 branches. Leaves ranged in color from green to purple, green/red, green/purple, green/brown, green/red/yellow. Basal leaves were sparsely hairy and dentate on the margin; sparsely hairy on mid vein on the abaxial

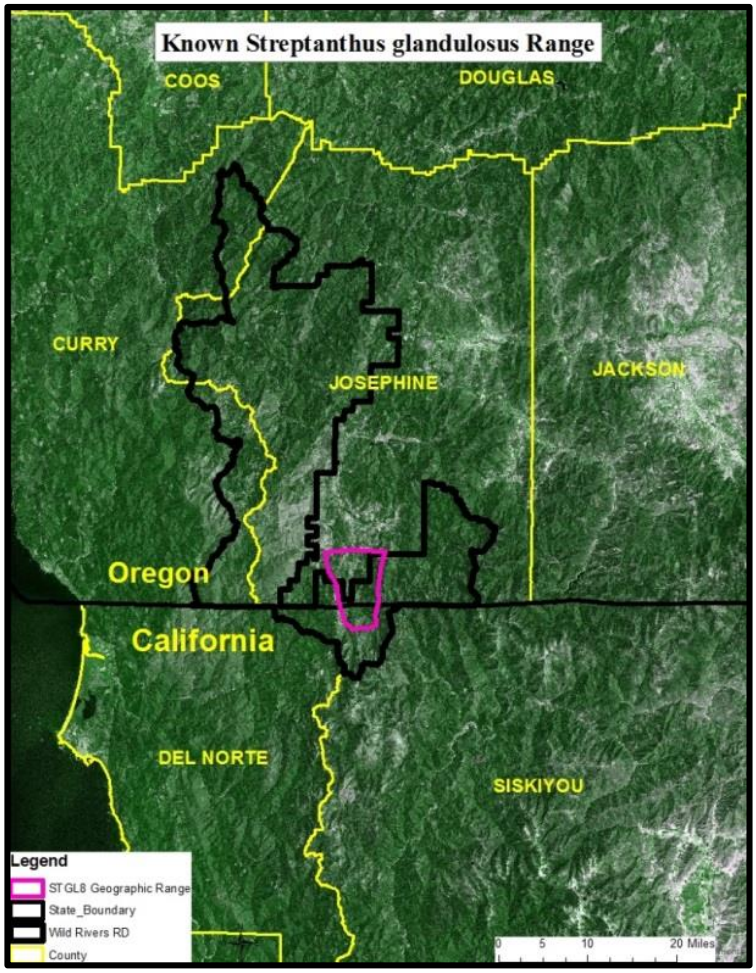
surface, and on the adaxial surface where hairs emerge from bumps or warts; leaf size ranged from 1.5mm to 15mm with an average of 3mm in width: and were 5mm to 61mm with an average of 10.89mm in length. Cauline leaves were sparsely hairy on the margin; sagittate and clasping; and were 1mm to 19mm with an average of 7.4mm in width; were 4mm to 70 mm and averaged 25.6mm in length. Racemes were secund; plants had 1 to 96 flowers with an average of 23. Sepal colors were white, yellow, green, yellow/green, white/yellow, and cream; were very sparsely hairy; and ranged from 4mm to 8mm with an average of 5.88mm in length. Petal colors were white and purple; ranged from 3mm to 8mm with an average of 5.37mm in length. Fruits were spreading ascending glabrous siliques with glabrous pedicels; ranging from 11mm to 70 mm with an average of 25.6mm in length; and 1mm to 2mm with an average of 1.23mm in width. All hairs on the plant appeared to be simple and despite the taxon's name the plant had no glands.



Row 1 – whole plant; plant with ruler **Row 2** - basal leaves; cauline leaves; flowering raceme
Row 3 – flowering racemes; flower with silique forming; plant with siliques
Row 4 – clump of plants; a lot of plants in habitat

GEOGRAPHIC RANGE

The subspecies has a known narrow endemic range restricted to Josephine County, Oregon and Del Norte County, California. The subspecies is also restricted to serpentine soils or areas directly adjacent to serpentine soils. The surveys found seven new occurrences of the subspecies in areas anticipated to be within the potential range.



Known Range of *Streptanthus glandulosus* subsp. *josephinensis*

CONSERVATION STATUS

Streptanthus glandulosus is ranked globally as G4 by Nature Serve (January, 2014). "Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern (i.e. there is some threat or somewhat narrow habitat). Nature Serve has T rankings for 6 subspecies but does not rank subspecies *josephinensis*.

The Oregon Biodiversity Information Center (ORBIC) ranks the species as an S1 "Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences".

Presently the subsp. is unranked in California. However, new occurrence information submitted to the California Natural Diversity Database should prompt a state ranking.

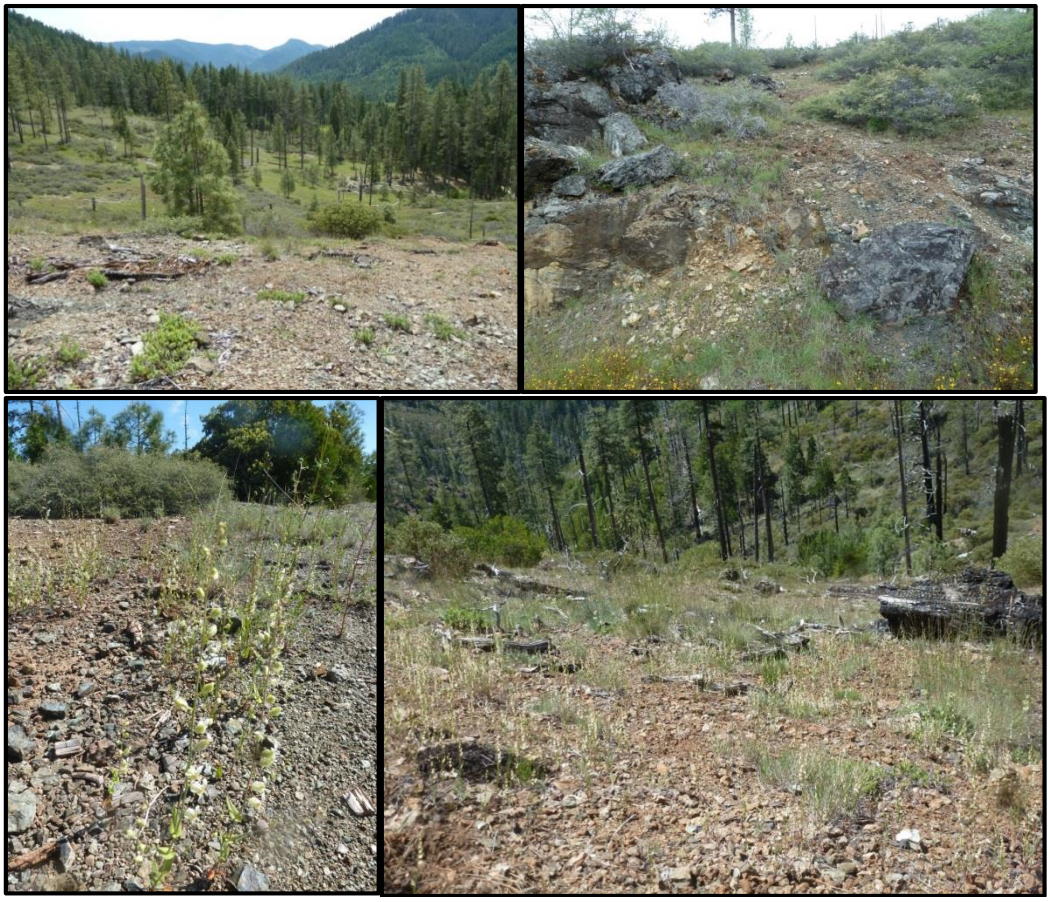
ORBIC also ranks the subspecies as a List 2 (ORBIC 2013). "List 2 contains taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon. These are often peripheral or disjunct species which are of concern when considering species diversity within Oregon's borders. They can be very significant when protecting the genetic diversity of a

taxon. ORBIC regards extreme rarity as a significant threat and has included species which are very rare in Oregon on this list."

The Forest Service and BLM lists *Streptanthus glandulosus* as a sensitive species.

HABITAT

Streptanthus glandulosus subsp. *josephinensis* is found primarily and consistently on serpentine soils and substrates. It was found during the 2014 surveys to also exist on rock outcrops and areas that were adjacent to or slightly influenced by serpentine geology. The subspecies was found in an array of habitat types: open serpentine meadows, serpentine brush communities, rock outcrops, disturbed areas such as along roadsides, and on a seldom used becoming re-vegetated Forest Service road prism. The subspecies was found in open areas within and adjacent to serpentine brush communities and underneath the brush where it was unexpected to be found. The endemic range appears to be isolated by serpentine areas found within non serpentine surroundings. Elevation ranged from 1,920 feet to just over 3,000 feet.



Examples of *Streptanthus glandulosus* subsp. *josephinensis* habitat

RESULTS OF SURVEYS AND INVENTORIES

Initially members of the Rogue River-Siskiyou's Wild Rivers Ranger District Botany Crew during June 2013 revisited the one known site on BLM lands. A small population was relocated in an

open rocky serpentine area between serpentine *Ceanothus cuneatus* dominated shrub land and non-serpentine woodland. Less than 10 Individuals were also located under the canopy of a robust *C. cuneatus.* Subsequently, the site was revisited in early May 2014 prior to project surveys to hone a search image to survey for the subspecies.

After this potential habitat polygons were surveyed throughout May 2014 in the East Fork Illinois River Watershed near the community of Takilma. Polygons were identified through GIS aerial imagery interpretation. Additional areas with high quality habitat were identified in the field and surveyed. Surveys were conducted by Rogue River-Siskiyou National Forest botanists Stacy Johnson, Christine McCullough, and Stu Osbrack. *Streptanthus glandulosus* subsp. *josephinensis* was found in multiple survey polygons and also in high quality habitat that was not initially identified. Populations were located on Forest Service lands, BLM lands, and private lands. The subspecies was found in Josephine County, Oregon and just over the border in Del Norte County, California. Vouchers were sent to the OSU Herbarium in Corvallis, Oregon and Jepson Herbarium in Berkeley, California.

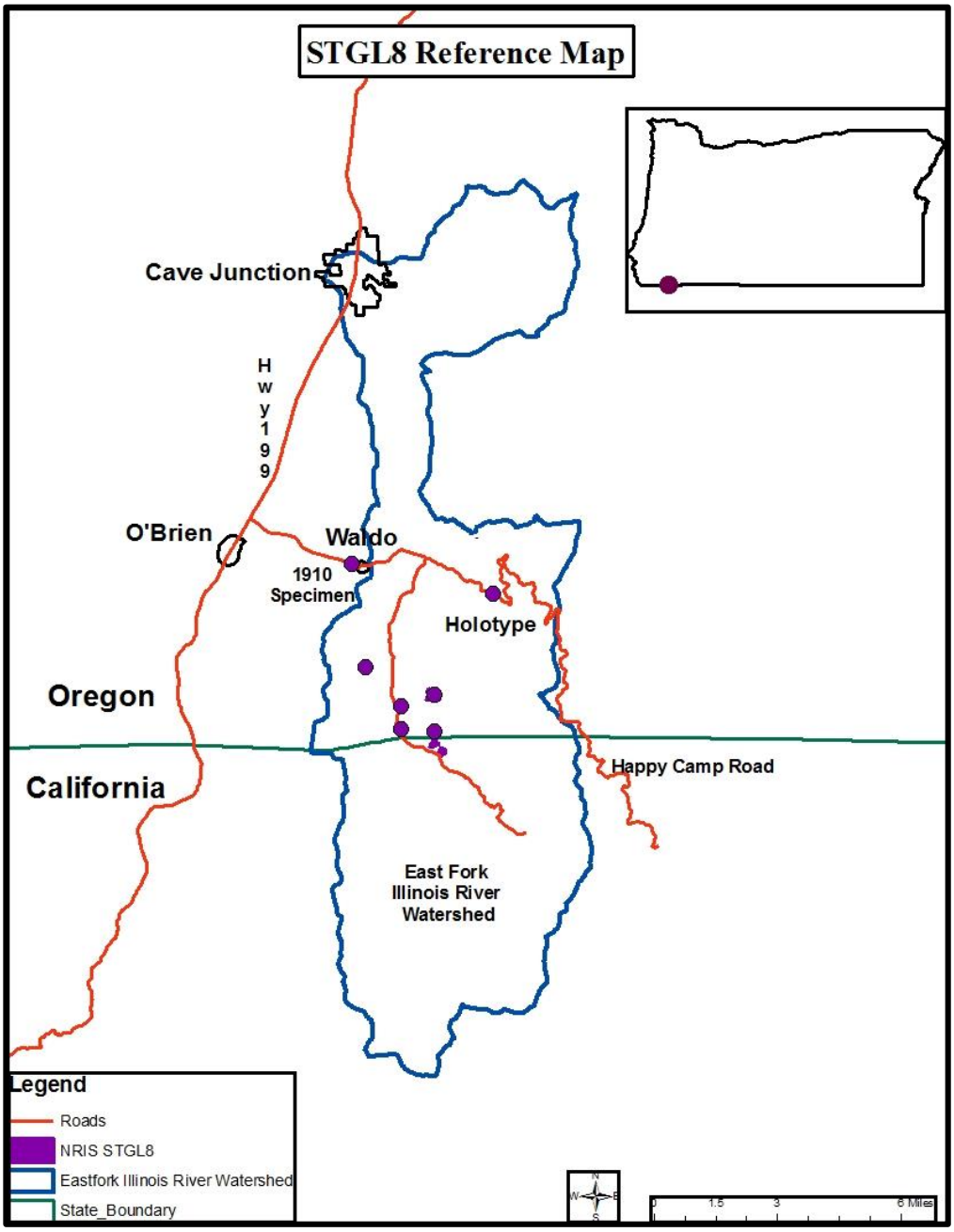
NRIS ID	OWNERSHIP	COUNTY STATE	PLANT COUNT	DATE
061122_STGL8_001	Forest Service	Josephine, Oregon	150	5/7/2014
061122_STGL8_002	Forest Service	Josephine, Oregon	2,000 - 3,000	5/22/2014
061122_STGL8_003	BLM	Josephine, Oregon	500	5/14/2014
061122_STGL8_004	Forest Service	Del Norte, California	400	5/18/2014
061122_STGL8_005	Forest Service	Josephine, Oregon	5,000 - 7,500	5/13/2014
061122_STGL8_006	Private	Josephine, Oregon	500	5/18/2014
061122_STGL8_007	Forest Service	Del Norte, California	5,0000 - 7,500	5/19/2014

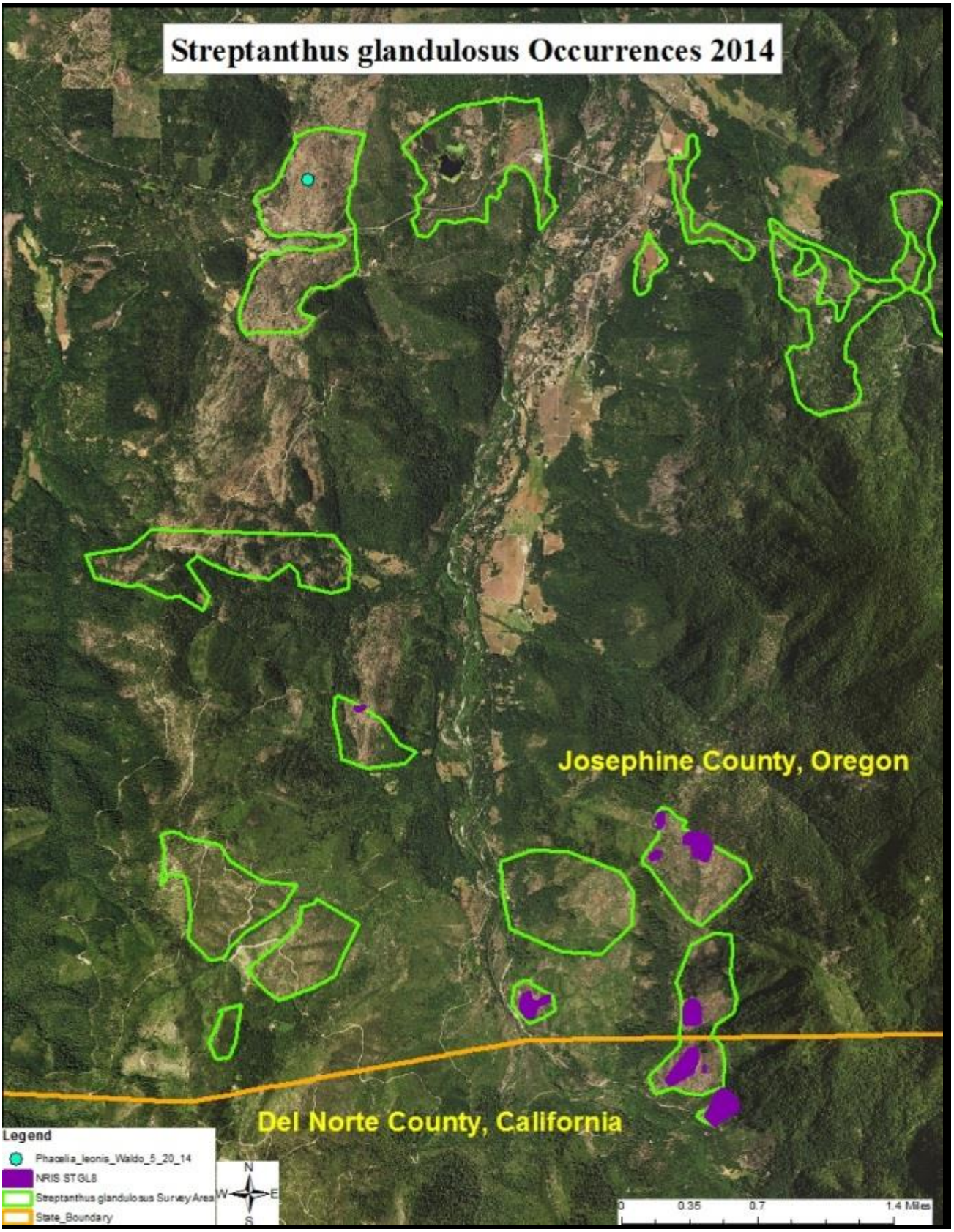
Almost 900 acres were surveyed yielding new discoveries of 15,000-25,000 individuals at 7 separate locations. *Streptanthus glandulosus* subsp. *josephinensis* was located in some areas in large numbers. It was found along the roadside in some locations; with star thistle in one rocky outcrop area; and in the middle of a Forest Service road that is undergoing passive re-vegetation due to the absence of maintenance and low to no vehicular travel. The plant was always found in habitat deemed highly suitable. The relocation of the type specimen was attempted but was not found. This could be attributed to either searching in the wrong location or that the annual no longer persists in the area. No individuals were located near the 1910 specimen site from Waldo. All populations found are within a 1.75 mile radius. The population polygon clusters range from 2500-3800 feet from one another and all but one population are on the east side of the Illinois River. Individuals were also not found near Waldo where a specimen was collected in 1910. However this location may be on private lands that were not surveyed or may be inaccurate since Waldo use to reference a much larger area than it is today. Bee flies were noticed visiting *Streptanthus glandulosus* subsp*. josephinensis* flowers suggesting a role as a pollinator.

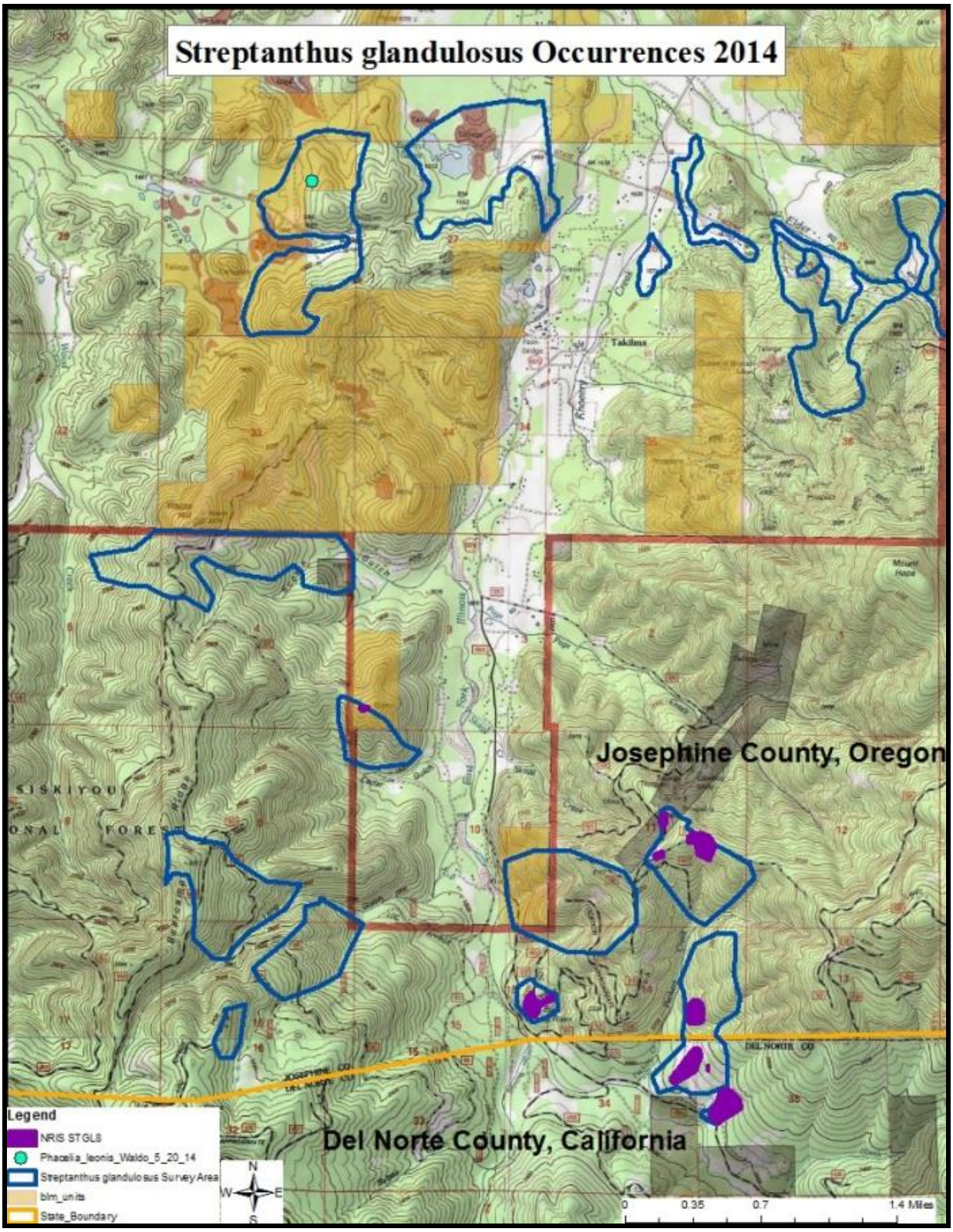
For the most part during May of 2014 the occurrences had many plants that were robust with many flowers. In 2015 plants were relocated in occurrence areas. In April and early May the

plants seemed sparse in numbers and not as robust as in 2014. But by late May the populations had fully expressed themselves with plant numbers and vigor that seemed to parallel findings of 2014.

Unfortunately, as with many rare plant occurrences on the Wild Rivers Ranger District, invasive plants were identified within and near a few of the new populations that were discovered during project surveys. Invasive plants found include: *Centaurea melitensis* (maltese starthistle), *Elymus caput-medusae* (*Taeniatherum caput-medusae*/medusa head), *Cirsium vulgare* (bull thistle), and *Bromus tectorum* (cheatgrass).




Streptanthus glandulosus Occurrences 2014
Josephine County, Oregon
Del Norte County, California
Legend
Phacelia_leonis_Waldo_5_20_14
NRIS STGL8
Streptanthus glandulosus Survey Area
State_Boundary
N
W
E
S
0
0.35
0.7
1.4 Miles



Streptanthus glandulosus subsp. *josephinensis* survey polygons, occurrences, and incidental siting

INCIDENTAL SITES

During the 2014 field surveys for *Streptanthus glandulosus* subsp. *josephinensis* another rare plant species was discovered on BLM lands. *Phacelia leonis* (Siskiyou phacelia), the focus of a 2010 ISSSSP project, was discovered in Waldo, Oregon within a *Streptanthus glandulosus* subsp. *josephinensis* potential polygon. In 2010 the area was surveyed for *P. leonis* but the species was not found most probably due to the survey timing. Although expert Richard Halse determined that the occurrence was *P. leonis* there still is some question among Rogue River-Siskiyou botanists that the population is *P. leonis* or another diminutive annual Phacelia species.

CONCLUSION

The project was a success demonstrated by the discovery of new populations and thousands of individuals. The subspecies is a tight endemic that appears to be restricted to serpentine geology within a small geographic area. Additional surveys are needed for the subspecies to delineate the true range of the subspecies.

It would seem that the seedbanks are integral to the plants survivorship and viability upon the landscape into the future. There is a need for conservation and protection for the subspecies which at this time appears to be quite rare. As with many other tight endemic plant taxa they are locally abundant and globally rare. This subspecies is prolific at the few locations discovered but not present elsewhere.

Finding the plant along roadsides and even within a re-vegetating road prism suggests the tolerance for some disturbance. In addition, its existence in a fire adapted ecosystem may indicate fire adaption, dependence, or tolerance. A restoration and fuels reduction project on an overstocked shrub land where one population is located may help answer this question. The population has been buffered and will not receive any management at this time, however, some scattered outlying individuals are found within the dense shrub canopy that will be treated and then broadcast burned. The hope is that this project will give us data on the subspecies seedbank response to fire and disturbance.

Invasive plants may be the greatest threat to the subspecies. *Streptanthus glandulosus* subsp. *josephinensis* is a small diminutive annual species that exists in somewhat open or rocky serpentine areas that have little competition from other plant species. Competition from other plants may diminish the subspecies from its occupied habitat. Species such as medusahead have the potential to displace populations and extirpate seedbanks in locations adjacent to or within infestations. Other threats to the subspecies include the loss of open area to shrub encroachment most likely caused by the continual lack of disturbance.

ACKNOWLEDGEMENTS

Thanks goes to expert botanists Stacy Johnson and Christine McCullough who performed the bulk of the field work, plant measurements, data entry, and picture taking. Their top notch skills and tireless enthusiasm allowed for this project to be a success.

All photos taken by Stacy Johnson, Christine McCullough, and Stuart Osbrack

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APPENDIXES

I

Key to the Subspecies of *Streptanthus glandulosus* (Al-Shehbaz and Mayer)

1a. Rachis of raceme flexuous; lower stems and cauline leaves glabrous; fruiting pedicels 1–3.2 cm; sepals dark purple-black	*S. glandulosus* subsp. *niger*
1b. Rachis of raceme straight; plants sparsely to densely hirsute; fruiting pedicels 0.2–1.5 cm; sepals white, lilac, lavender, purple, or reddish purple	Racemes not secund
2a. Sepals white, greenish white, or pale yellow; Santa Clara Co., California	*S. glandulosus* subsp. *albidus*
3a. Sepals reddish purple, dark maroon, or lilac-lavender; San Luis Obispo Co. north into Santa Clara, Lake, and Mendocino counties, California	*S. glandulosus* subsp. *glandulosus*
2b. Racemes secund	
4a. Sepals lavender to rose or purple	
5a. Fruiting pedicels 2–5 mm; fruits curved upward, divaricate to ascending; adaxial filaments 6–8 mm; Marin Co., California	*S. glandulosus* subsp. *pulchellus*
5b. Fruiting pedicels 5–15 mm; fruits arcuate, spreading to reflexed; adaxial filaments 7–10 mm; Sonoma Co., California	*S. glandulosus* subsp. *hoffmanii*
4b. Sepals greenish white, white, cream, or pale yellow	
6a. Petals 7–8 mm; adaxial stamens 5–6 mm; fruits divaricate-ascending, straight or curved inward; Josephine Co., Oregon	*S. glandulosus* subsp. *josephinensis*
6b. Petals 10–17 mm; adaxial stamens 5–6 mm; fruits spreading to reflexed, arcuate; Marin, Napa, and Sonoma counties, California	
7a. Sepals greenish white with lavender or purplish base; petals with purple veins; Marin and Napa counties, California	*S. glandulosus* subsp. *secundus*
7b. Sepals cream or pale yellow, without purplish or lavender base; petals without purple veins; Sonoma Co., California	*S. glandulosus* subsp. *sonomensis*

II
Previously Known BLM Occurrence Site Visit Notes
Streptanthus glandulosus subsp. *josephinensis*

Population on BLM land

Christine McCullough, Brad Mead, and Stuart Osbrack; June 5, 2013

The first area that we located plants in is above the big rock underneath *Ceanothus cuneatus*. There were 5 plants at this location, 4 were in flower and fruit and 1 was just in fruit. The tallest plant was 220 mm and the shortest plant was 92 mm. The fruiting pedicels were 3-4 mm. The siliques were: 50, 54, 42, 40, 40, 15 mm and were glabrous. The cauline leaves were clasping and dentate. The amount of leaves per stem was: 3, 3, 2, 2, 3 and the leaves were about 15 mm long. The sepals were 5 mm and had small hairs on them. The anthers were 1 mm and the filaments were 2 mm.

The second area where plants were found was open with no canopy and was a little ways down the slope and on a rock outcrop. In this location there were 100+ plants, most of them were in fruit. Plants extended down the slope and were mostly on rock outcrops. One plant was measured at this location. It was 150 mm tall and the main stem was hairy. The leaves were clasping, hair on the margins and dentate and were around 20 mm long. The pedicels were 4, 7 and 6 mm long. The sepals were 5 mm and were cream colored. The siliques were 45 and 42 mm long.

Associated Plants

Ceanothus cuneatus, Toxicodendron diversilobum, Eriodictyon californicum, Pinus jeffreyi, Chlorogalum augustifolium, Aspidotis densa, Dichlostemma, Eriophyllum lanatum, Quercus chrysolepis, Arctostaphylos, Madia, Epilobium, Danthonia californica, Aira caryophyllea, Bromus tectorum, Eschscholzia californica, Gilia capitata, Micropus californicus, Elymus glaucus, Vulpia bromoides

III
Associated Species Lists - New Occurrences found in 2014

STGL8 California
NRIS ID 061122_STGL8_004

Allium falcifolium
Allium sp
Arbutus menziesii
Arctostaphylos sp
Aspidotis densa
Balsamorrhiza deltoidea
Calochortus tolmei
Calystegia occidentalis
Ceanothus cuneatus
Collinsia grandiflora
Dichlostemma
Epilobium minutum
Eriodictyion californicum
Eriogonum nudum
Gilia capitata
Hastingia serpentinicola
Lomatium sp
Mellica geyeri
Minuartia douglasii
Phacelia corymbosa
Stipa lemmonii
Viola hallii
Vulpia myorus

STGL8 on Private off Page Creek Road
NRIS ID 061122_STGL8_006

Agoseris sp
Allium sp
Amelanchier alnifolia
Aspidotis densa
Calocedrus decurrens
Calystegia occidentalis ssp occidentalis
Ceanothus cuneatus
Cercocarpus betuloides
Chlorogalum pomeridianum var. pomeridianum
Claytonia sp
Collinsia grandiflora
Delphinium sp
Epilobium minutum
Eriodictyon californicum
Eriophyllum lanatum
Erysimum sp
Gallium sp
Hastingia serpentinicola
Lithophragma
Lotus sp
Madia elegans
Marah oregano
Mellica geyeri

STGL8 at end of Page Creek Road
NRIS ID 061122_STGL8_005

Arctostaphylos sp
Calochortus tolmei
Castilleja sp
Ceanothus cuneatus
Collinsia grandiflora
Eriogonum nudum
Festuca californica
Iris chrysophyllus
Lomatium sp
Ranunculus sp
Viola sp

STGL8 BLM Road 4803
NRIS ID 061122_STGL8_003

Allium falcifolium
Arctostaphylos sp
Aspidotis densa
Balsamorrhiza deltoidea
Calocedrus decurrens
Calochortus tolmei
Calystegia occidentalis
Ceanothus cuneatus
Ceanothus pumilus
Cerastium
Cryptantha/Plagiobothrys sp
Dichlostemma
Epilobium minutum
Eriodictyion californica
Eriophyllum lanatum
Festuca roemeri
Gallium
Garrya
Gilia capitata
Hastingia serpentinicola
Hieracium
Lomatium sp
Mellica geyeri
Minuartia douglasii
Monardella
Phacelia corymbosa
Pinus jeffreyi
Polygala
Pseudotsuga menziesii
Ribes
Toxicodendron diversilobum
Umberllaria californica
Vulpia myorus

STGL8 Cali Oregon
NRIS ID 061122_STGL8_002

Allium falcifolium
Arabis sp
Arctostaphylos sp
Aspidotis densa
Calocedrus decurrens
Calochortus tolmei
Calystegia occidentalis
Ceanothus cuneatus
Dichlostemma
Epilobium minutum
Eriodictyion californica
Eriogonum nudum
Eriogonum sp
Eriophyllum lanatum

Festuca californica
Festuca roemeri
Gallium sp
Gilia capitata
Lomatium sp
Madia sp
Minuartia douglasii
Pinus jeffreyi
Pseudotsuga menziesii
Ranunculus sp
Silene campanulata
Silene hookeri
Stipa lemmonii
Wyethia

STGL8 California 2
NRIS ID 061122_STGL8_007
Achillea millefolium
Arabis sp
Arctostaphylos
Aspidotis densa
Calocedrus decurrens
Calystegia
Ceanothus cuneatus
Collinsia grandiflora
Dichlostemma
Epilobium minutum
Eriodictyion
Eriogonum nudum
Eriophyllum lanatum
Fraxinus
Gilia capitata
Hastingia serpentinicola
Mimulus
Minuartia
Oxeye Daisy
Pinus jeffreyi
Plectritis
Poa pratensis
Pseudotsuga menziesii
Rhamnus californica
Salix sp
Senecio macounii
Stipa lemmonii
Umbellaria californica
Viola hallii
Wallflower

STGL8 On Forest
NRIS ID 061122_STGL8_001
Agoseris
Allium sanbornii ssp sanbornii
Arbutus menziesii
Aspidotis densa
Bromus hordeaceous
Calocedrus decurrens
Ceanothus cuneatus
Cheatgrass
Cheilanthes
Chlorogalum
Delphinium nudicaule
Delphinium sp
Eriodictyion californicum
Eriogonum nudum
Gallium
Hastingia serpentinicola
Madia
Maltese Star Thistle
Marah
Mimulus
Minuartia
Phacelia heterophylla
Plectritis
Pseudotsuga menziesii
Quercus garryana
Stipa lemmonii
Toxicodendron diversilobum
Trifolium willdenovii
Umbellaria californica

STGL8 Page Creek USFS
NRIS ID 061122_STGL8_005
Achillea millefolium
Agoseris sp
Allium falcifolium
Amelanchier alnifolia
Arctostaphylos sp
Aspodotis densa
Calchortus tolmei
Calocedrus decurrens
Calystegia occidentalis
Castilleja sp
Ceanothus cuneatus
Collinsia grandiflora
Dichlostemma
Eriogonum nudum
Eriophyllum lanatum
Erythronium sp
Festuca californica
Gallium sp
Hieracium sp
Ipomopsis
Minuartia douglasii
Penstemon
Phacelia corymbosa
Phlox diffusa
Pinus lambertiana
Pseudotsuga menziesii
Rhamnus californica
Silene campanulata
Silene hookeri
Umbellaria californica
Viola sp
Vulpia myuros
Wyethia