An Inventory and Assessment of *Lilium kelloggii* in Oregon

Photo © Christine McCullough

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Abstract

Kellogg's Lily (*Lilium kelloggii* Purdy) ranges from Humboldt County in California north to the Oregon-California border and possibly farther. Herbarium records indicate that historical populations of *L. kelloggii* have existed in southern Oregon in Curry and Josephine Counties. Surveys were conducted for *L. kelloggii* during June of 2013 at three different locations. No new *L. kelloggii* sites were discovered.

Introduction

Lilium kelloggii is a perennial herb in the Liliaceae family. The Liliaceae contains approximately 16 genera, and 635 species worldwide. Kellogg's lily is a "true lily" in the genus *Lilium*, which consists of approximately 100 species, 22 of which occur in North America. Of those 22 species, 12 occur in the California Floristic Province (Baldwin et al. 2012), and 6 occur in Oregon (Oregon Flora Project 2014).

L. kelloggii grows in serpentine[1] chaparral or mixed forest openings and roadsides below 3,500 feet, including as an understory forb species within redwood (*Sequoia sempervirens*) forest. *L. kelloggii* originates from a scaly rhizome and is known to reach two meters in height. It is distinguished from other *Lililum* species by its pink to white, fragrant, pendent flowers with purple spots and a yellow midrib, and pale red-orange or magenta anthers. Another lily native to southern Oregon growing in similar habitats, *Lilium columbianum,* has a yellow to orange perianth and maroon toned spotting. Additionally, the leaf margins of *L. kelloggii* are generally not wavy, as compared to the wavy leaf margins of *Lilium bolanderi. L. bolanderi* shares somewhat similar habitat and can have similarly colored flowers as *L. kelloggii* at first glance, but is easily distinguishable with further examination due to its nodding to ascending flowers and wavy leaf margins (Skinner 2012).

L. kelloggii is endemic to northern California, and possibly southern Oregon. It can be found within the Klamath Ranges and the Outer North Coast Ranges of the California Floristic Province (Figure 1) (Baldwin et al. 2012). There are extant populations in Humboldt and Del Norte Counties of California and historical records in Curry and Josephine Counties of Oregon.

There are two documented historical populations of *Lilium kelloggii* in southern Oregon with associated collections in the Oregon State University Herbarium (OSC). The exact locations of these collections are unknown due to sparse location descriptions. The first collection was made by F. H. Smith from what is presumed to be near Oregon Mountain and Wimer Road in southern Josephine County in 1943. The second collection was made by L.E. Detling from Packsaddle Mountain in Curry County in 1948. Additionally, there is one reputed historical population near Peavine Ridge in Curry County. Due to the senescent nature of the existing herbarium specimens at OSC from southern Oregon, as well as the possibility of those specimens having been incorrectly identified, it is difficult to determine if *L. kelloggii* populations did in fact historically exist in Oregon.

The goal of this inventory and assessment is to determine the current distribution of *Lilium kelloggii* in the state of Oregon. Our first mission was to relocate historical populations of *L. kelloggii*, and then to inventory new potential habitat to determine the extent of the species within the state of Oregon.

[1] Serpentine soils are rich in heavy metals particularly iron, chromium, nickel and cobalt. Serpentine soils are derived from ultramafic rocks, particularly serpentinite, a rock formed by the hydration and metamorphic transformation of ultramafic rock from the Earth's mantle. Serpentine soils are characterized by a low calcium to magnesium ratio and a lack of essential nutrients such as nitrogen, potassium and phosphorous.

Conservation Status

NatureServe and the Oregon Biological Information Center (ORBIC) list *L. kelloggii* as a G3/SH. This characterizes the conservation status of the species as globally rare, threatened or uncommon throughout its range (G3) and historically part of the native biota with the implied expectation that it may be rediscovered (SH) in Oregon. In addition the species is federally listed as a Species of Concern (SOC) requiring additional data in order to determine if the species warrants listing as Threatened or Endangered.

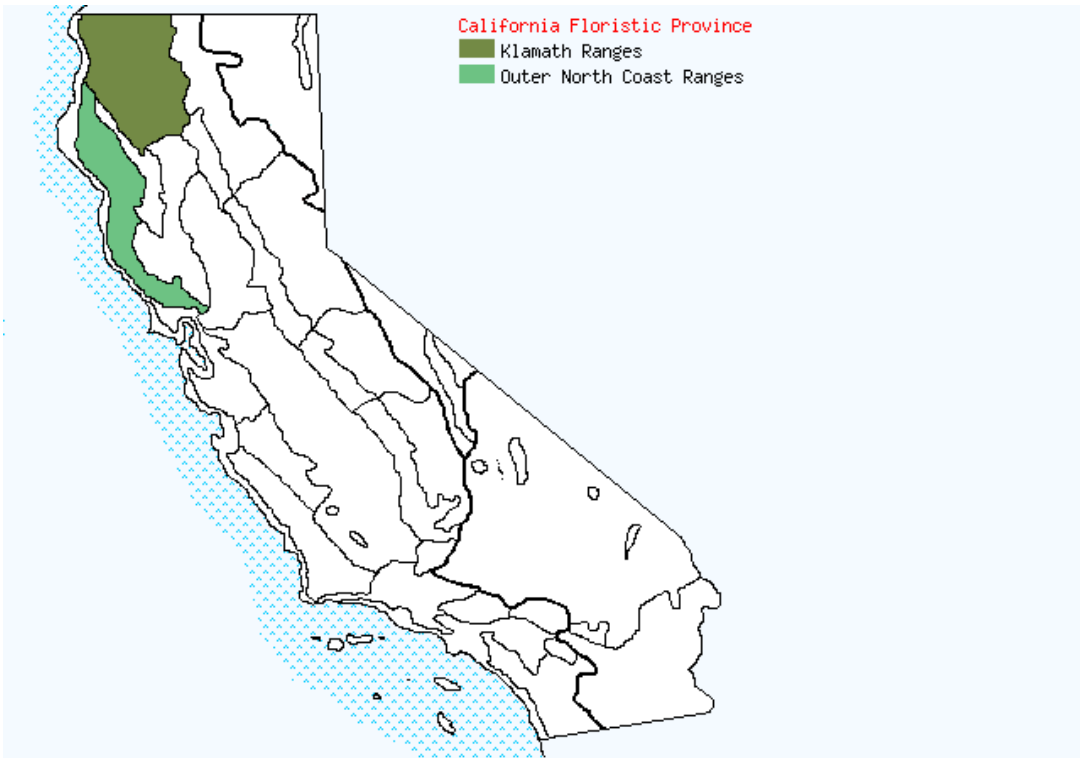

Figure 1. The Klamath Ranges and the Outer North Coast Ranges are the Bioregions in which *Lilium kelloggii* occurs in the California Floristic Province. ©Copyright 1993 by the Regents of the University of California.

Methods

There is very little information specifically addressing habitat requirements for *L. kelloggii.* The Flora of North America (Skinner 2002) describes the habitat as gaps and roadsides in redwood or mixed evergreen forests, or gaps and edges in chaparral. The Jepson Manual 2nd edition (Skinner 2012) describes the habitat simply as gaps and roadsides in conifer forest or chaparral.

In order to better understand the preferred habitat of *L. kelloggii,* known sites on French Hill Road off highway 199 in Del Norte County near Gasquet, California were visited on July 22, 2013.These populations exist in a mosaic of patchy serpentine scrub and conifer forest. Associated overstory species at sites along this road include *Calocedrus decurrens, Pinus attenuata, Sequoia sempervirens, Chrysolepis chrysophylla, Alnus rubra, Pseudotsuga menziesii, Notholithocarpus densiflorus,* and *Arbutus menziesii.* The associated understory species include *Gaultheria shallon, Pteridium aquilinum, Polystichum munitum, Vaccinium ovatum,* and *Rhododendron macrophyllum* (Figure 2).

The habitat of *L. kelloggii* as observed at known populations may be characterized by forest openings in the understory of mixed conifer forests or as dense shrub dominated serpentine chaparral within small breaks in

vegetation. The plants show an affinity for gaps created by roadsides and trails, which historically would likely be created by fine scale disturbance associated with mixed severity fire. *L. kelloggii* is edaphically tolerant, growing in habitats with a serpentine influence. The species is not, however, limited to serpentine soil. Collections from extant populations in California are known from locations not influenced by ultramafic geology or serpentine soils.

Using the characteristics of the known sites, new sites were selected with similar habitat parameters. Sites were chosen using information from historical population records, aerial photographs, geology maps, topographic maps and conversations with Forest Service personnel. Searches were mostly conducted along roads and trails in the three survey areas chosen (Table 1). Maps of areas surveyed can be found in Appendix A.

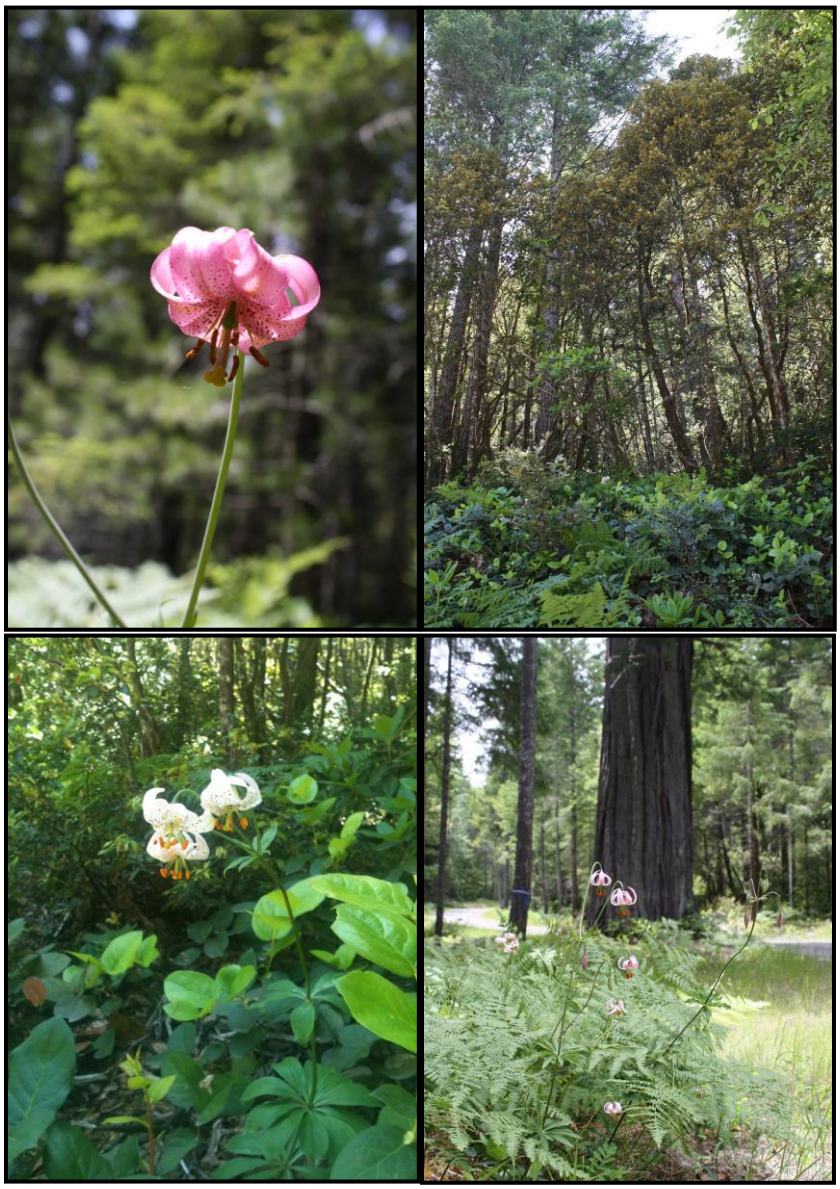

Figure 2. Photograph examples of *Lilium kelloggii* and habitat taken from known site on French Hill Rd, near Gasquet, California off highway 199, Del Norte County. Photos© Kailey Clarno

Table 1. Survey Areas

Survey Area	Location/ Herbarium Collection Info	Survey Area Size	Date Surveyed	Surveyors	Habitat notes/ Associated Species	*Lilium* Species Found	Notes
1	**Collection #1)** Oregon Mt., Wimer Rd., Josephine County, OR. Collected June 22, 1943- F.H. Smith #s.n. – OSC #49769	159 acres	6/23/2013	Kailey Clarno Catherine Dunn Mark Skinner Christine McCullough Stuart Osbrack	Deep serpentine scrub. *Arctostaphylos Columbiana, Notholithocarpuusdensiflorus, Quercus vacciniifolia, Rhododendron macrophyllum,*	*L. bolanderi*	The exact spatial location of this collection is unknown but based on all the information currently available we surveyed the most likely collection site.
2	**Collection #2)** Packsaddle Mt. T41SR12WS13, Curry County, OR. Collected June 18, 1948 – L.E. Detling #6300 - ORE Accession no. 21795	113 acres	6/24/2013	Kailey Clarno Catherine Dunn Mark Skinner Christine McCullough	Douglas fir forest; fairly open light; coarse sand; gentle slope; s. exposure; moderately dry. *Pseudotsuga menziesii, Pinus attenuata, Notholithocarpusdensiflorus, Arctostaphylos columbiana, Ceanothus velutinus*.	*L. bolanderi* *L. columbianum*	The exact location of this collection is unknown but based on all the information available we surveyed the most likely collection site. *L. columbianum*was found where potential habitat existed, and *L. bolanderi* was found in serpentine scrub.
3	Peavine Ridge, Curry County, OR. Oregon Redwoods. No collection made. Observation turned in by Frank Callahan in 1992.	23 acres	6/24/2013	Kailey Clarno Catherine Dunn Mark Skinner Christine McCullough	Redwood (*Sequoia sempervirens*)forest.	*L. columbianum*	Habitat at this survey area is much more mesic in a general sense. Some redwood associated extant sites further south may be similar to this site but were not visited during this inventory.

Inventory Results

Three areas were identified and surveyed from 22-24 June 2013 (Table 1). We could not relocate any of the historic populations of *Lilium kelloggii* either collected in or reported for Oregon. *Lilium bolanderi* was found within serpentine scrub habitats at two sites (Packsaddle and Oregon Mountains) while *L. columbianum* was found trailside/roadside in somewhat xeric Douglas-fir forest as well as mesic redwood forest. A total of 295 acres of potential habitat were surveyed. No new populations of *Lilium kelloggii* were discovered even though much of the surveyed habitat seems suitable. No recent disturbance (fire in particular) was noted, besides typical disturbances associated with roadsides and trail maintenance.

Survey Area 1: Oregon Mountain and Wimer Road

L. kelloggii was collected by F. H. Smith in 1943 (OSC#49769). This collection record has an inexplicit location description, "Oregon Mountain Wimer Road." *L. kelloggii* was also documented by Albert Vollmer and Larry Beane in 1955 just over the California border, a mile south of the junction of Oregon Mountain Road and Wimer Road (Appendix A). The bulbs of these plants were dug, and the plants pressed for the herbarium (Beane and Vollmer 1955). These areas were surveyed on Sunday, June 24, 2013. Based on all of the information available, the areas where the plant was most likely collected from were the focus of our efforts. First, the skid road leading to the top of Oregon Mountain was thoroughly surveyed. This area can be characterized as serpentine scrub. Dominant species in this area include *Arctostaphylos columbiana, Notholithocarpus densiflorus, Quercus vacciniifolia* and *Rhododendron macrophyllum. Lilium bolanderi* was the only *Lilium* species found.

The entirety of the area adjacent to Wimer Road in the state of Oregon was surveyed. The habitat along this road is similar to the habitat found on Oregon Mountain. No new *Lilium kelloggii* sites were found in this survey area.

Survey Area 2: Packsaddle Mountain

L.E. Detling's collection from 1948 (ORE#21795) has a location description of "Packsaddle Mountain". On Monday, June 24th the Packsaddle Mountain area was surveyed. Surveys were focused on the Sourdough trail and gated road that runs perpendicular to the trail. These areas were thoroughly inventoried. The habitat description on Detling's collection characterizes the location as "Douglas fir forest, fairly open light, coarse sand, gentle slope, and south exposure, moderately dry." During surveys, some areas of the Packsaddle Mountain area contained habitats consistent with this description. In these areas *Lilium columbianum* was found. Serpentine scrub exists in other areas around Packsaddle Mountain and *Lilium bolanderii* was found at these locations.

Survey Area 3: Peavine Ridge

A rare plant sighting record of *L. kelloggii* was made near Peavine Ridge in July of 1991 by Frank Callahan. The notes on this record place the site on the bank above the road leading to the Oregon Redwoods Trail (FSR1101.000) at the junction of FSR1101.170 (Appendix A). He describes the habitat as sunny, dry, and brushy. Forest Service personnel were not able to relocate the population in 1992 during surveys. The habitat in this survey area can be characterized as Redwood (*Sequoia sempervirens*) forest. On Monday, June 24th the redwood trail on the Winchuck River and surrounding areas of Peavine Ridge were surveyed. During this survey only *Lilium columbianum* was found.

Discussion and Recommendations

Though no new *Lilium kelloggii* sites were located during this survey, it is possible that surveys in the future will reveal new Oregon populations of Kellogg's Lily. Of the sites visited in this survey, the Packsaddle Mountain area is the most worth re-visiting. This site had similar associated species to known sites, and a more thorough survey of the surrounding areas may result in a new occurrence of *L. kelloggii* in Oregon. Oregon Mountain is also worth a revisit due to Beane and Vollmer's 1955 nearby observation in California. The conclusion of this inventory and assessment, however, is that the species is no longer extant within the state of Oregon.

There are at least four rare vascular plant species (*Lilium kelloggii, Sidalcea malachroides, Clintonia andrewsiana and Silene serpentinicola*) that share a similar range (though somewhat differing habitats) extending through the Klamath-Siskiyou Mountains of Northern California just barely into southern Oregon. All four of these species are known from historical Oregon collections but are now either extirpated in the state or limited to only one small population right on the border with California. This could be the result of fire exclusion. Over the past six years three of the four species (*Lilium kelloggii, Sidalcea malachroides* and *Silene serpentinicola*) have been assessed in the field with Interagency Special Status and Sensitive Species (ISSSSP) funding to determine their population status in Oregon. A similar conclusion of each one of these assessments is that these species are disturbance dependent and do not compete well with conifers or other forms of vegetation. They may also rely on fire for other processes such as seed germination or scarification (topics such as reproductive biology were not covered in depth with these informal inventory assessment reports unless clearly stated in the literature). We are concerned that in one corner of the state three rare plants have world-wide populations that are contracting at a great enough rate to cause state level extirpation. We should act now to understand why this is happening. Is this a climate change-driven shift in vegetation or is it due to fire

exclusion? Or could it possibly be that the historic sites in Oregon represented anomalous populations at the far north end of the range that were short lived due to inbreeding issues such as self-pollination? There could be many other answers to these questions.

In 2010 ~200 *Sidalcea malachroides* grown for one year in a nursery setting were out planted in five areas within historic clear cuts that were pre-commercial thinned and then pile-burned within the Winchuck River watershed near the border of California. When monitored in the summer of 2014 every site had at least a few reproductive plants, though no new seedlings were observed yet. This small scale informal adaptive management project seeks to shed some light on whether *Sidalcea malachroides* has the potential to colonize and persist within this geographic region at this current point in climatological history. So far, anecdotal observations point to the fact that the species can colonize and persist if the habitat is sufficiently open and if seed source is available. Documenting a newly germinated seedling at one of the sites will lend credence to the notion that it is more of a fire exclusion issue than it is a climate shift issue that is causing these species to disappear at the northern end of their range. Based on seven years' worth of field observation in the area it has become increasingly obvious that fire exclusion has played a large role in the reduction of both landscape and fine scale heterogeneity in this portion of the Siskiyou Mountains and may be leading to over simplification of world renowned vegetative assemblages. Future research in the Siskiyou Mountains should consider focusing on the effects of fire exclusion to fine scale biodiversity, such as these species of rare vascular plants that may be undergoing congruent population contraction at a worldwide species distribution scale.

Acknowledgements

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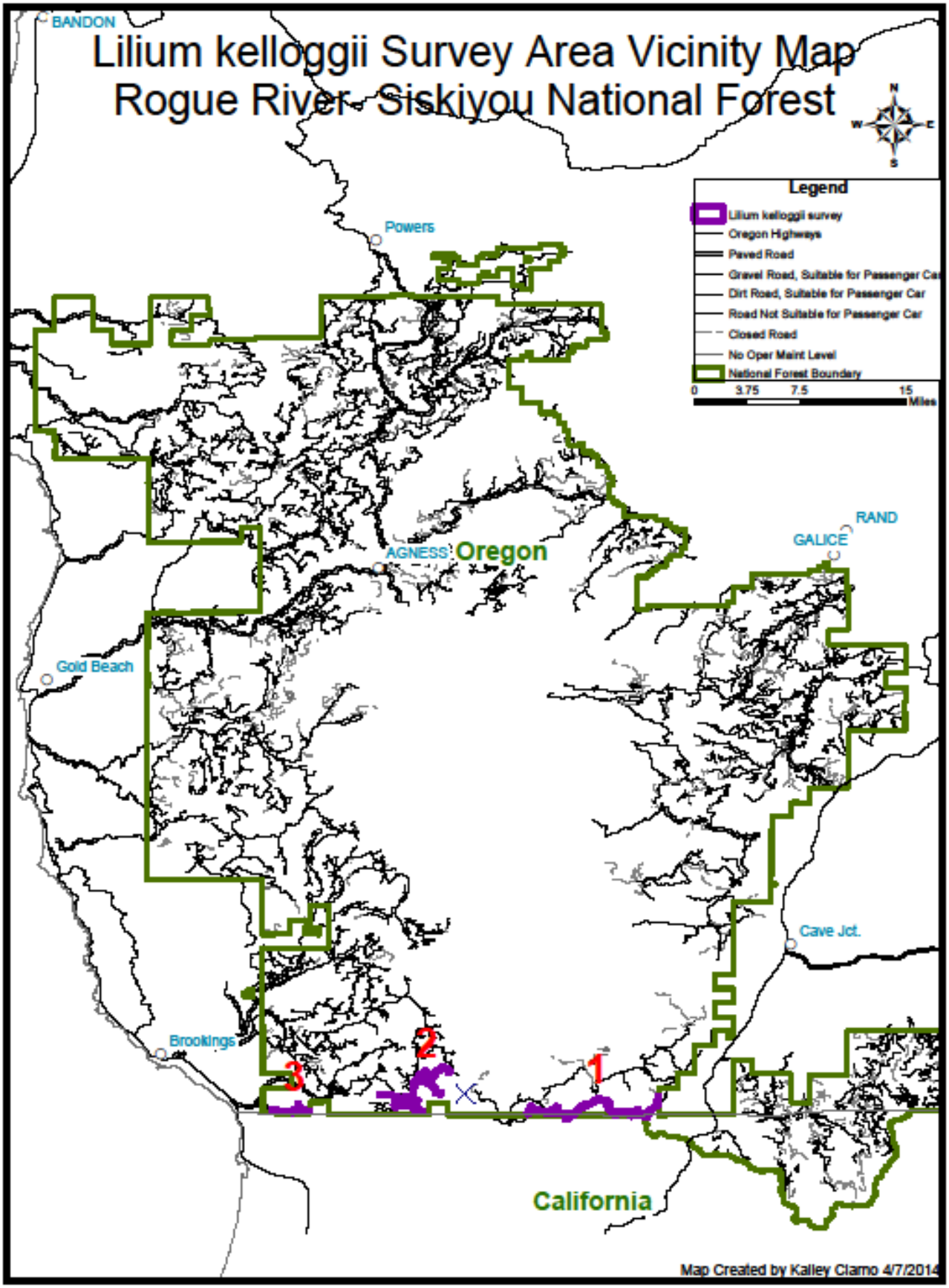
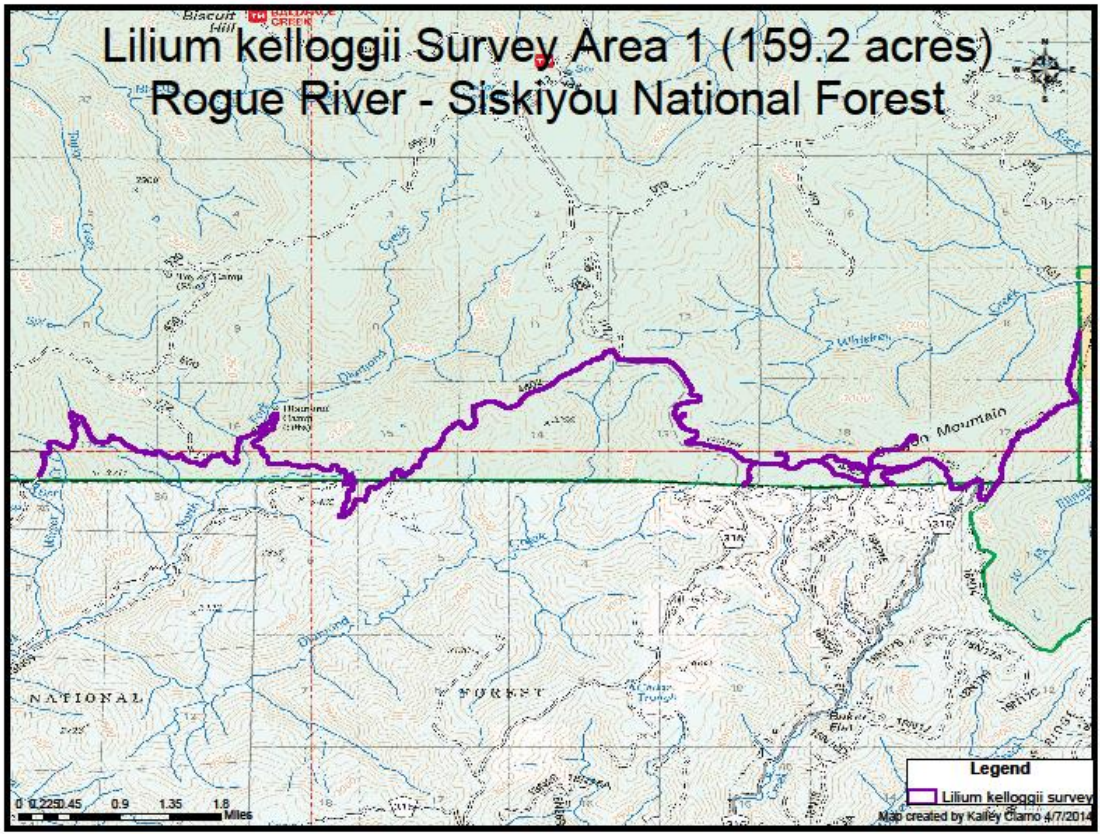
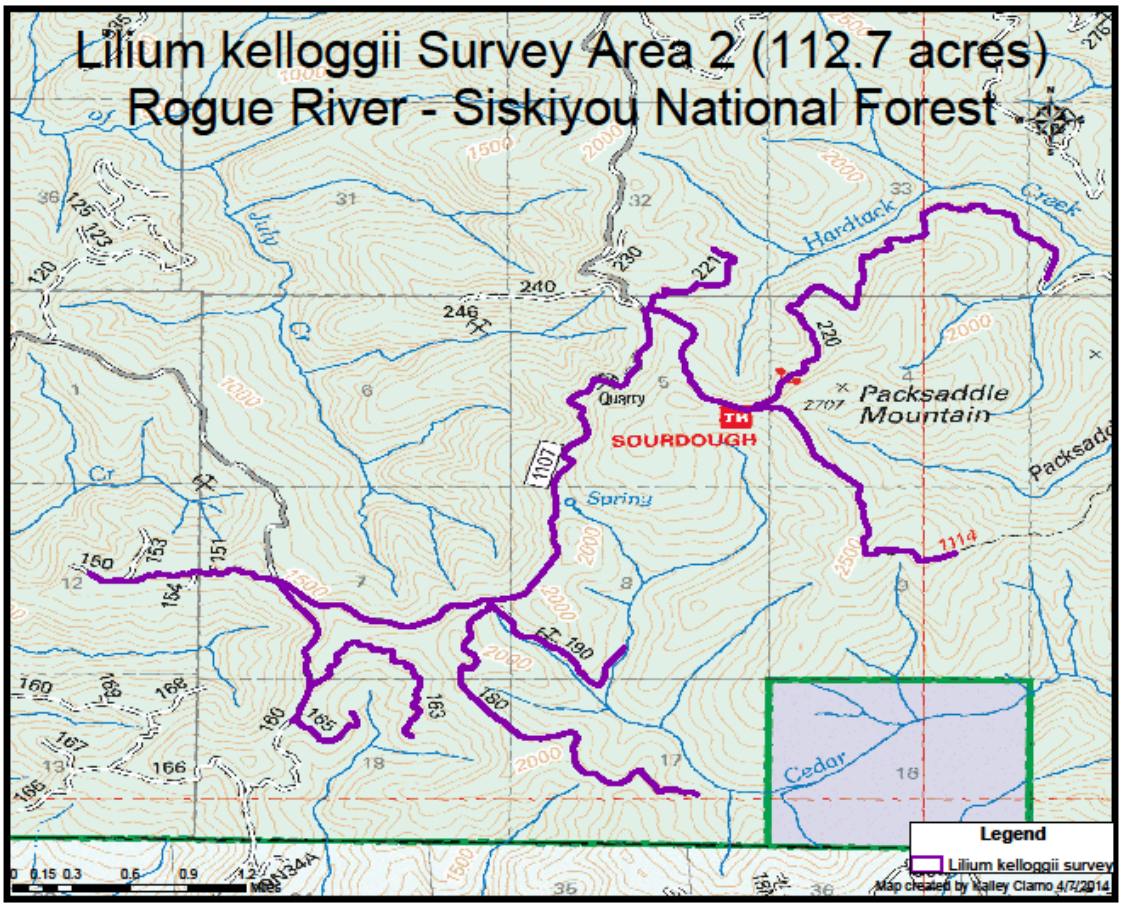
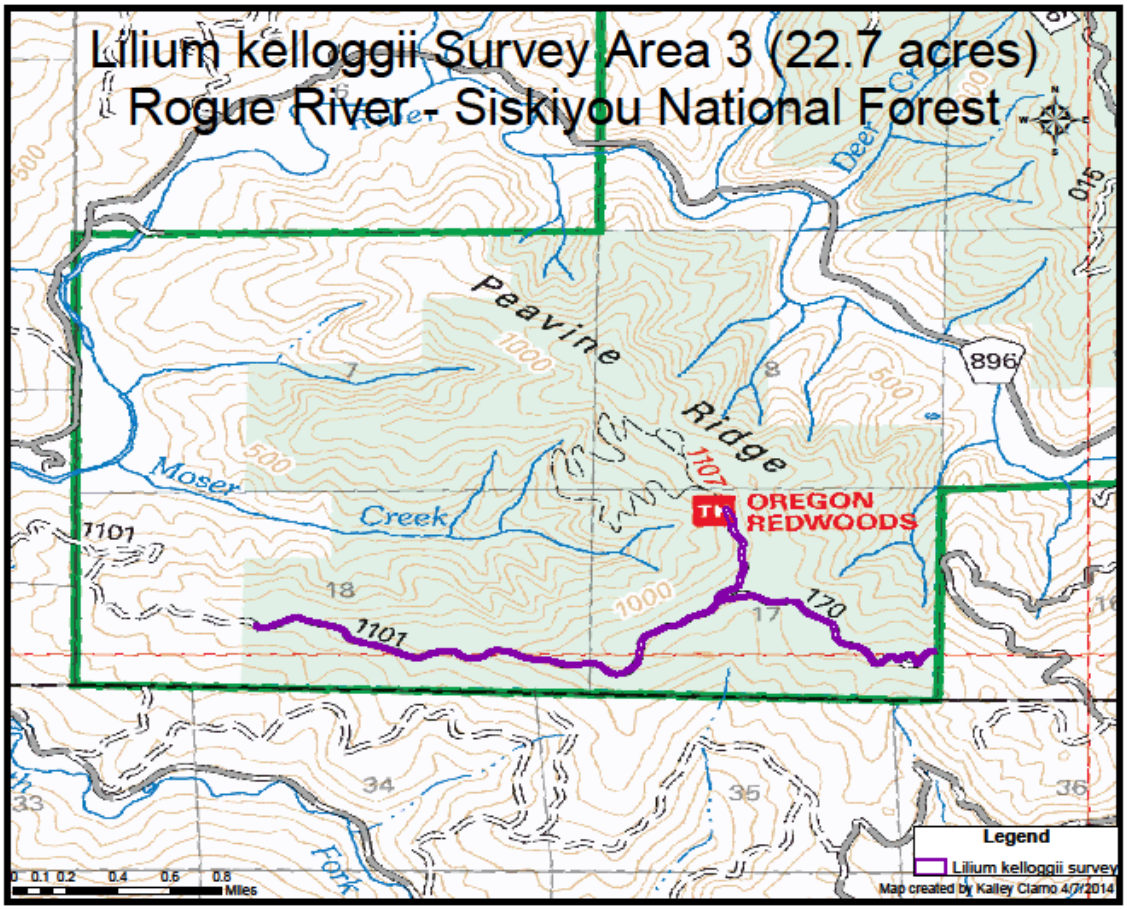
Appendix A


Lilium kelloggii Survey Area Vicinity Map
Rogue River- Siskiyou National Forest
N
W
E
S
Legend
Lilium kelloggii survey
Oregon Highways
Paved Road
Gravel Road, Suitable for Passenger Car
Dirt Road, Suitable for Passenger Car
Road Not Suitable for Passenger Car
Closed Road
No Oper Maint Level
National Forest Boundary
0
3.75
7.5
15
Miles
BANDON
Powers
AGNESS
Oregon
RAND
GALICE
Gold Beach
Cave Jct.
Brookings
1
2
3
California
Map Created by Kalley Clamo 4/7/2014


Lilium kelloggii Survey Area 1 (159.2 acres)
Rogue River - Siskiyou National Forest
Legend
Lilium kelloggii survey
Map created by Kalley Clamo 4/7/2014


Lilium kelloggii Survey Area 2 (112.7 acres)
Rogue River - Siskiyou National Forest
Packsaddle Mountain
SOURDOUGH
Quarry
Spring
Hardtack
Cedar
Legend
Lilium kelloggii survey
Map created by Kalley Clamo 4/7/2014


Lilium kelloggii Survey Area 3 (22.7 acres)
Rogue River - Siskiyou National Forest
Peavine
Ridge
Moser
Creek
OREGON
REDWOODS
1101
1107
170
896
Legend
Lilium kelloggii survey
Map created by Kalley Clarno 4/7/2014
Miles