**CONSERVATION AGREEMENT between the U.S. Fish and Wildlife Service and the U.S. Forest Service and U.S. Bureau of Land Management for *Calochortus persistens* (Siskiyou mariposa lily)**

Cover photograph
*Calochortus persistens*
Siskiyou Mariposa Lily
By Marla Knight

**Table of Contents**

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## I. Introduction

*Calochortus persistens* M. Ownbey (Siskiyou mariposa lily), a narrow endemic found on open rock outcrops and talus, is restricted to three disjunct ridge tops in the Klamath-Siskiyou Range, on the California-Oregon border. The species is designated as a candidate species by the U.S. Fish and Wildlife Service (Service), a sensitive species by Region 5 of the U.S. Forest Service (USFS) and the Medford District of the Bureau of Land Management (BLM), a rare species by the State of California, and a candidate species by the State of Oregon. Populations occur on lands administered by the Klamath National Forest (KNF) and the BLM as well as on lands owned and managed by industrial timber companies and other private landowners.

The purpose of this conservation agreement is to identify and schedule management actions on Federal lands that will remove or reduce the threats to this species in order to provide for its long-term protection and conservation. When implemented, this agreement will provide protection for this species on public lands across its known range. With permission, conservation actions have and will continue to be carried out on private lands, as well. The signatories understand that implementation of this conservation agreement is intended to remove or reduce existing threats to *Calochortus persistens,* however, the conservation agreement shall not preclude any person or agency from listing or recommending the listing of this species under the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. § 1531 *et seq.*).

## II. Geographic Area and Management Agencies Included in this Agreement

This agreement covers the known populations of this species found on Federal lands across its entire range in the Klamath-Siskiyou Mountains of southwestern Oregon and northwestern California. Thirty-six percent (93.9 hectares (ha), 232 acres (ac)) of *Calochortus persistens* habitat is confined to the Gunsight-Humbug Ridge in the eastern Scott Bar Mountains of Siskiyou County, California, which extends across approximately 407 ha (1005 ac), as mapped in the Klamath National Forest Land and Resource Management Plan (U.S. Department of Agriculture 1995a). The habitat on Gunsight-Humbug Ridge has been designated a Special Habitat Management Area for *C. persistens* (U.S. Department of Agriculture 1995a). Further north in Siskiyou County, the Cottonwood Peak and Little Cottonwood Peak populations comprise 60 percent of the total occupied *C. persistens* habitat (164 ha, 404 ac). A very small disjunct population, that is less than 5 square meters (m) (50 square feet (ft)) in size, is found on Bald Mountain, Jackson County, Oregon. Eighty-seven percent of *C. persistens* habitat is located on Federal lands. The Bald Mountain population is located on lands managed by the BLM. Maps of the known locations of *C. persistens* are included in Appendix A.

Involved Management Agencies:

1. U.S. Fish and Wildlife Service
   Erin Williams, Field Supervisor
   Yreka Fish and Wildlife Office
   1829 S. Oregon Street
   Yreka, California 96097
   (Nadine Kanim, Fish and Wildlife Biologist, 530-842-5763)

2. U.S. Fish and Wildlife Service
   Jim Thrailkill, Field Supervisor
   Roseburg Field Office
   2900 NW Stewart Parkway
   Roseburg, Oregon 97470
   (Sam Friedman, Botanist, 541-957-3474)

3. U.S. Forest Service
   Patricia A. Grantham, Forest Supervisor
   Klamath National Forest
   1711 South Main Street
   Yreka, California 96097
   (Susan Stresser, Wildlife/Botany/Range Program Manager, 530-841-4538
   Marla A. Knight, Forest Botanist, 530-841-4425)

   Dave Hays, District Ranger
   Scott/Salmon River Ranger Districts
   Klamath National Forest
   11263 North Highway 3
   Fort Jones, California 96032

4. Dayne Barron, District Manager
   U.S. Bureau of Land Management
   Medford District Office
   3040 Biddle Road
   Medford, Oregon 97504
   (Mark Mousseaux, Botanist, 541-618-2232,
   Susan Fritts, Botanist, 541-471-6546)

5. Bernie Paul, Operations Chief
   California Department of Forestry and Fire Protection
   P.O. Box 128
   Yreka, California 96097
   (Alan Stovall, Siskiyou Unit Chief, 530- 842-3516)

Interested Parties:

1. Klamath-Siskiyou Wildlands Center
   P.O. Box 102
   Ashland, Oregon 97520

2. Oregon Wild
   5825 N. Greeley Avenue
   Portland, Oregon 97217

3. Barbara Knapp
   2041 N.W. 29th Avenue, Apt. 2
   Portland, Oregon 97210

4. Roxanne Bittman, Botanist
   California Natural Diversity Database
   Department of Fish and Game
   1807 13th Street
   Sacramento, California 95814

## III. Authority, Purpose, Objective, and Management Goal of this Conservation Agreement

The authority for the Service to enter into this voluntary Conservation Agreement derives from the Act. The authority for the USFS and the BLM to enter into this voluntary conservation agreement derives from the Economy Act of 1932 (31 U.S.C. § 1535, P.L. 97-258 and 98-216).

**The purpose of this agreement** is to formally document the intent of the involved parties to protect and conserve *Calochortus persistens* and its habitat.

**The objective** of this agreement is to provide a mechanism for the protection and conservation of *Calochortus persistens* and its habitat on Gunsight-Humbug Ridge and Cottonwood and Little Cottonwood Peaks in Siskiyou County, California and on Bald Mountain in Jackson County, Oregon.

**The management goal** is to maintain all *Calochortus persistens* populations such that each is comprised of a diverse age structure by removing or reducing threats to the species in areas covered by this conservation agreement.

## IV. Description, Status, Distribution, Ecology, and Population Biology of the Species

Species Description

*Calochortus persistens* (Family Liliaceae) is an herbaceous perennial with a single, basal leaf arising from a bulb (cover photograph). The basal leaf can be up to 2 decimeters (dm) (7.9 inches (in)) in length and the flowering stem approximately 10 cm (3.9 in) high. One to two large showy, pink to lavender, erect, bell-shaped flowers have a yellow fringe above the nectary

at the base of the petals (Appendix B). Below the nectary on each of the three petals is a wide ciliate membrane. Sepals and petals are both 35 millimeters (mm) (1.4 in) to 40 mm (1.6 in) in length. The nodding three-winged fruit are approximately 1 cm (0.4 in) long and remain covered by the persistent sepals and petals (Hickman 1993, Ownbey 1940). Ownbey (1940) described *C. persistens* from the type specimen collected by E.L. Greene (# 903), on June 30, 1876, from the "mountains near Yreka", Siskiyou County, California.

Status

*Calochortus persistens* is a Federal candidate species under the Act, a Region 5 USFS and BLM sensitive species, and is listed as rare by the State of California (California Department of Fish and Game 2006) and as a candidate species by the Oregon Department of Agriculture (Oregon Department of Agriculture 2011a).

Distribution

*Calochortus persistens* is a narrow endemic that is restricted to three disjunct ridge tops in the Klamath-Siskiyou Range, on the California-Oregon border (see maps, Appendix A). Until recently, only two extant populations were known: the type locality on Gunsight-Humbug Ridge, west of Yreka, Siskiyou County, California and the Bald Mountain site, west of Ashland, Jackson County, Oregon. The legal locations are as follows: in California, T45N, R8W, portions of Sections 13, 14, 16, and 21-23; T45N, R7W Sections 18 and 19 MDM; and in Oregon, T39S, R1W, Section 21 WM.

In July 2006, as part of a timber harvest review conducted by California Department of Fish and Game staff, a new locality for *C. persistens* was discovered (M. Knight *in litt.* 2006, Fallscheer *in litt.* 2007) on Cottonwood Peak and Little Cottonwood Peak, Siskiyou County, California. A botanical survey conducted by Callahan (2007) in May 2007, confirmed *C. persistens* populations on the east slopes of these two peaks and one unnamed peak on the ridge between Cottonwood Peak and Little Cottonwood Peak. The legal locations of these populations are: T46N, R7W, portions of Sections 2, 3, and 10; T47N, R7W, portions of Sections 26, 27, 34, and 35 MDM.

Frank Callahan (pers. comm. 2008) reported that in 2000 or 2001, he found *Calochortus persistens* growing in ultramafic soils on an east-west ridgeline of Observation Peak, on the border of the Rogue River and Klamath National Forests, Jackson County, Oregon. However, he was unable to relocate any *C. persistens* plants in a 2007 botanical survey and suspects that small rodent herbivory may have led to the loss of this population. The legal location of this site is: T41S, R2W, Section 12 WM.

In the southern-most population in California, *Calochortus persistens* is found at nine separate sites, which were mapped at a fine scale in 2003 and again in 2009. Occupied *C. persistens* habitat is found on 17.6 ha (43.4 ac) of KNF and privately owned lands that stretch for 10 kilometers (km) (6 miles (mi)) along the Gunsight-Humbug Ridge (Klamath National Forest 2004). Gunsight-Humbug Ridge forms the eastern edge of the Scott Bar Mountains, a small mountain range that runs from the Marble Mountains northeast to Yreka. Floristically, this area falls into the Klamath Ranges (KR) which is defined on its eastern edge by the Shasta Valley (Hickman 1993).

The newly discovered Cottonwood Peak and Little Cottonwood Peak locality consists of 50,000 to 100,000 plants, which are distributed on three individual peaks in the Klamath National Forest and on private lands (Callahan 2008, M. Knight *in litt.* 2009, M. Knight, Klamath National Forest, pers. comm. 2009, Knight 2010). These populations have been mapped only at a gross habitat scale.

The Oregon population, initially discovered in 1998, by botanist Frank Callahan was documented by the BLM as covering an area of less than 5 square meters (50 square feet) (B. Tong *in litt.* 2006a). The Bald Mountain occurrence is located on lands managed by BLM's Medford District.

Ecology

On Gunsight-Humbug Ridge in California, *Calochortus persistens* occurs at elevations of 1,310 m (4,300 ft) to 1,847 m (6,060 ft) on ridgeline rock outcrops and talus, where the soils are shallow, dry, rocky, and acidic (Knorr 1987, Klamath-Siskiyou Wildlands Center *et al.* 2001). These soils are well drained and dry early in the season after snowmelt. *Calochortus persistens* plants are found in greater numbers on north-facing slopes. This may be a result of longer snow bank retention on north-facing slopes and may be very important to plant survival in dry years. The plants are almost entirely restricted to the rockiest portions of the ridge tops and ridge shoulders, and do not extend very far down the associated slopes. It is not known whether this reflects a requirement for very rocky, well-drained soil, or a restriction to these areas due to an inability to compete successfully with other vegetation (Knorr 1987). Soils on Gunsight-Humbug Ridge are gravelly loams (composed of clay, silt, and sand) formed from metamorphic parent material and belong to the Jayar-Woodseye families association (Knorr 1987, Klamath National Forest 1994, Klamath-Siskiyou Wildlands Center *et al.* 2001). In the Cottonwood Peak and Little Cottonwood Peak locality, *C. persistens* plants are found on all slope exposures from 1,300 m (4,300 ft) to 1,829 m (6,000 ft) in elevation (Callahan 2007).

In Oregon, the habitat is similar to the habitat of the California populations. *Calochortus persistens* is found at 1,707 m (5,600 ft) in McMullin Rock Outcrop Complex soils, which are also shallow talus soils (B. Tong *in litt.* 2006a).

*Calochortus persistens* plants occur in rocky openings within a montane shrub plant community (Appendix B). The total vegetative cover within the plant community averages 20 to 40 percent. Dominant shrubs are *Cercocarpus ledifolius* (curl-leaf mountain mahogany) and *C. betuloides* (birch-leaf mountain mahogany). *Berberis aquifolium* (Oregon-grape) is another associate that can sometimes be dominant. Other common shrub species in the vegetative community are *Quercus garryana* var. *breweri* (Brewer's variety of Oregon white oak), *Prunus emarginata* (bitter cherry), *Chrysothamnus nauseosus* (rubber rabbitbrush), *Holodiscus discolor* (oceanspray), *Garrya* sp. (silk tassel bush), and *Amelanchier alnifolia* var. *semiintegrifolia* (service-berry) (Callahan 2008, Knorr 1987, Knapp 1996). Within this shrub community, the *C. persistens* plants are found in rocky openings where the total plant cover is less than 25 percent and the litter layer is shallow or absent. Between these rock outcrops, in pockets of slightly deeper soils, the plant community is dominated by herbaceous species. The most commonly associated forb species are *Eriogonum ursinum* var. *erubescens* sp. nov. (blushing

wild buckwheat), *Eriogonum umbellatum* (sulfur flower), *Penstemon parvulus (*beardtongue), *Monardella glauca* (pennyroyal), *Achnatherum lemmonii* (Lemmon's needlegrass), *Festuca roemeri* (Roemer's fescue), *Phlox diffusa* (spreading phlox), and *Phlox cespitosa*. Surrounding this open shrubby vegetative community where *C. persistens* occurs, is mixed coniferous forest, dominated by *Pinus ponderosa* (ponderosa pine), *Pseudotsuga menziesii* (Douglas-fir), *Calocedrus decurrens* (incense cedar), and *Abies concolor* var. *lowiana* (white fir). Due to past decades of fire suppression these coniferous species have started to encroach upon the montane shrub plant community.

In Oregon, *Calochortus persistens* is found in an open rock outcrop associated with *Pinus ponderosa*, *Holodiscus discolor*, *Garrya fremontii* (Fremont's silk tassel), *Prunus emarginata*, *Festuca idahoensis* (Idaho fescue), *Cheilanthes gracillima* and *Eriogonum* sp. (B.Tong *in litt.* 2006a).

Population Biology

For management purposes, nine separate *Calochortus persistens* population sites are recognized and identified on Gunsight-Humbug Ridge, in California. There appears to be great yearly variation in numbers of plants in each population (Appendix C). All observers of *C. persistens* at both the California and Oregon sites have noted a high rate of herbivory of leaves and flowers by what appears to be rodents and/or deer (Klamath National Forest 2004), and a high rate of fruit destruction by insects (Knorr 1987; Knapp 1997; Klamath-Siskiyou Wildlands Center *et al.* 2001; B. Tong *in litt.* 2003a, 2003b, 2006a). Removal of aboveground plant parts by herbivory very early after the snow has melted has contributed to difficulties in monitoring and making accurate plant counts. Estimates of plant numbers have also been inconsistent between observers. In addition, plant counts can vary depending upon when, during the growth cycle, the counts are made (Knapp 1997). Seedlings and juveniles, which are very small, can easily be mistaken for young grass plants or juveniles of other lily family species. Plants are also likely to be overlooked because the leaves senesce early in the spring, soon after the snow melts. It is likely that the historical plant counts only included large adult plants. A 1982 census resulted in a California occurrence estimate of 3,455 plants in nine separate populations. In 1987, 1,640 plants were counted in eight separate locations. In June 1995, KNF locations were partially surveyed resulting in an estimate of 1,792 plants (Klamath National Forest 2009). More than 3,671 *C. persistens* plants were counted on Federal and some private lands in 2003 (Klamath National Forest 2005). A substantially higher number of juvenile and adult plants (39,656) were counted in the 2009 monitoring census because it was conducted early in the season before the leaves had senesced (Forney 2009, M. Knight, pers. comm. 2010). In his 2008, survey of Cottonwood Peak and Little Cottonwood Peak, Frank Callahan estimated a total count of 15,900 juvenile and adult lilies (Knight 2010). However, this number is likely an underestimate because suitable habitat on private lands in Section 3, T46N, R7W, MDM was not surveyed (Knight 2010).

The Oregon population has been monitored since it was first discovered in 1998. Five *Calochortus persistens* plants were counted in 1998, one in 2000, two in 2001, two and four (B. Knapp, pers. comm. 2002) by separate observers in 2002, one in 2003, three in 2004, five in 2005, two in 2006, one in 2007, and two in 2008 (B. Tong *in litt.* 2003a, 2003b, 2004a, 2004b,

2005, 2006a, 2006b, 2008a, and 2008b). Observers of this population have noted variation in plant numbers and phenology depending upon the timing of the season.

In 1995, Barbara Knapp initiated a long-term monitoring project on selected sites to study the population demography of the species (Knapp 1995). The initial result of two years of monitoring indicated a high reproductive rate and was thought to represent a boom period for reproduction of the species (Knapp 1997). Germination of seeds and establishment of seedlings was high in 1995, which was a wet year. In contrast, no successful reproduction was observed in 1996, a dry year. Based on the low mortality of adult plants and periodically high reproductive rates (1995), the species was thought to exhibit stable to increasing population sizes in spite of the slow growth rates of individual plants (Knapp 1997).

Subsequent unpublished data collected by Knapp from 1997 to 2000, showed that none of the seedlings established in 1995 survived to 2000, suggesting no survival for an entire year's reproduction (Klamath-Siskiyou Wildlands Center *et al.* 2001). Additional long-term monitoring is needed to clarify whether the high seedling mortality rates and slow plant growth rates are due to an unusually dry period from 1996 to 2000, or due to other natural or anthropogenic factors, such as competition with weeds. In the 2009 monitoring census conducted by KNF, juveniles represented 20 percent of the *Calochortus persistens* plants counted on Gunsight-Humbug Ridge (Forney 2009). The Oregon population, which is not subject to the same competitive stresses from weeds as is either of the California populations, also has shown no reproduction since the population was first discovered.

Other species of interest

*Eriogonum ursinum* var. *erubescens* is a newly described variety of *Eriogonum* known presently from six populations in the eastern Scott Bar Mountains west of Yreka, in Siskiyou County and several recently identified populations in Shasta and Trinity Counties, California (Reveal and Knorr 2004, Taylor 2011). This restricted species is found in a portion of the same area where *Calochortus persistens* is found. Four populations are found along the Gunsight-Humbug Ridge in the same habitat as *C. persistens.* Actions taken to protect the *C. persistens* populations are likely to benefit these *E. ursinum* var. *erubescens* populations. The other two populations are found just to the west, on the tops of Deadwood and Indian Baldy peaks. However, Deadwood Peak and Indian Baldy Peak are not covered under this conservation agreement because *C. persistens* is not present at these sites.

## V. Known and Potential Threats to the Species

A. The present or threatened destruction, modification, or curtailment of its habitat or range

Major threats include 1) competition as a result of the introduction and spread of nonnative invasive weeds, 2) fire suppression resulting in increased fuel loading and shading and competition by native and nonnative species and the risk of high-intensity fire, 3) destruction of plants and nonnative invasive weed species introduction as a result of maintenance and construction around communication sites located on Gunsight Peak and Mahogany Point, 4) soil disturbance and nonnative invasive weed species introduction as a result of off-highway vehicle (OHV) and other recreational uses, and 5) other potential impacts from management activities (Knorr 1987, Knapp 1996, Klamath-Siskiyou Wildlands Center *et al.* 2001).

1) Competition with Nonnative Invasive Weeds

Numerous observers have cited competition with *Isatis tinctoria* (dyer's woad) as the most significant and chronic threat to the survival of *Calochortus persistens* (Knorr 1987, Knapp 1997, Klamath-Siskiyou Wildlands Center *et al.* 2001). *Centaurea diffusa* (diffuse knapweed) and *C. maculosa* (spotted knapweed) have been discovered and removed from the Gunsight-Humbug Ridge road in the area where *C. persistens* occurs on only three isolated occasions and therefore, are not considered a threat at the present time. However, these invasive species may be reintroduced to Gunsight-Humbug Ridge, if current treatment efforts were to be discontinued.

*Isatis tinctoria*, a nonnative weed species introduced from Europe, has spread throughout much of the western United States and is common in Siskiyou County. The State of California pest rating for this species is "B": containment and/or control are at the discretion of the Agricultural Commissioner. *Isatis tinctoria* releases allelopathic chemicals that can prevent the germination of seeds of other species (Young and Evans 1971). High reproductive output and a two-layered rooting pattern also help to make *I. tinctoria* an especially successful invasive weed (Farah *et al*. 1988, Monaco *et al*. 2005). A facultative biennial, with a deep taproot, *I. tinctoria* forms dense rosettes in infested areas, and is thought to prevent *Calochortus persistens* seedling establishment by competing for space, water, and nutrients. In dry seasons when available water is a limiting factor, *I. tinctoria* can out-compete *C. persistens* because of its deep taproot. *Isatis tinctoria* is a taller plant, and therefore can shade out vulnerable *C. persistens* seedlings, which are very small.

Surveys within *Calochortus persistens* habitat have found that *Isatis tinctoria* affects 75.2 percent of the known *C. persistens* habitat on Gunsight-Humbug Ridge at some infestation level (Table 1, Klamath National Forest 2005). The table below represents the infestation percentages within all *C. persistens* sites, as of 2003. Nineteen sites were infested at the lowest *I. tinctoria* density levels and these sites represent 55 percent of the total *C. persistens* habitat affected. Invasion of *I. tinctoria* is most evident in disturbed areas along access roads, in areas cleared as fire breaks, along power lines, around permitted communication sites, on private land, and in areas directly adjacent to these disturbances.

Table 1. Infestation level of *Isatis tinctoria* within nine *Calochortus persistens* population areas on Gunsight-Humbug Ridge.

| **Ownership** | **Percent Infestation** | **Number of Sites** | **Total Amount of *Calochortus persistens* Habitat Infested (Ha (Ac))** | **Percent of *Calochortus persistens* Habitat Infested (%)** |
|---|---|---|---|---|
| Federal | 0 | 2 | 0.4 (0.9) | 0 |
| Federal | 1* | 19 | 9.7 (24) | 55 |
| Federal | 3 | 1 | 1.3 (3.3) | 7.6 |
| Federal | 5 | 5 | 0.85 (2.1) | 4.8 |
| Federal | 10 | 3 | 0.4 (0.9) | 2 |
| **Total Federal** | | | **12.6 (31.2)** | |
| Private | 0 | 2 | 3.9 (9.7) | 0 |
| Private | 5 | 1 | 1.0 (2.5) | 5.8 |
| **Total Private** | | | **4.9 (12.2)** | |
| **Totals** | **N/A** | **33** | **17.6 (43.4)** | **75.2** |

***** Where a polygon was greater than 0 % but less than 1% infested, a value of 1% was assigned.

In 1990, KNF botanist Julie Knorr initiated trial plots where the feasibility of hand digging as a method of controlling *Isatis tinctoria* within *Calochortus persistens* habitat was investigated (Knorr 1990). This method was deemed infeasible for long-term control because of the time and effort it took to remove the deep taproots in a very dense infestation. The adjacent areas were also very densely infested and reinvasion of the plots seemed likely.

To gain a better understanding of the weed treatment options and their efficacy, the KNF and the Service conducted an experiment at the Mahogany Point Communications Site on Gunsight-Humbug Ridge where *Isatis tinctoria* populations were dense and accessible. Three replicates of three different treatments (clipping/whacking, hand digging, herbicide application) and the control were repeated each year between May and early August 2004 to 2006. The results indicated that chemical methods averaged 98 percent control, hand digging achieved 90 percent control, and clipping/whacking averaged 33 percent control of *I. tinctoria* (Kanim and Knight 2011). Soil disturbance caused a greater incidence of *I. tinctoria* seedling germination in digging plots than in herbicide plots. Although herbicide application was the most effective method and is less expensive than digging, the active ingredients of the herbicide mix currently being used and tested in this experiment, is not permitted for use in occupied *Calochortus persistens* habitat in California (California Pesticide Information Portal 2008, 2009). There is no information on the effects of specific herbicides to *C. persistens*. Therefore, Kanim and Knight (2011) recommend an integrated and hierarchical approach to removing *I. tincoria* when it covers large areas, so that hand digging is used within occupied habitat and herbicide application is used outside occupied habitat.

Beginning in 2003, and every year since, KNF and the Service have been involved in an ongoing effort to hand dig or chop *Isatis tinctoria* plants before seed set along the length of the Gunsight-Humbug Ridge access road (Road 45N28) in the area where *Calochortus persistens* occurs. Results shown in photographs taken at the same time and location each year, have demonstrated that with continued treatment there has been a notable decrease in the number of *I. tinctoria* plants along the road.

A strategy for control of *Isatis tinctoria* has been developed based on the observable success of the roadside treatment. USFS Road 45N28 provides a logical control point on the south side of the Gunsight-Humbug and Mahogany Point ridgeline (i.e., creating a barrier to the continual upward movement of weeds from below) for habitat between the road and the top of the ridge. There is no logical control point on the north side of the ridge where *I. tinctoria* continues to move up the slopes to the *Calochortus persistens* habitat at the top.

Almost every year since 2003, KNF and the Service have cooperated in an effort to remove *Isatis tinctoria* from Federal lands, within and between occupied *C. persistens* habitat, through interagency agreements to implement the control strategy which employs hand-digging. The amount of habitat treated has increased from 6.5 ha (16 ac) in 2003, to as much as 48.6 ha (120 ac) in 2010 (M. Knight pers. comm. 2011). In addition, through interagency agreements and Partners for Fish and Wildlife cooperative agreements funded by the Service, the Siskiyou County Department of Agriculture has chemically treated private lands on Gunsight-Humbug Ridge since 2006, the Mahogany Point and Gunsight Peak communication administrative sites since 2007, and access roads through private lands in the Cottonwood Peak and Little Cottonwood Peak population areas since 2009.

Herbicide application on private lands requires the permission of landowners. The Siskiyou County Department of Agriculture gained permission to treat a total of 178.5 ha (440 ac) of land adjacent to occupied *C. persistens* habitat in 2009, and repeated that treatment in 2010 (Aceves 2009, 2010; M. Knight *in litt.* 2010). Siskiyou County Department of Agriculture staff use a backpack sprayer with a nozzle that can direct the flow of herbicide to individual plants (J. Aceves, Siskiyou County Department of Agriculture, pers. comm. 2011). The active ingredients selectively target broadleaf weeds and some grass weeds (Du Pont de Nemours and Company 1999, Balluff and Young 2004, Environmental Protection Agency 2005, and Riverdale 2011). To avoid potential effects to *C. persistens* plants, buffers around occupied habitat are established, where only removal by hand digging can take place.

The effects of competition from the *Isatis tinctoria* invasion on *Calochortus persistens* population dynamics have not been demonstrated. It is unclear whether the lack of reproduction seen from 1996 to 2000, is due to the presence of *I. tinctoria*, survey timing, or to other environmental variables, such as drought or other undetermined factors.

The Oregon population on Bald Mountain is currently free from *Isatis tinctoria*, or any other invasive species.

2) Fire Suppression and Succession

On the Gunsight-Humbug ridgeline, the open areas occupied by *Calochortus persistens* are adjacent to, or interspersed among, dense patches of *Cercocarpus* spp. and *Berberis aquifolium* shrub lands, and mixed conifer forest. Both the shrub lands and conifer forest restrict and define the current *C. persistens* habitat boundaries. Within the general area of the ridgeline, shrubs occupy more acreage than does *C. persistens* habitat. It is not known if the openings where *C. persistens* grows have decreased in size as a result of encroachment of other vegetation due to fire exclusion or other factors.

The presence of shrubs within *Calochortus persistens* habitat may provide benefits. Observations during the 2003 survey noted juvenile *C. persistens* plants free of herbivory when tucked underneath *Cercocarpus* shrubs, presumably providing protection from grazers.

*Calochortus persistens* occurs in a region (Klamath-Siskiyou Ranges) with a very high historical fire frequency due to hot, dry summers and an abundance of lightning. The Gunsight-Humbug Ridge has one of the highest rates of lightning strikes (G. Lewis, Klamath National Forest, pers. comm. 2006, Klamath National Forest 2006a) and small fire ignitions on the KNF (Klamath National Forest 2006b). The combination of high fire frequency and rocky, shallow soils probably maintained the ridge system as an open montane shrub community interspersed with rocky forb openings where *C. persistens* thrived. Skinner (1995) showed that in the Dillon, Clear, and Swillup Creek watersheds of the KNF, the size of openings in mixed conifer forests had decreased and the distance between openings had increased in the period between 1944 and 1985, and attributed this change to the results of fire suppression.

Fire suppression since the early 1900's may have caused a reduction in habitat suitability for *Calochortus persistens* through shading and competition by conifers and other native species, including *Cercocarpus ledifolius, C. betuloides,* and *Berberis aquifolium* (Knapp 1996). Fire suppression also may have resulted in an increased fuel load that could result in higher intensity fires than otherwise would have occurred in the area (Klamath-Siskiyou Wildlands Center *et al.* 2001). The last large fire on the Gunsight-Humbug Ridge was the 1955 Haystack Fire, illustrating the effectiveness of fire suppression since that time.

The Gunsight-Humbug ridgeline forms a logical firebreak zone should a large fire approach the urban and outlying areas of Yreka to the south and east. The Gunsight-Humbug Ridge is in the California Department of Forestry and Fire Protection (CAL FIRE)'s State Responsibility Area, meaning CAL FIRE would conduct fire suppression activities on Federal lands in this area. Firebreak construction in the past along the Gunsight-Humbug Ridge probably has resulted in direct destruction of plants and habitat of *Calochortus persistens* and could threaten large portions of the existing California *C. persistens* occurrence, if a large fire were to threaten Yreka. In addition to direct destruction of plants and habitat, firebreak construction and other activities have resulted in the introduction and spread of *Isatis tinctoria* where bulldozers and other equipment have disturbed the soil.

The effects of prescribed fire upon *Calochortus persistens* have not been studied. Prescribed fire fuel treatment projects may impact plants if fire intensities are too high or if burning is done during the spring and summer before leaves, stems, and flowers of *C. persistens* plants have died back. Prescribed fire could also be beneficial to *C. persistens* by eliminating competition with other plants for light and nutrients and by providing a nutrient flush from ash. Population sizes could increase as a result of burning. Other *Calochortus* species, in particular *C. elegans* (cat's ear) and *C. tolmei* (pussy ears) have been observed to be prolific following wild and prescribed fire (M. Knight, pers. comm. 2003). Secondary effects of prescribed burning on *C. persistens* could be an increase in the number of *Isatis tinctoria* plants as a result of disturbance and elimination of competing vegetation.

3) Communication Site Construction, Maintenance, and Use

Communication site facilities were constructed on Gunsight Peak and Mahogany Point in the 1940's (C. Kraus, Klamath National Forest, pers. comm. 2003) around the time *Calochortus persistens* was described as a new species. The top of Gunsight Peak and ridges on Mahogany Point were leveled and communication towers and buildings were constructed. Power poles were erected and power was brought up from Yreka. All of this has contributed to the destruction of approximately 6.1 ha (15 ac) of *C. persistens* habitat along the ridgeline. The disturbance created by these actions provided habitat for the invasion of *Isatis tinctoria* in the area, which is now a major problem.

The KNF currently authorizes use of one building at Mahogany Point by seven different private organizations and county departments through a Communication Use Lease agreement with Siskiyou County and use of one building at Gunsight Peak by six State agencies, through a Special Use Permit with the California Department of General Services. The Mahogany Point Communications Site Management Plan (KNF 2008a) states that the purpose of this administrative site is commercial and county use. The four facilities at Mahogany Point are on KNF lands and are owned by private companies and Siskiyou County, although three buildings are currently vacant. The Gunsight Peak Communications Site Management Plan (KNF 2008b) describes the primary use of the site as administrative radio repeater and base radio station operation. The facility at Gunsight Peak is owned by the USFS. Maintenance of the facilities has occasionally contributed to plant and habitat destruction, and has increased habitat for *Isatis tinctoria*.

In addition to these communication sites, a power line cuts through portions of occupied *Calochortus persistens* habitat on Gunsight-Humbug Ridge. Future and ongoing activities such as line maintenance, pole replacement, and vegetation control may impact the *C. persistens* plants growing within the maintenance area. Development of new utility lines either into or out of these existing disturbed areas is an additional threat. Direct destruction of plants and habitat resulted from unauthorized snow plowing to replace a power pole in the winter of 1999/2000 (J. Knorr *in litt.* 2000, M. Boland *in litt.* 2001). In addition, *Isatis tinctoria* has been introduced along the power line so that the entire width of the right-of-way is covered by this weed. Therefore, the power line represents a significant infestation source which is currently not being treated.

The Special Use Permit for use or occupation of the Gunsight Peak Communications Site was issued on March 3, 2010, for a period of 19 years. Included in the permit are provisions for preparation and implementation of a noxious weed plan, an operating plan, and protective measures for federally listed or USFS sensitive species. The Communications Use Leases for the Mahogany Point administrative site were issued in 1997 and expire in 2016. These leases specify that operation and maintenance of facilities must be in compliance with the communications site plan. Both the Gunsight Peak and Mahogany Point site plans require facility owners and managers to treat and control noxious weeds; submit a plan for any proposed construction or modification of facilities that protects identified sensitive resources, including washing earth-moving equipment to prevent weed seed dispersal; and prohibits soil or vegetation removal or off-road or parking area traffic that could damage *Calochortus persistens* plants. Pacific Power and Light (PPL) operates under two separate 50-year permits for the area within occupied *Calochortus persistens* habitat. Neither permit contains provisions for *C. persistens* protection. One permit expires in 2018 and the second expires in 2020.

4) OHV and Other Recreational Use

Recreational use, in general, and OHV use, in particular, has increased considerably in the last decade along the Gunsight-Humbug Ridge. While damage to occupied *Calochorus persistens* habitat has never been observed during monitoring surveys, four-wheelers and motorcycles have the potential to access the ridge top between populations CAPE-5-2B and CAPE-5-2C, where trails could destroy plants and habitat (Klamath National Forest 2009). In this area, sign installation has not proven to be an effective deterrent to OHV use because signs are removed soon after they have been erected (M. Knight *in litt.* 2007). Recreational mineral extraction has been observed, but the impacts to *C. persistens* are unknown.

As part of a USFS nationwide effort to designate routes open to OHV use, KNF issued the Motorized Travel Management Final Environmental Impact Statement in January 2010 (U.S. Department of Agriculture 2010a) and Record of Decision in July 2010 (U.S. Department of Agriculture 2010b). As a result of this decision, all routes within the *Calochortus persistens* Special Habitat Management Area have been closed to motorized vehicles, except for Road 45N53 and Road 45N28, the two major access roads, and spurs from Road 45N28 which afford access to Gunsight Peak and Mahogany Point Communication Sites. Enforcement actions can now be taken against unlawful OHV use within the Special Habitat Management Area.

In 2005, a new unlawful OHV trail was discovered on the ridge above the *Calochortus persistens* occurrence site in Oregon (B. Tong, U.S. Bureau of Land Management, pers. comm. 2005; B. Tong *in litt*. 2005, 2006a). Brush had been removed resulting in slight soil and vegetation disturbance. Three years later, an additional unauthorized, lightly used trail was developed and occasional recreational use of this trail is evident (B. Tong *in litt.* 2008b, M. Mousseaux, U.S. Bureau of Land Management, pers. comm. 2010). While direct destruction of *C. persistens* plants has not occurred, the trail could result in increased access to the plants or introduction of nonnative invasive weeds by OHVs.

5) Other Potential Impacts from Management Activities

Other management activities that could result in adverse impacts to *Calochortus persistens* are timber harvest, road and landing construction and maintenance, and other ground-disturbing activities. Ground-disturbing activities create habitat for further spread of *Isatis tinctoria*, increasing the area from which infestations can spread and compete with *C. persistens*.

To prevent ground-disturbing impacts on Gunsight-Humbug Ridge, the Klamath National Forest Land and Resource Management Plan (U.S. Department of Agriculture 1995a) has established Standards and Guidelines for this Special Habitat Management Area:

- MA5-77 "Prohibit any ground disturbance that would adversely affect the known habitat (by introducing weedy species) or physically disturbing existing plants. Disturbed areas near this habitat should be managed to exclude non-native invasive plant species."

- MA5-78 "Conduct programmed or permitted activities within the management area so as not to adversely affect the habitat values for the *Calochortus*."

There are no Standards and Guidelines for management of the Cottonwood Peak and Little Cottonwood Peak KNF lands or for Medford BLM lands.

B. Overutilization for commercial, recreational, scientific, or educational purposes

It has been well documented that bulbs of many *Calochortus* species have been extensively collected in the past. In the late 1800's, Carl Purdy was reported to have collected over a quarter of a million *Calochortus* bulbs in one year (Fredricks 1989). Demand for wild bulbs may still exist. In 1979 and 1982, the KNF reported that there was some evidence that *C. persistens* bulbs may have been removed on Federal lands (Knorr 1987). Knapp (1995) lists bulb collection as an occasional threat to this species. At present, horticultural theft is not known to be a significant threat to the California occurrences. The species is currently excluded from the KNF list of species for which collection permits can be obtained.

C. Disease or predation

Native wildlife and insect predation of *Calochortus persistens* leaves, buds, flowers, and fruits causes significant impact on seed production (Knorr 1987, Knapp 1996, Klamath-Siskiyou Wildlands Center *et al.* 2001). Similar impacts resulting from herbivory have been documented for *Calochortus greenei* (Greene's mariposa lily) (Brock 1988, Knight 1992) and *C. umpquaensis* (Fredricks 1989) and may represent a common occurrence for some *Calochortus* species (Fiedler 1986). In a 1995 to 2000, demographic study of *C. persistens*, no seeds matured in four out of six years, due in large part to predation on reproductive structures (Klamath-Siskiyou Wildlands Center *et al.* 2001). Herbivory also has been a factor affecting the Oregon population (B. Tong *in litt.* 2003a, 2003b, 2006a).

D. The inadequacy of existing regulatory mechanisms

Federal action to protect *Calochortus persistens* began as a result of Section 12 of the Act, which directed the Secretary of the Smithsonian Institution to prepare a report on those plants

considered to be endangered, threatened, or extinct in the United States. In a December 15, 1974, report to Congress (House Document No. 94-51), the Secretary of the Smithsonian Institution recommended that *C. persistens* be included in the list of threatened species (U.S. Fish and Wildlife Service 1975). The Service published a notice on July 1, 1975, in which it announced that the Smithsonian report had been accepted as a petition under the terms of the Act, and that the taxa named in the report were being reviewed for possible inclusion in the list of endangered and threatened species (U.S. Fish and Wildlife Service 1975). On December 15, 1980, the Service published a notice that classified *C. persistens* as a Category 1 candidate for listing (U.S. Fish and Wildlife Service 1980). Category 1 candidates were those for which the Service had on file substantial information on biological vulnerability and threats to support preparation of listing proposals. In a November 28, 1983, notice *C. persistens* was changed to a Category 2 candidate and was recognized as such in three subsequent notices (U.S. Fish and Wildlife Service 1983, 1985, 1990, and 1993). Category 2 candidates were those for which data indicated that listing was possibly appropriate, but for which substantial data on biological vulnerability and threats were not currently known or on file to support listing proposals. Because the February 28, 1996, Federal Register Notice of Review (U.S. Fish and Wildlife Service 1996) discontinued the designation of Category 2 species, *C. persistens* was not included in the list of candidate species.

*Calochortus persistens* was again added to the list of Federal candidates in the June 13, 2002, Federal Register Candidate Notice of Review (U.S. Fish and Wildlife Service 2002). A Federal candidate is defined as a species for which the Service has on file sufficient information on biological vulnerability and threats to support a proposal to list as endangered or threatened but for which preparation and publication of a proposal is precluded by higher-priority listing actions. As such, Federal candidate species are not protected under the Act.

The USFS listed *Calochortus persistens* as a Region 5 Sensitive Species prior to August 1979. USFS sensitive species status in Region 5 affords a substantial measure of protection by prohibiting actions that would lead to the Federal listing of this species. The Regional Forester's List of Sensitive Plant Species is intended to provide for diverse plant communities by maintaining viable populations of plants and to conserve species by ensuring continued existence of viable populations that will prevent a trend towards listing under the Act. Likewise, BLM lists *C. persistens* as a Sensitive Species and through policy and guidance, requires that its actions are consistent with the conservation needs of the species and do not contribute to the need for Federal listing.

The KNF has issued Management Guidelines for *Calochortus persistens* (Klamath National Forest 1982) and has designated 407 ha (1005 acres) as a Special Habitat Management Area for *C. persistens* (U.S. Department of Agriculture 1995a). The Klamath National Forest Land and Resource Management Plan Standards and Guidelines for this Special Habitat Management Area prohibit ground disturbance which would adversely affect known *C. persistens* habitat, prohibit physically disturbing existing plants, and require programmed or permitted activities be conducted in a manner which does not adversely affect habitat values for this species. There are numerous directives regarding the management of invasive species, including Executive Order 13112 of 1999, Forest Service Manual 2080 (U.S. Department of Agriculture 1995b), the National Invasive Species Management Plan of 2001 (National Invasive Species Council 2001) and the National Strategy and Implementation Plan for Invasive Species Management (U.S.

Department of Agriculture 2004). These documents prioritize the program elements of prevention: early detection and rapid response, control and management, and rehabilitation and restoration. Implementation of weed treatment and prevention since 2002 has depended primarily on KNF staff time and Service funding through annual interagency agreements.

*Calochortus persistens* was listed in July 1982, by the State of California Fish and Game Commission, as a rare species under the California Native Plant Protection Act (CNPPA) (Chapter 10, section 1901 *et seq*., California Fish and Game Code, and Title 14, California Code of Regulations 670.2). The CNPPA prohibits the taking, possessing, or selling of plants listed under this act, though there are exceptions to these prohibitions. The State, however, has no management jurisdiction on Federal lands and to date, CNPPA has provided limited protection for *C. persistens* from the impacts of habitat modification or invasive weed introduction and spread on Federal and private lands.

The Oregon Department of Agriculture has listed *Calochortus persistens* as a candidate species since 2009 (K. Amsberry, Oregon Department of Agriculture, pers. comm. 2011). A candidate species is defined as any plant species, designated for study by the director of the Oregon Department of Agriculture, whose numbers are low or declining or whose habitat is sufficiently threatened and declining in quantity and quality, and therefore potentially qualifies for listing as a threatened or endangered species in the foreseeable future (Oregon Department of Agriculture 2011a). As such, the State designation as a candidate species doesn't confer any official protection for the species (K. Amsberry pers. comm. 2011). Amsberry and Meinke (2010) have recommended that *C. persistens* be listed under the State Endangered Species Act, pursuant to Oregon Revised Statute 564.105 due to the species' limited range-wide distribution and the risks posed by small population size, competition from noxious weeds, and chronic reproductive failure. Although *C. persistens* is not listed by the State of Oregon, collecting or injuring any species of *Calochortus* species on State lands, along highways, or on private lands without permission from the landowner, is unlawful under Oregon Statute 564.020 (Oregon Department of Agriculture 2011b). Because this species is known to occur only on Federal lands in Oregon, *C. persistens* is not protected by State law at the present time.

E. Other natural or manmade factors affecting its continued existence

*Calochortus persistens* may have an extremely low success rate for recruitment to reproductive age. Unpublished data from a five-year demographic study in California, conducted within 13, 5 m (16 ft) by 0.5 m (1.6 ft) transects, showed that none of the seedlings established in 1995 survived to 2000, suggesting no survival for an entire year's reproduction (Klamath-Siskiyou Wildlands Center *et al.* 2001). The reproductive rate based on conditions from 1995 to 1996 was high compared to those averaged over the period from 1995 to 2001 (B. Knapp, pers. comm. 2001). However, even during the period from 1995 to 1996, when the reproductive rate appeared to be relatively high, only 20 percent of buds produced in transects matured to distribute seeds (Knapp 1996). There is no evidence of asexual reproduction by bulblets and plants don't begin to flower until 8 to 10 years of age (Klamath-Siskiyou Wildlands Center *et al.* 2001). In the years since the discovery of the Bald Mountain occurrence, recruitment has not been observed (Amsberry and Meinke 2010). Another factor affecting the Oregon occurrence, in particular, is its small, disjunct nature which makes it especially vulnerable to extinction by stochastic events, including disease, fire, collection, and drought cycle.

Alternatively, for the two larger occurrences, successful recruitment may be episodic and depend on specific favorable environmental conditions. Juvenile plants of all ages, indicated by single leaves of varying widths, were evident in all populations in the 2003 KNF survey. As a result of this information, the Service revised the listing priority number of *Calochortus persistens* from 2 to 5, in the May 11, 2005, Candidate Notice of Review, to reflect the fact that evidence of reproduction lowered the immediacy of the threat to the species (U.S. Fish and Wildlife Service 2005). The number of plants counted in the 2009 KNF monitoring census was an order of magnitude higher than in 2003 (Appendix C), possibly as a result of survey timing. By starting earlier in the season, juvenile and adults could be counted before the leaves senesced (M. Knight, pers. comm. 2010), resulting in an estimate of 20 percent juvenile plants on Gunsight-Humbug Ridge in 2009 (Forney 2009). Many botanists have noted extreme variation in the number of plants counted from one year to the next, presumably as a result of environmental factors and survey timing (Overton 1979, Knorr 1987, Klamath-Siskiyou Wildlands Center *et al.* 2001, M. Knight, pers. comm. 2010).

In summary, the combination of only three occurrences in an extremely restricted range and habitat, extremely low numbers (five plants) in the Oregon occurrence, herbivory, slow plant growth rate, low seed production and short seed dispersal distance, apparently poor seedling survival rates in some years, habitat disturbance, and competition from nonnative invasive weeds may threaten the continued existence of this species.

## VI. Conservation Actions That Will Be Implemented

**Management objective**

The objectives of the management actions proposed in this conservation agreement are to reduce or eliminate existing threats to *Calochortus persistens* and restore its habitat so that population levels can be maintained or increased. Many of the management actions have already been implemented (see Implementation Schedule). The intention of meeting these management objectives is to eliminate the need to list *C. persistens* as a Federal threatened or endangered species.

**All Agencies agree to:**

- Actively seek outside sources of funding and cooperate in cost sharing of habitat improvement projects, monitoring, long-term studies and similar actions specific to this Conservation Agreement, as funding allows.

- Coordinate as needed, to review and document activities conducted under this agreement, including new activities that are initiated as a result of adaptive management, and produce monitoring reports that will include the following:

    - A review of each agency's management actions that have been completed as part of this Conservation Agreement,

  - A review of the effectiveness of those management actions to reduce threats to the species,
  - A review of the overall site conditions and status of the species, and
  - A review of any new information.

- Initiate new actions (i.e., adaptively manage) based on the results of monitoring program review and interagency coordination.
- Conduct National Environmental Policy Act analysis for conservation actions, as appropriate.
- Secure a long-term research partner to conduct research and address conservation needs discussed in this Conservation Agreement.

**The USFS agrees to:**

Reduce or remove existing threats to *Calochortus persistens* habitat on USFS lands.

A. <u>The present or threatened destruction, modification, or curtailment of its habitat or range</u>

1) <u>Competition with Nonnative Invasive Weeds</u>

- Survey plant population areas in order to determine where *Isatis tinctoria* and any other noxious weed species occur.
- Design and implement test plots to monitor the effect of different weed removal treatments (i.e., pulling, cutting, and herbicides) on *I. tinctoria* density.
- Implement weed removal treatments along roads, in fuel breaks, around communication sites, and in other areas adjacent to the existing *Calochortus persistens* populations in order to reduce the invasion pressure of weeds on the habitat.
- Using the results of the test plots, analyze and implement weed removal treatments within *C. persistens* populations that will most effectively reduce *I. tinctoria* density, while not damaging *C. persistens* plants.
- Conduct a greenhouse study to determine whether *I. tinctoria* inhibits *C. persistens* reproduction and whether there is competition between *I. tinctoria* and *C. persistens* seedlings.

2) Fire Suppression and Succession

- Conduct field and aerial photograph studies to determine if shrub and conifer encroachment has occurred within *Calochortus persistens* habitat.
- If encroachment appears to be occurring, plan and conduct prescribed burn tests or small conifer hand-removal projects in those areas.
- Continue to coordinate with CAL FIRE to protect *C. persistens* in the State Responsibility Area agreement.
- Plan and implement fuel reduction test plots within portions of *C. persistens* habitat that will reduce the risk of high-intensity fire, shading, and competition. Continue prescribed burning if tests show it creates suitable habitat that is being colonized by *C. persistens* plants. Discontinue prescribed fire if tests show that this type of disturbance increases the density of *Isatis tinctoria* or other weeds.

3) Communication Site Construction, Maintenance, and Use

- Coordinate with Mahogany Point and Gunsight Peak Communication Site facility managers and tenants to ensure that communication site plan provisions to protect *Calochortus persistens* and manage noxious weeds are implemented.
- Coordinate with Gunsight Peak permittees to develop noxious weed management and operating plans; and to implement these plans along with Provision L, Protection of Habitat of Endangered, Threatened, and Sensitive Species; as required by the Gunsight Peak Special Use Permit.
- Coordinate with PPL to explore noxious weed treatment options in the transmission line right-of-way on Gunsight-Humbug Ridge and review methods to protect *C. persistens* plants from damage or destruction during maintenance operations.
- Explore the possibility of amending the two current authorizing permits for the PPL transmission line to include provisions for noxious weed management and protection of *C. persistens* plants during maintenance operations.
- When they expire, amend the two PPL transmission line operation authorizing permits to include provisions for noxious weed management and protection of *C. persistens* plants.

4) OHV and Other Recreational Use

- Survey and map all the existing OHV routes in order to determine where soil compaction within occupied *Calochortus persistens* habitat is occurring.
- Participate in the current OHV planning effort to avoid OHV use in the *C. persistens* Special Habitat Management Area.
- Install barriers and routing devices, where necessary, to prevent damage to *C. persistens* habitat.

5) Other Potential Management Impacts

- Maintain the existing roads in a manner that prevents weed invasion and minimizes damage to *Calochortus persistens* and its suitable habitat.

- In timber stands adjacent to the *C. persistens* Special Habitat Management Area or occupied habitat in the Cottonwood Peak and Little Cottonwood Peak *C. persistens* population localities, design any proposed ground-disturbing activities in a manner that will prevent spread of *Isatis tinctoria*.

C. Disease or predation

- Explore opportunities to design and implement a long-term monitoring plan (greater than 10 years) to determine the agent of herbivory on leaf and reproductive parts and whether herbivory significantly affects species viability.

D. The inadequacy of existing regulatory mechanisms

- The existing regulatory mechanisms allow for conservation of the species. The prioritization of available funds needs to be elevated so that the conservations actions listed in the implementation schedule can be accomplished.

E. Other natural or manmade factors affecting its continued existence

- Explore opportunities to design and implement a long-term (greater than 10 years) quantitative monitoring or demographic study to investigate the population dynamics of the species, including the pollination mechanism, seed viability and germination rate, and survival and mortality rates of the different life stages (seedling, juvenile, and adult).
- Explore opportunities to design and implement a long-term (greater than 10 years) monitoring study to determine the effects of the threats listed above, including *Isatis tinctoria* or any other noxious weed invasion, herbivory, shrub and conifer encroachment, and prescribed fire to the population dynamics of the species. Determine which of these threats can be ameliorated by land management actions.

**Monitoring**

As funding allows, design and implement a comprehensive monitoring plan to establish a current baseline for the size of the *Calochortus persistens* populations and for the extent and nature of existing threats. The monitoring plan also will be designed to test the effectiveness of different types of treatments used to improve *C. persistens* habitat and species viability and to address knowledge gaps. Monitoring will be conducted as needed, including monitoring of the effects of OHV and other recreational activities.

a.) Baseline population size and demography

Conduct an initial survey to map populations and determine existing population sizes and repeat this survey as needed. This initial survey has been completed and will serve as the baseline upon which to measure the effects of different habitat improvement projects that are employed in the future.

Baseline population levels were established from 2003 monitoring data for USFS lands on Gunsight-Humbug Ridge and 2007 data for USFS lands on Cottonwood and Little Cottonwood Peaks. A second monitoring survey was conducted on Gunsight-Humbug Ridge in 2009.

b.) *Isatis tinctoria* encroachment

Map the existing extent and severity of *Isatis tinctoria* encroachment periodically, or as changes occur, or if projects may affect habitat to guide weed treatment efforts.

c.) Shrub and conifer encroachment

Every five years, determine whether *Calochortus persistens* plants or conifers and shrubs have become established in areas that have been treated by prescribed fire or other fuel reduction methods.

d.) OHV and other recreational impacts

Periodically conduct surveys for impacts associated with OHV trespass in designated area closures.

e.) Effectiveness monitoring

Design and implement effectiveness monitoring as needed to determine if conservation actions are having a beneficial effect.

f.) Monitoring summary

Include the results of this monitoring in the KNF's Annual LRMP Monitoring Report or other public documents. In addition, the effectiveness and appropriateness of the monitoring strategy will be reviewed as necessary, to determine whether changes are needed. Revisions may be required if new information or techniques become available.

g.) Coordination

Coordinate to review and document activities in a Monitoring Report.

**The BLM agrees to:**

Manage occupied *Calochortus persistens* habitat in a manner that is beneficial to the species. Population levels need to be maintained at stable or increasing levels to ensure that random natural variations in population sizes will have no effect on the future viability of *C. persistens.*

A. The present or threatened destruction, modification, or curtailment of its habitat or range

OHV and Other Recreational Use

- Survey and map all the existing OHV routes in the vicinity of the Bald Mountain *Calochortus persistens* population to determine where adverse impacts to the species or its habitat are occurring. If a site assessment shows that there are OHV impacts to *C. persistens* or its habitat, install barriers around the Bald Mountain population to prevent damage to *C. persistens*.
- Close the area to OHV use if barriers are not effective or if OHV impacts to *C. persistens* habitat are extensive.

B. Overutilization for commercial, recreational, scientific, or educational purposes

- Coordinate with the Service to write and implement a plan for seed storage.
- Coordinate with the Service to write and implement a plan to develop propagation techniques.
- Coordinate with the Service to prepare a population augmentation plan that specifies the conditions warranting introduction and guides the potential introduction of "off-site" *Calochortus persistens* plant material (seeds, bulbs, or plants) into currently occupied areas or for establishing new wild-land populations.

E. Other natural or manmade factors affecting its continued existence

- Survey for additional *Calochortus persistens* populations in the vicinity of the known location. Document where previous surveys have been conducted to date.
- Coordinate with the Service to write and implement a plan for seed storage, as mentioned above in Section B.
- Coordinate with the Service to write and implement a plan to develop propagation techniques, as mentioned above in Section B.
- Coordinate with the Service to prepare a population augmentation plan that specifies the conditions warranting introduction and guides the potential introduction of "off-site" *Calochortus persistens* plant material (seeds, bulbs, or plants) into currently occupied areas or for establishing new wild-land populations, as mentioned above in Section B.

**Monitoring**

Continue to monitor the known location annually for:

a.) Baseline population size and demography,

b.) Noxious weed encroachment, and

c.) OHV and other recreational impacts.

Coordinate with the Service and KNF to design and implement effectiveness monitoring and to review and report the results in a Monitoring Report.

**The Service agrees to:**

- Provide technical assistance to the KNF and Medford District of the BLM in the implementation of this agreement, including the design of monitoring elements stated above.

- Coordinate with the KNF to conduct a greenhouse study to determine whether *Isatis tinctoria* inhibits *Calochortus persistens* reproduction and whether there is competition between *I. tinctoria* and *C. persistens* seedlings.

- Coordinate with the BLM to write and implement a plan for seed storage.

- Coordinate with the BLM to write and implement a plan to develop propagation techniques.

- Coordinate with the BLM to prepare a population augmentation plan that specifies the conditions warranting introduction and guides the potential introduction of "off-site" *Calochortus persistens* plant material (seeds, bulbs, or plants) into currently occupied areas or for establishing new wild-land populations.

- Reevaluate the status of *Calochortus persistens* annually and propose appropriate actions or modifications if the status changes.

## VII. Funding of Conservation Actions

At the times of the signing of this conservation agreement, KNF, Medford District of the BLM, and the Service have already dedicated funds for a portion of the conservation actions that are outlined in the body of this document. Monitoring efforts have occurred in the past and are expected to continue to be funded by each agency in the future. Funds required for the implementation of these conservation actions may come directly from the funding of staff positions. In addition, each agency is committed to seek funding to implement this conservation agreement and will implement conservation actions as funding allows.

## VIII. Duration of Agreement

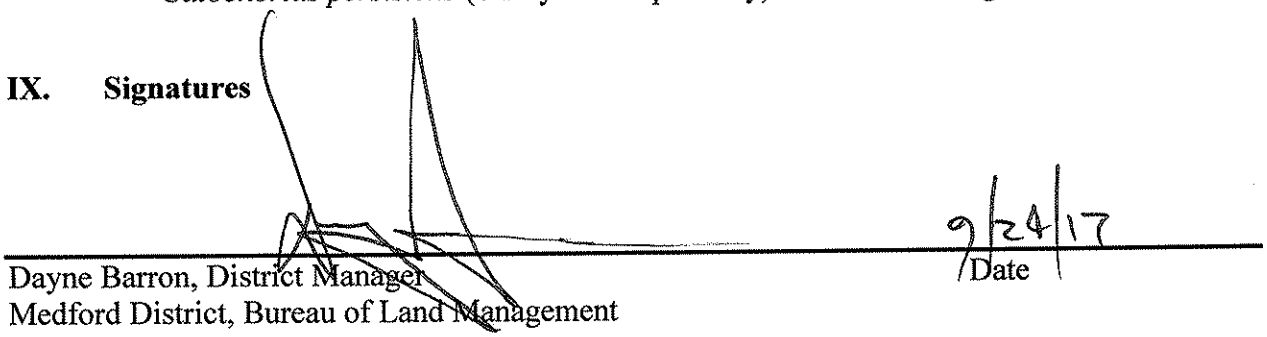
This agreement shall become effective with the signature of the last approving agency official and shall remain in perpetuity. The agreement can be revised at any time by agreement of all parties. The revised agreement will incorporate a new literature review, results of monitoring and research completed to date, and appropriate conservation actions needed, based on the new information gained. This agreement can be terminated in writing at any time by the KNF, Medford District of the BLM, or the Service (represented by two offices) with a 60-day written notice to all four parties. In addition any party may withdraw from this agreement with a 60-day notice to all other parties.

**IX. Signatures**

(for) Patricia A. Grantham, Supervisor
Klamath National Forest, U.S. Forest Service

19 Nov 2013
Date

## IX. Signatures



9/24/17

Dayne Barron, District Manager
Medford District, Bureau of Land Management

Date

## IX. Signatures

Erin Williams 9/18/12

Erin Williams, Field Supervisor — Date
Yreka Fish and Wildlife Office, U.S. Fish and Wildlife Service

## IX. Signatures

Jim Thrailkill, Field Supervisor
Roseburg Office, U.S. Fish and Wildlife Service

10-4-2012
Date

## X. References

### A. Literature Cited

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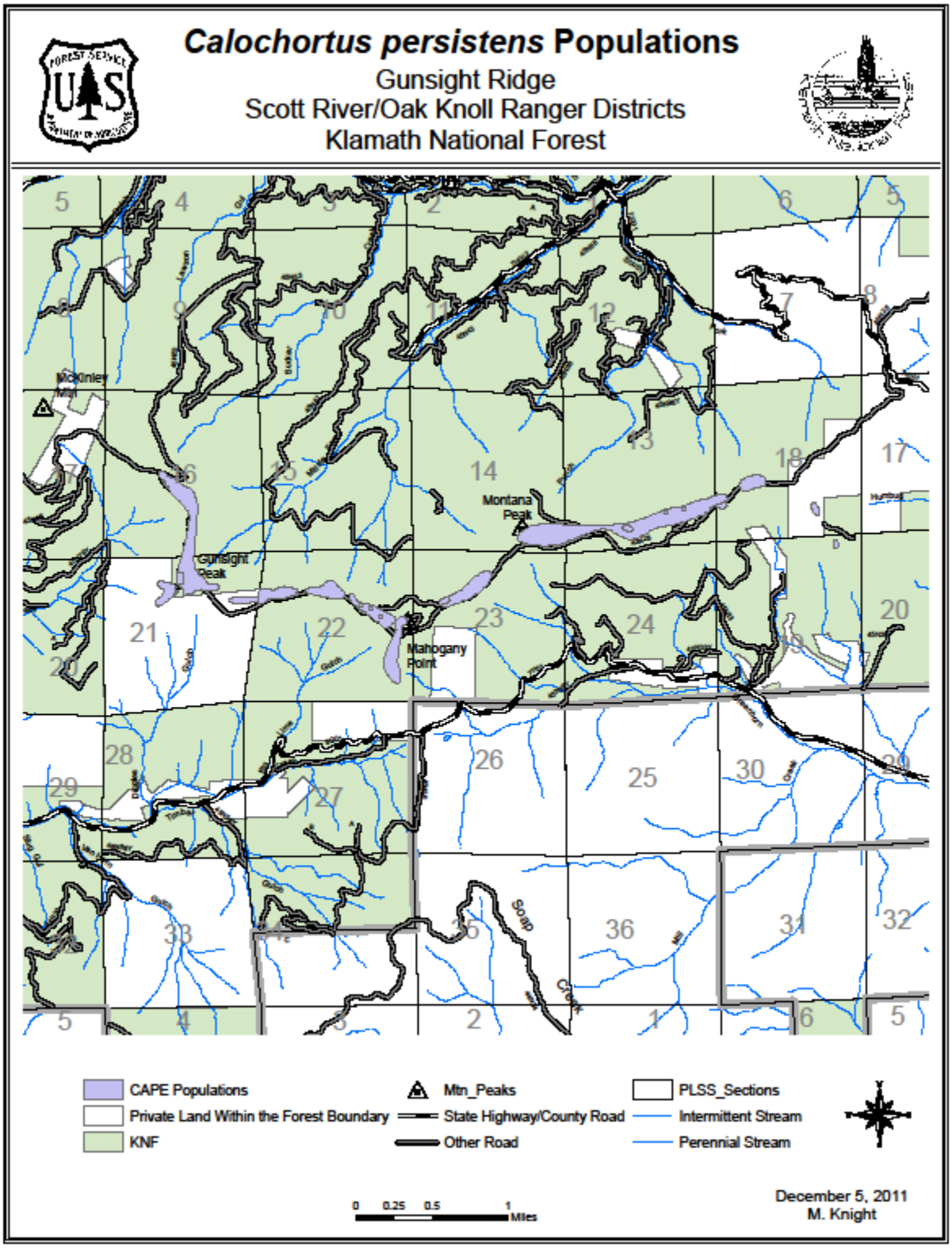
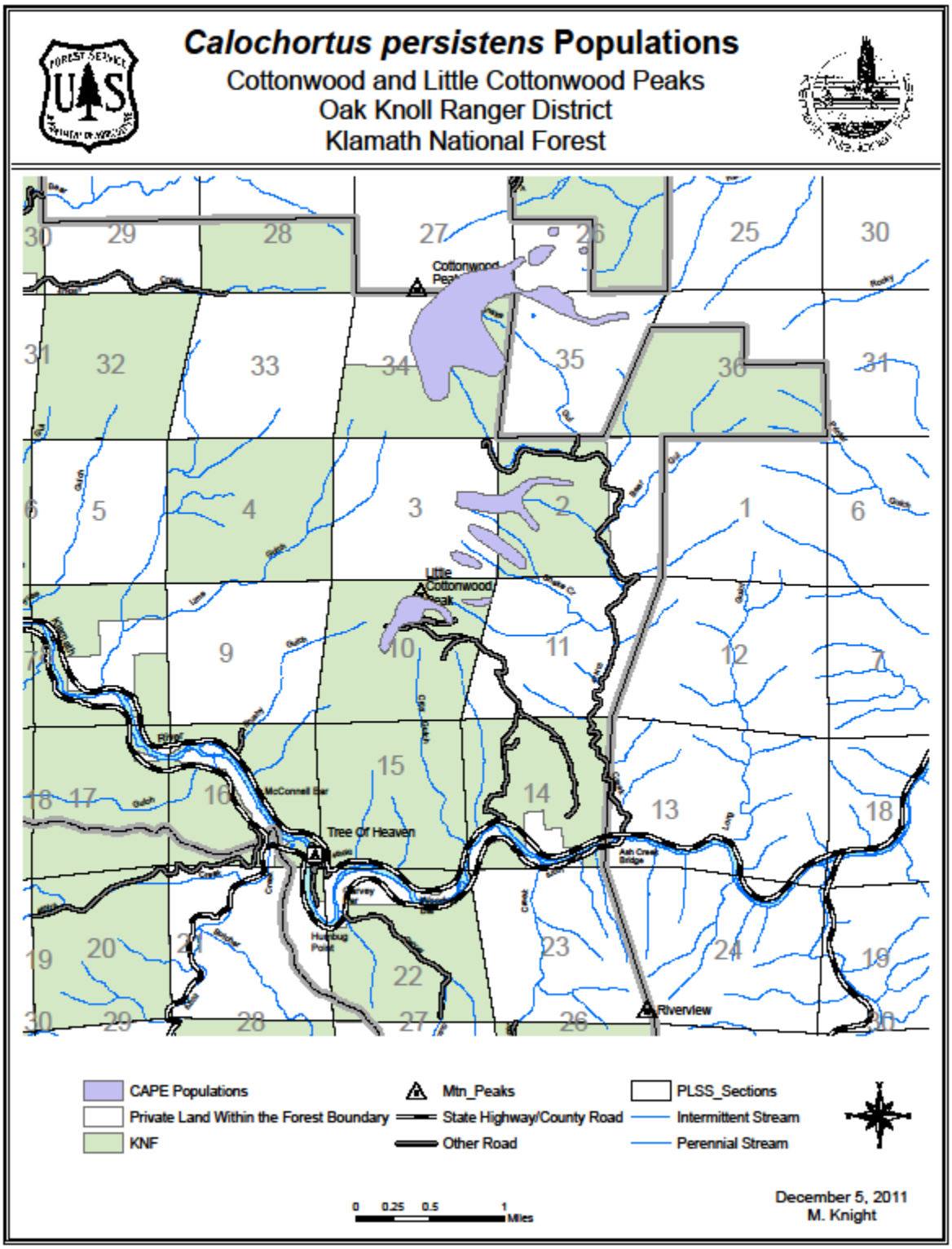
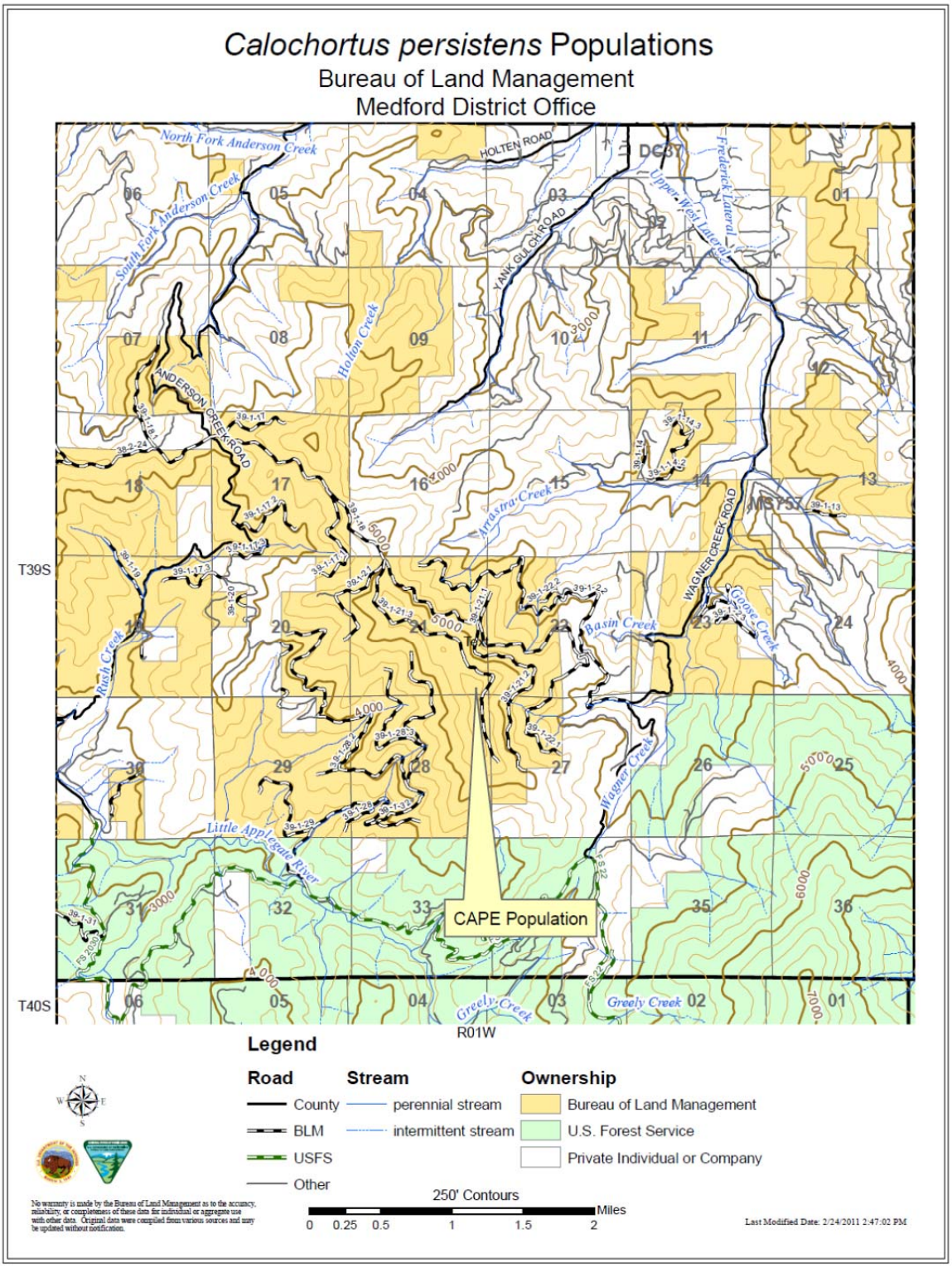
**Appendix A. Maps of *Calochortus persistens* distribution on Gunsight-Humbug Ridge and Cottonwood and Little Cottonwood Peaks in Siskiyou County, California, and Bald Mountain in Jackson County, Oregon.**




Calochortus persistens Populations
Cottonwood and Little Cottonwood Peaks
Oak Knoll Ranger District
Klamath National Forest
Cottonwood Peak
Little Cottonwood Peak
McConnell Bar
Tree Of Heaven
Riverview
CAPE Populations
Private Land Within the Forest Boundary
KNF
Mtn_Peaks
State Highway/County Road
Other Road
PLSS_Sections
Intermittent Stream
Perennial Stream
0 0.25 0.5 1 Miles
December 5, 2011
M. Knight


Calochortus persistens Populations
Bureau of Land Management
Medford District Office
North Fork Anderson Creek
South Fork Anderson Creek
HOLTEN ROAD
YANK GULCH ROAD
Upper West Lateral
Frederick Lateral
Holton Creek
ANDERSON CREEK ROAD
Arrastra Creek
WAGNER CREEK ROAD
Basin Creek
Goose Creek
Rush Creek
Wagner Creek
Little Applegate River
Greely Creek
CAPE Population
T39S
T40S
R01W
Legend
Road
County
BLM
USFS
Other
Stream
perennial stream
intermittent stream
Ownership
Bureau of Land Management
U.S. Forest Service
Private Individual or Company
250' Contours
Miles
0 0.25 0.5 1 1.5 2
Last Modified Date: 2/24/2011 2:47:02 PM

**Appendix B. Photographs of *Calochortus persistens* and habitat.**

Photograph courtesy of Brad Tong, Medford District BLM

Bald Mountain habitat.
Photograph courtesy of Brad Tong, Medford District BLM

Gunsight-Humbug Ridge habitat.
Photograph courtesy of Marla Knight, Klamath National Forest

Cottonwood Peak habitat.
Photograph courtesy of Frank Callahan, Callahan Seeds

Photograph courtesy of Frank Callahan, Callahan Seeds

**Appendix C. Number of plants in each population on Gunsight-Humbug Ridge, Cottonwood Peak and Little Cottonwood Peak, Siskiyou County, California and Bald Mountain, Jackson County, Oregon.**

**Klamath National Forest lands on Gunsight-Humbug Ridge, Siskiyou County**

| Population Number | 1980 | 1981 | 1982 | 1987 | 1992 | 1995 | 2003 | 2009 |
|---|---|---|---|---|---|---|---|---|
| 1 A-M | | | 2000 | 500 | | 800 | 1810 | 17523 |
| 2 A-C | | | | 500 | | 500 | 121 | 4768 |
| 3 | 85 | 500 | | | 75 | | 25 | 288 |
| 4 A-E | 65 | 120 | | 100 | | 475 | 120 | 6836 |
| 5 A-C | 23 | 35 | 55 | 80 | | 17 | 326 | 1008 |
| 6 A,B | | 1000 | 700 | 150 | | | 303 | 2778 |
| 7 A-E | | 200 | 300 | 50 | | 195 | 4213 | 1152 |
| 8 | | 130 | | 0 | | | 0 | 0 |
| 9 A-C | | 450 | 400 | 260 | | | 371 | 2242 |
| **Total** | **173** | **2435** | **3455** | **1640** | **75** | **1792** | **3271** | **36595** |

**Klamath National Forest lands on Cottonwood/Little Cottonwood Peak, Siskiyou County, California**

| Population Number | 1980 | 1981 | 1982 | 1987 | 1992 | 1995 | 2003 | 2009 |
|---|---|---|---|---|---|---|---|---|
| 10 A-D | | | | | | | | 13000* |
| 11 A, B | | | | | | | | 1725* |
| 12 A, B | | | | | | | | 600* |
| **Total** | | | | | | | | **15325*** |

**Private lands on Gunsight-Humbug Ridge and Cottonwood Peak, Siskiyou County, California**

| Population Number | 1980 | 1981 | 1982 | 1987 | 1992 | 1995 | 2003 | 2009 |
|---|---|---|---|---|---|---|---|---|
| PVT-1 | | | | | 215 | | | |
| PVT-2 | | | | | | | 357 | 2236 |
| PVT-3 | | | | | | | | 210 |
| PVT-4 | | | | | | | | 575* |
| **Total** | | | | | **215** | | **357** | **3021** |

**Bureau of Land Management lands on Bald Mountain, Jackson County Oregon**

| Population Number | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | 0 | 1 | 2 | 2 | 1 | 3 | 5 | 2 | 1 | 2 |

* Estimate, 2008

Data based on USFS & BLM population site reports:

1) Klamath National Forest, 1980-2009. Sensitive Plant Site Reports, Yreka, California

2) B. Tong, *in litt*. 2003a,b; 2004a,b; 2005; 2006a,b; 2008a,b.

## Appendix D. Implementation schedule.

| Appendix D. *Calochortus persistens* conservation agreement implementation schedule. | | | | | |
|---|---|---|---|---|---|
| Action Number* | Action Description | Date Action Initiated | Date Action Completed | Frequency | Responsible Agency |
| A1.1 | Conduct initial survey for *Isatis tinctoria* and other noxious weed species. | 2003 | 2003 | Once | KNF |
| A1.2 | Design and implement test plots to monitor the effects of *I. tinctoria* treatments. | 2003 | 2007 | Annually for three years | KNF |
| A1.3 | Implement weed removal treatments in areas adjacent to *C. persistens* populations, including Gunsight-Humbug Ridge roads, fuel breaks, and power lines. | 2003 | Ongoing | Annually | KNF |
| A1.4 | Implement weed removal treatments within *C. persistens* populations. | 2003 | Ongoing | Annually | KNF |
| A1.5 | Conduct a greenhouse study to determine whether *I. tinctoria* inhibits *C. persistens* reproduction and whether there is competition between *I. tinctoria* and *C. persistens* seedlings. | 2011 | 2016 | Once | KNF, FWS |
| A2.1 | Determine and map where shrub and conifer encroachment may be occurring. | 2011 | 2013 | Once | KNF |
| A2.2 | If encroachment appears to be occurring, plan and conduct prescribed burn tests or small conifer hand-removal projects in those areas. | 2012 | 2017 | TBD | KNF |
| A2.3 | Coordinate with CAL FIRE to incorporate protections for *C. persistens* as provisions of their State Responsibility Area agreement. | 2006 | Ongoing | Annually | KNF |
| A2.4 | Plan and implement fuel reduction test plots within *C. persistens* habitat to reduce the risk of high-intensity fire, shading, and competition. | 2012 | 2017 | TBD | KNF |
| A3.1 | Coordinate with Mahogany Point and Gunsight Peak Communication Site facility managers and tenants to ensure that communication site plan provisions to protect *C. persistens* and manage noxious weeds are implemented. | 2012 | Ongoing | Annually | KNF |
| A3.2 | Coordinate with Gunsight Peak permittees to develop noxious weed management and operating plans; and to implement these plans along with Provision L, Protection of Habitat of Endangered, Threatened, and | 2012 | Ongoing | Annually | KNF |

| Appendix D. *Calochortus persistens* conservation agreement implementation schedule. | | | | | |
|---|---|---|---|---|---|
| Action Number* | Action Description | Date Action Initiated | Date Action Completed | Frequency | Responsible Agency |
| | Sensitive Species; as required by the Gunsight Peak Special Use Permit. | | | | |
| A3.3 | Coordinate with PPL to explore noxious weed treatment options in the transmission line right-of-way on Gunsight-Humbug Ridge and review methods to protect *C. persistens* plants from damage or destruction during maintenance operations. | 2012 | Ongoing | Annually | KNF |
| A3.4 | Explore the possibility of amending the two current authorizing permits for the PPL transmission line to include provisions for noxious weed management and protection of *C. persistens* plants during maintenance operations. | 2012 | 2018 | Once | KNF |
| A3.5 | When they expire, amend the two PPL transmission line operation authorizing permits to include provisions for noxious weed management and protection of *C. persistens* plants. | 2012 | 2020 | Once | KNF |
| A4.1 | Survey and map OHV routes resulting in soil compaction within *C. persistens* habitat. | 2007 | 2007 | Once | KNF |
| A4.2 | Participate in current OHV planning effort to avoid OHV use in the Special Habitat Management Area for *C. persistens.* | 2007 | 2010 | Once | KNF |
| A4.3 | Install barriers and routing devices, where necessary, to prevent damage to *C. persistens* habitat. | 2008 | TBD | Ongoing | KNF |
| A4.4 | Conduct a site assessment to determine if there are OHV impacts to *C. persistens* or its habitat. | 2011 | Ongoing | Annually | BLM |
| A4.5 | If site assessment shows OHV impacts to *C. persistens* or its habitat, construct barriers to protect the population. | 2011 | 2011 | Once | BLM |
| A4.6 | If barriers are not effective in protecting *C. persistens* or its habitat from OHV implacts, close the area to OHV use. | TBD | TBD | Once | BLM |
| A5.1 | Maintain the existing roads in a manner that prevents weed invasion and minimizes damage to *C. persistens* and its suitable habitat. | 2006 | Ongoing | Annually | KNF and Lessees |

| Appendix D. *Calochortus persistens* conservation agreement implementation schedule. | | | | | |
|---|---|---|---|---|---|
| Action Number* | Action Description | Date Action Initiated | Date Action Completed | Frequency | Responsible Agency |
| A5.2 | In timber stands adjacent to the *C. persistens* Special Habitat Management Area or occupied habitat in the Cottonwood Peak and Little Cottonwood Peak *C. persistens* population localities, design any proposed ground-disturbing activities in a manner that will prevent invasion of *Isatis tinctoria*. | 2006 | Ongoing | As needed | KNF |
| B1.2 | Write and implement a plan for seed storage. | 2011 | 2021 | Once | FWS, BLM |
| B1.3 | Write and implement a plan to develop propagation techniques. | 2011 | 2021 | Once | FWS, BLM |
| B1.4 | Prepare a population augmentation plan that specifies the conditions warranting introduction and guides the potential introduction of "off-site" *C. persistens* plant material (seeds, bulbs, or plants) into currently occupied areas or for establishing new wild-land populations. | 2011 | 2021 | Once | FWS<br>BLM |
| C1 | Design and implement a long-term monitoring plan to determine the cause of herbivory on leaf and reproductive parts and to determine whether herbivory significantly affects species viability. | 2011 | 2018 | Once | KNF<br>FWS |
| D1 | Prioritize available funding for *C. persistens* conservation planning and actions. | 2003 | Ongoing | Annually | KNF<br>FWS<br>BLM |
| E1 | Design and implement a long-term quantitative monitoring or demographic study to investigate the population dynamics of the species, including the pollination mechanism, seed viability and germination rate, and survival and mortality rates of the different life stages (seedling, juvenile, and adult). | 2013 | 2023 | Once | KNF<br>FWS<br>BLM |

| Appendix D. *Calochortus persistens* conservation agreement implementation schedule. | | | | | |
|---|---|---|---|---|---|
| Action Number* | Action Description | Date Action Initiated | Date Action Completed | Frequency | Responsible Agency |
| E2 | Design and implement a long-term monitoring study to determine the effects of the threats listed above, including *Isatis tinctoria* or any other noxious weed invasion, herbivory, shrub and conifer encroachment, and prescribed fire to the population dynamics of the species. Determine which of these threats can be ameliorated by land management actions. | 2013 | 2023 | Once | KNF |
| E3 | Survey for additional *C. persistens* populations in the vicinity of the known locations in suitable habitat. | 2001 | Ongoing | Annually | BLM |
| E4 | Document where previous surveys have been conducted to date. | 2001 | Ongoing | Annually | BLM |
| E5 | Write and implement a plan for seed storage (same as B1.2). | 2011 | 2021 | Once | FWS, BLM |
| E6 | Coordinate with the Service to write and implement a plan to develop propagation techniques (same as B1.3). | 2011 | 2021 | Once | FWS, BLM |
| E7 | Prepare a population augmentation plan that specifies the conditions warranting introduction and guides the potential introduction of "off-site" *C. persistens* plant material (seeds, bulbs, or plants) into currently occupied areas or for establishing new wild-land populations (same as B1.4). | 2011 | 2021 | Once | FWS, BLM |
| Monitoring (a) | Baseline population size and demography | 2003<br>1998 | Ongoing | Every 5–10 years<br>Annually | KNF<br>BLM |
| Monitoring (b) | Map existing extent and severity of *I. tinctoria* encroachment to guide weed treatment efforts. | 2003 | Ongoing | Every 5 years<br>Annually | KNF<br>BLM |
| Monitoring (c) | Determine whether *Calochortus persistens* plants or conifers and shrubs become established in areas that have been treated by prescribed fire or other fuel reduction methods. | 2020 | Ongoing | Every 5 years | KNF |
| Monitoring (d) | Conduct surveys for impacts associated with OHV trespass in designated area closures. | 2007 | Ongoing | Biennially<br>Annually | KNF<br>BLM |

| Appendix D. *Calochortus persistens* conservation agreement implementation schedule. | | | | | |
|---|---|---|---|---|---|
| Action Number* | Action Description | Date Action Initiated | Date Action Completed | Frequency | Responsible Agency |
| Monitoring (e) | Design and implement effectiveness monitoring to determine if conservation actions are having a beneficial effect. | 2005 | Ongoing | Every 5 years | KNF<br>FWS<br>BLM |
| Monitoring (f) | Publish the results of the monitoring program. Review monitoring and study protocols to determine whether or not there is a need for revision. | 2010 | Ongoing | Every 5 years | KNF<br>FWS<br>BLM |
| Monitoring (g) | Coordinate to review and document activities in a Monitoring Report. | 2003 | Ongoing | Annually | KNF<br>FWS<br>BLM |
| Funding | Actively seek outside sources of funding. | 2005 | Ongoing | Annually | KNF<br>FWS<br>BLM |
| Adaptive Management | Initiate new actions (i.e., adaptively manage) based on the results of monitoring program review and interagency coordination. | 2011 | Ongoing | As needed | KNF<br>FWS<br>BLM |
| NEPA Analysis | Conduct National Environmental Policy Act analysis for conservation actions, as appropriate. | 2011 | Ongoing | As needed | KNF<br>FWS<br>BLM |
| Research | Secure a long-term research partner to conduct research and address conservation needs discussed in this Conservation Agreement. | 2011 | Ongoing | Once | KNF<br>FWS<br>BLM |

* Action Number corresponds with Conservation Actions that will be implemented, starting on page 20 of this document.

TBD To Be Determined
KNF Klamath National Forest
FWS U.S. Fish and Wildlife Service
BLM U.S. Bureau of Land Management, Medford District