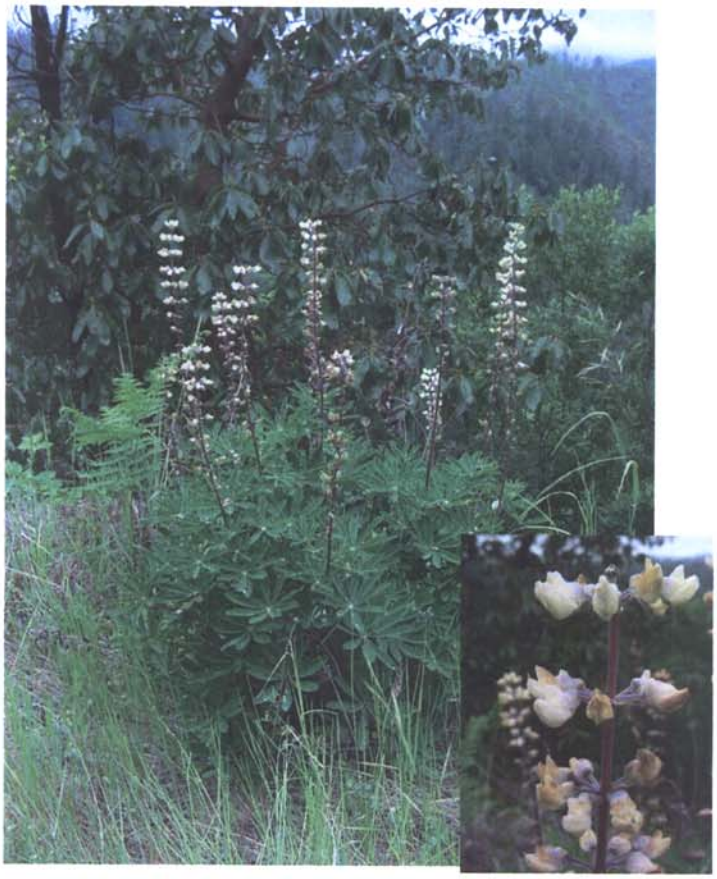
Management Plan
for
Kincaid's Lupine
(*Lupinus sulphureus* ssp. *kincaidii*)
in
Douglas County, Oregon

March 2008



U.S.D.I. Bureau of Land Management
Roseburg District

U.S.D.A. Forest Service
Umpqua National Forest

U.S.D.I. Fish and Wildlife Service
Roseburg Field Office

Management Plan Approval

The Bureau of Land Management Roseburg District and the Umpqua National Forest Tiller Ranger District agree to implement this management plan as available funding permits.

District Manager, Roseburg District, Bureau of Land Management	Date 4/2/08
District Ranger, Tiller Ranger District, Umpqua National Forest	Date 4/29/08

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Executive Summary

Kincaid's lupine is a long-lived herbaceous perennial species in the Pea Family. Kincaid's lupine was federally listed as threatened on January 25, 2000. It is endemic to the Pacific Northwest and ranges from Lewis County, Washington, to the north to Douglas County, Oregon, to the south. The species was originally described from the Willamette Valley, Oregon, where most of the known and historic populations occur. In the Willamette Valley, Kincaid's lupine is the host species for the federally endangered Fender's blue butterfly. The habitat for Kincaid's lupine in the Willamette Valley consists primarily of upland prairie remnants. The Douglas County populations are highly disjunct and isolated from the Willamette Valley populations with approximately 54 miles (87 km) separating Oregon's south Willamette Valley populations from the Douglas County populations. In Douglas County, Kincaid's lupine occurs at 14 sites. Of these, nine sites occur on public lands: eight on Bureau of Land Management (BLM) land managed by the Roseburg District and one on Umpqua National Forest land. The primary habitat for Kincaid's lupine in Douglas County is open woodland and meadow edges, often near roadsides, associated with Pacific madrone, incense cedar, and Douglas-fir trees with a relatively open canopy cover.

Critical habitat for Kincaid's lupine was designated on October 31, 2006. No critical habitat units for Kincaid's lupine in Douglas County were designated. In April 2006, the BLM Roseburg District, the U.S. Fish and Wildlife Service, and the Umpqua National Forest completed the "Programmatic Conservation Agreement for Kincaid's Lupine in Douglas County" (BLM, USFWS, and USFS 2006). The purpose of the conservation agreement is to formally document the intent of the parties involved to protect, conserve, and contribute to the recovery by implementing recovery actions for Kincaid's lupine and its habitat on Federal lands within Douglas County. A key provision of the Conservation Agreement is the development of a management plan which outlines specific management activities within the federally owned populations of Kincaid's lupine within Douglas County.

This management plan addresses the populations and habitat for Kincaid's lupine on BLM and Forest land within Douglas County. The primary threats to the species in this part of its range are forest succession and resulting canopy shading, noxious weed invasions, and road maintenance. In addition, the populations in Douglas County are generally small and isolated from each other. This isolation limits the likelihood of cross-pollination between populations and could result in inbreeding depression.

A multi-species recovery plan for the listed prairie species of western Oregon and southwest Washington is in preparation by the U.S. Fish and Wildlife Service. This plan will include Kincaid's lupine. A recovery outline for Kincaid's lupine was developed in March 2006 which outlines recovery criteria for the species. The management actions specified in this management plan are intended to meet the management goals and objectives which are linked to the recovery criteria for the species.

I. NATURAL HISTORY

A. Species Description

Kincaid's lupine (*Lupinus sulphureus* Hooker ssp. *kincaidii* (C.P. Smith) Phillips) is a long-lived herbaceous perennial species in the Pea Family (Fabaceae). In a study performed in the Willamette Valley, one excavated Kincaid's lupine plant was found to have 25 annual growth rings. This information was used in extrapolating lateral growth rates to the largest individuals which suggests that some plants could be several centuries old (M.V. Wilson, unpubl. data, as cited in Wilson et. al. 2003). Kincaid's lupine forms a branched crown and is low growing (30-50 cm). Individual plants are capable of spreading by rhizomes, producing clumps of stems exceeding 20 meters (m) (33 feet [ft]) in diameter. Because of this growth form it is difficult to determine where one plant ends and another plant begins. The leaves are palmately lobed with seven to twelve leaflets and have long petioles which are one to five times the length of the leaf blade. The basal leaves are still present after flowering. The flowering stems are unbranched and up to 100 cm long. The flowers are borne in racemes at the end of the flowering stems with flowers maturing from the bottom of the raceme first and then progressing toward the top. Kincaid's lupine has five petals in the typical pea flower arrangement: The two lower petals are fused and form the keel; the upper petal is known as the banner; and the two side petals are the lateral wings. The flowers range in color from light blue or purple to light yellow or cream. Older flowers fade to an orange-brown color. The banner of the flower has a characteristic ruffle. The stems and leaves are covered with silky hairs except for the upper surfaces of the leaves, which are smooth or very slightly hairy. The fruits are flattened legume pods which are about 2-3 cm long.

B. Reproductive Biology

The breeding system is not completely understood for Kincaid's lupine. Kincaid's lupine relies on pollinator service for fruit and seed set (Kaye 1999) but is also capable of self pollination (Severns and Lewis 2007). Results of a hand pollination study of Kincaid's lupine in a Willamette Valley population indicate that Kincaid's lupine has a mixed mating system: visits by pollinating insects (e.g. bumble bees) are required, but pollen transfer is not necessary for self seed set (Severns and Lewis 2007). Like many other lupine species, the flower parts are arranged like a pump or piston where a string of pollen is pushed through the tip of the keel by the stigma when the flower comes under pressure during an insect visit.

II. CURRENT SPECIES SITUATION

A. Status And Distribution

The U.S. Fish and Wildlife Service listed Kincaid's lupine as threatened on January 25, 2000, under the authority of the Endangered Species Act of 1973, as amended (USFWS 2000). Critical habitat for Kincaid's lupine was designated on October 31, 2006. No critical habitat units for Kincaid's lupine in Douglas County were designated. In April 2006, the BLM Roseburg District, the Service, and the Umpqua National Forest completed the "Programmatic Conservation Agreement for Kincaid's Lupine in Douglas County" (BLM, USFWS, and USFS 2006). The purpose of the conservation agreement is to formally document the intent of the parties involved to

protect, conserve, and contribute to the recovery by implementing recovery actions for Kincaid's lupine and its habitat on Federal lands within Douglas County. A key provision of the Conservation Agreement is the development of a management plan which outlines specific management activities within the federally owned populations of Kincaid's lupine within Douglas County. Three timber companies, whose lands contain habitat for Kincaid's lupine, are working cooperatively with state and federal agencies to implement conservation and recovery activities for this species on their private properties. Lone Rock Timber Management Company, Roseburg Forest Products, and Seneca Jones Timber Company, signed a voluntary agreement with USFWS in August 2006.

Kincaid's lupine occurs in 76 occurrences, totaling approximately 1,150 acres (465 ha) in size, scattered across six counties (Lewis County, Washington, and Yamhill, Polk, Benton, Lane, and Douglas Counties, Oregon) (USFWS 2005). Kincaid's lupine populations in Douglas County, Oregon, represent the furthest southern extent of the current range. These populations are highly disjunct and isolated from the Willamette Valley populations with approximately 54 miles (87 km) separating Oregon's south Willamette Valley populations from the Douglas County populations. A population of Kincaid's lupine consists of plants within close enough proximity of one another that cross-pollination by pollinating insects is possible. A population may be composed of one or more sites which are discreet clusters of plants that are physically separated from each other usually due to habitat features. In Douglas County, Kincaid's lupine occurs at 14 sites ranging in size from 0.21 to 3.55 acres. Of these, nine sites occur on public lands.

A multi-species recovery plan for the listed prairie species of western Oregon and southwest Washington is in preparation by the U.S. Fish and Wildlife Service. This plan will include Kincaid's lupine. A recovery outline for Kincaid's lupine was developed in March 2006 which outlines recovery criteria for the species. The preliminary recovery strategy is based upon recovery zones within the range of the species. All of the Douglas County Kincaid's lupine populations occur within the Douglas County Recovery Zone. The goal for the Douglas County Recovery Zone is to have a minimum of 5,000 square meters (1.25 acres) of occupied habitat consisting of at least two metapopulations. A metapopulation can be defined as "an assemblage of populations existing in a balance between extinction and colonization" (Levins 1969, 1970, as cited in Husband and Barrett 1996), meaning that overall the metapopulation can remain stable even though local populations may disappear in one place and new populations may occur in adjacent habitat.

B. Habitat In Douglas County

The primary habitat for Kincaid's lupine in Douglas County is open woodland and meadow edges, often near roadsides, associated with Pacific madrone *(Arbutus menziesii)*, incense cedar *(Calocedrus decurrens)*, and Douglas-fir *(Pseudotsuga menziesii)* trees with a relatively open canopy cover. Most of the Douglas County populations appear to tolerate more shaded habitat conditions than the Willamette Valley populations with canopy cover of 50 to 80 percent (Barnes 2004). However, canopy covers between zero and 50 percent occur at the Callahan Meadows and Callahan Ridge sites. Because the Douglas County populations represent the southern-most extent of this species' range, they may be adapted to tolerate more extreme habitat and/or other environmental conditions.

III. PROBLEMS FACING THE SPECIES

A. Effects from Natural and Human Influenced Processes

1) Forest Succession and Canopy Shading. Kincaid's lupine generally occurs in open areas. Shade appears to be a limiting factor at many of the sites in Douglas County where Kincaid's lupine plants may only be found on road cut banks, old logging roads, or areas previously burned. Canopy openness and vigor of Kincaid's lupine populations, as defined by leaf cover and fruit and seed production, appear to be correlated (Menke and Kaye 2006). As forest canopy increases it is likely that production of viable seed will decrease.

2) Noxious Weed Invasion. Noxious weeds have been observed adjacent to and within Kincaid's lupine populations. Scotch broom (*Cytisus scoparius*) and Himalayan blackberry (*Rubus armeniacus*) occur at the China Ditch, Stout's Creek, and Loose Laces sites. Medusahead (*Taeniatherum caput-medusae*) occurs adjacent to the Callahan Meadows site. Since most of the sites are adjacent to roads, they are subject to new invasions of noxious weeds. Unrestrained expansion as well as unmitigated treatment of noxious weeds could adversely impact the species.

3) Herbivory and Predation. Herbivory is a natural part of the life cycle of most plants. Heavy consumption of plant parts by herbivores such as deer, gophers, voles, and insects may threaten small populations.

B. Direct Disturbance from Human Influenced Events

1) Road Maintenance. Since many of the known populations occur within road ditches and road cuts, road maintenance could threaten populations. Road maintenance activities such as grading and ditch pulling can destroy plants even if implemented when the plants are dormant.

2) Recreation and Off-Highway Vehicle (OHV) Use. Since Kincaid's lupine occurs on old overgrown roads in several locations, it is vulnerable to potential OHV use. Impacts from OHV use include crushing of plants, increased soil compaction, increased soil erosion, and introduction of noxious weed species.

C. Population Demographics and Low Genetic Diversity

1) Small, Isolated Populations. Most of the populations in Douglas County are small and are most likely isolated genetically. Because of the distances between populations, transfer of genetic material through out-crossing is unlikely. Some populations are 11 to 16 air miles away from the next nearest known Kincaid's lupine population which exceeds the known ranges of the pollinators (small native bumblebees, solitary bees, and occasionally European honey bees) associated with Kincaid's lupine. Isolation of small populations could result in inbreeding depression and the accumulation of deleterious alleles. Low genetic diversity may be the cause of the reproductive failure in the Callahan Meadows population which has not produced any seed during the four year period starting in 2003 when monitoring was initiated (Menke and Kaye 2006).

IV. SITES

A. CALLAHAN MEADOWS

The Callahan Meadows site occurs approximately one mile south of Tiller, Oregon, about 16 miles east of Canyonville and I-5. The site is comprised of two small sub-populations that occur at the edge of a California black oak/incense cedar woodland adjacent to a serpentine meadow. The site occurs on the northern portion of an 80-acre parcel of public domain in T 31S, R 2W, Section 4. The entire parcel was fenced in 2004 to exclude livestock (cattle) that graze on adjacent private land. Prior to the parcel fencing, cattle could move freely from the private to the BLM land, and BLM employees noted evidence of cattle loafing within the vicinity of the Kincaid's lupine population.

Canopy cover at the Callahan Meadows site ranges from completely open to approximately 50% and is dominated by large (diameters greater than 24 inches) California black oak and incense cedar trees. A shrub layer is absent from this site. The herbaceous layer is dominated by non-native grasses; although a wide variety of native forb species, such as common yarrow (*Achillea millefolium*), deltoid balsamroot (*Balsamorhiza deltoidea*), cat's ear (*Calochortus tolmiei*), common biscuitroot (*Lomatium utriculatum*), and western buttercup (*Ranunculus occidentalis*), are present. The noxious weed medusahead is widespread in the general area and grows within 50 meters of the Kincaid's lupine occurrences. The more southern sub-population has been monitored since 2003 and fits entirely within a 12 m square plot. The northern sub-population has been monitored since 2004 and falls within a 6 m by 4 m plot.

There has been no successful fruit development documented at this population since monitoring was established. A lack of fruit set may relate to pollination limitation, insufficient diversity of mating genotypes, or resource limitation (Wilson et al. 2003). However since leaf abundance has increased during the monitoring period it is unlikely that resources are limited. Also the population occurs at the edge of a meadow which supports a diversity and abundance of native flowering plants which would likely attract pollinators. The reproductive failure is most likely due to low genetic diversity (Menke and Kaye 2006).

B. CALLAHAN RIDGE

The Callahan Ridge site is the only site managed by the Umpqua National Forest. It occurs approximately one mile southwest of the Callahan Meadows site. The Callahan Ridge population also occurs at the edge of a California black and Oregon white oak woodland adjacent to a serpentine meadow. The Callahan Ridge population is approximately 0.1 acres in size. Population trend monitoring between 1998 and 2003 revealed the population to be stable. Although very few flowering plants were observed in 1995, plants producing mature seed pods have been abundant since that time. The population was historically grazed as part of the Callahan allotment. Because of the shade provided by the oaks, the site was a frequently used resting site for cattle. This allotment was discontinued in 1993. Although occasional trespass cattle use the site, trespass has been increasingly infrequent. Associated species include: hedgehog dogtail grass (*Cynosurus echinatus*), Kentucky bluegrass (*Poa pratensis*), blue wildrye (*Elymus glaucus*), smooth brome

(*Bromus mollis*), medusahead, checkermallow (*Sidalcea malviflora*), and giant houndstongue (*Cynoglossum grande*).

The habitat is currently restricted by serpentine soils to the south and dense second-growth Douglas-fir to the north. Much of the second-growth Douglas-fir occupies an area that was historically an open oak community. The fragmented habitat may be restricting pollinator visitation to Kincaid's lupine. Competition from non-native species, particularly the annual grasses, may be limiting recruitment of Kincaid's lupine seedlings.

C. CHINA DITCH

The China Ditch population is located near the China Ditch Historic Site, approximately 14 miles east and slightly north of Myrtle Creek, Oregon. The area burned in a wildfire in 1987. The China Ditch Kincaid's lupine population was discovered in 2003 and consists of three relatively distinct subpopulations, all of which are on roadsides, cut banks, and slopes above and below roads, with almost full sun exposure. Some areas of the population have a patchy canopy of Douglas-fir and Pacific madrone. The population has substantial shrub cover, especially of manzanita (*Arctostaphylos* sp.), poison oak (*Toxicodendron diversilobum*), and oceanspray (*Holodiscus discolor*). Other shrub species include deerbrush (*Ceanothus integerrimus*) and snowbrush (*C. velutinus*) and two noxious weeds: Himalayan blackberry and Scotch broom. The herbaceous layer consists of the non-native grass, hedgehog dogtail grass, and several native and non-native forbs, including the noxious weed St. Johnswort (*Hypericum perforatum*).

The population faces threats from unstable road banks and over crowding by non-native and native shrubs. A small portion of the population was recently covered by a road cut-bank soil slide. The soil covered a portion of the access road so it was moved to an area previously unoccupied by Kincaid' lupine.

D. DICKERSON HEIGHTS

The Dickerson Heights population is located about nine miles southwest of Winston, Oregon, on a ridgeline and directly adjacent to BLM road 29-7-3.0. This population is small, almost completely fitting within a 15 m by 23 m monitoring plot. A few additional plants occur between this plot and BLM road 29-7-3.0 on the road cut bank. It has a fairly dense overstory of Douglas-fir with some Pacific madrone and incense cedar present. Native shrubs include poison oak, oceanspray, and manzanita (*Arctostaphylos columbiana*). Native forbs include common whipplea (*Whipplea modesta*), leafy pea (*Lathyrus polyphyllus*), pink honeysuckle (*Lonicera hispidula*), and checkermallow (*Sidalcea* sp.).

The population faces threats from over crowding by the dense overstory of Douglas-fir and shrubs.

E. LETITIA CREEK

The Kincaid's lupine sub-populations near Letitia Creek are about 11 miles east of Myrtle Creek, Oregon, and are concentrated along a ridge top dividing Letitia Creek and Long Wiley Creek at about 1760 feet elevation. There are two sub-populations on public land. The sub-populations are

considered two separate populations in the Oregon Natural Heritage Information Center (ORNHIC) database, but will be treated as one population for the purposes of this management plan. One sub-population is located further south, on the border between public and private land, with most plants on private property. At the other, northern, larger sub-population, Kincaid's lupine occurs within 10 m of a ridge top road and co-occurs with wayside aster (*Eucephalus vialis*), an Oregon State threatened and BLM sensitive species. Most of the surrounding area, including the ridge top, was cut for timber 30-40 years ago. Both Letitia Creek sub-populations follow an old dirt road on a forested ridgeline. The overhead canopy cover averages about 65% with some areas having 100% canopy coverage and some areas completely open. Most of the Kincaid's lupine plants are in the roadbed or within three meters of either side of the road edge.

The canopy layer consists of Douglas-fir, Pacific madrone, Oregon white oak, and incense cedar. Shrub species include oceanspray, poison oak, dwarf rose (*Rosa gymnocarpa*), common snowberry (*Symphoricarpus albus* var. *laevigatus*), and California blackberry (*Rubus ursinus*). The herbaceous layer consists of a variety of forbs and grasses, most of which are native. No noxious weeds are currently present at the Leticia Creek site.

The Letitia Creek population faces threats from shading by the dense overstory of Douglas-fir and shrubs.

F. LOOSE LACES

The Loose Laces Kincaid's lupine population is located approximately seven miles south of Riddle, OR, and five miles west of Interstate 5. This population is composed of four sub-populations. These are considered two separate populations in ORNHIC, but will be treated as one population for the purposes of this management plan. Two sub-populations occur on overgrown skid roads, one is on the cut-bank of a maintained roadside, and one occurs above a road cut bank. These sites range from 1560 – 1990 feet in elevation. Illegal dumping of household appliances has been a problem at one of the sub-populations on a skid road. The overhead canopy cover at the Loose Laces sub-populations generally ranges from 50-80%. However, plants that occur along the roadside receive full sun during the mid-day hours. The population at Loose Laces appears to be at risk by overcrowding and overshading by young tree establishment and increasing forest growth.

The canopy layer consists of Douglas-fir, Pacific madrone, ponderosa pine (*Pinus ponderosa*), and California black oak. Shrub species include common snowberry, California blackberry, poison oak, oceanspray, and Nootka rose (*Rosa nutkana*). The herbaceous layer consists of a variety of forbs and grasses, most of which are native. The noxious weed St. Johnswort is present at the Loose Laces site.

G. STOUT'S CREEK

The Stout's Creek population is located about three miles south of Milo, Oregon, and extends across both BLM and private land. The population overall is approximately one acre in size. On BLM land, sub-population 1 includes several diffuse clusters of plants north (above) the road. Sub-population 2 is much larger, and extends both above and well below the road. The population

at Stout's Creek appears to be at risk by overcrowding and overshading by young tree establishment and increasing forest growth. The overhead canopy cover averages at Stout's Creek population range from 0% to 80% canopy coverage.

The plant community in this area includes a sparse overstory/shrub layer of young Douglas-fir and some Pacific madrone and deerbrush. Shrub species include poison oak, salal (*Gaultheria shallon)*, oceanspray, common snowberry, hollyleaved barberry (*Mahonia aquifolium*), and western brackenfern (*Pteridium aquilinum*). Native grasses include California fescue (*Festuca californica*) and blue wildrye. Introduced grasses include orchardgrass (*Dactylis glomerata*), silver hairgrass (*Aira caryophyllea*), and soft brome (*Bromus hordeaceus*). Forbs include common whipplea, desert deervetch (*Lotus micranthus*), strawberry (*Fragaria virginiana*), hairy cat's ear (*Calochortus tolmiei*), and Queen Anne's lace (*Daucus carota*). Scotch broom occurs along the Stout's Creek Road near Kincaid's lupine plants.

V. MANAGEMENT

A. MANAGEMENT GOALS AND OBJECTIVES

Goal 1. Maintain viable populations of Kincaid's lupine on BLM and Forest managed lands in Douglas County and allow for the expansion of these populations.

Objective 1.1. Contribute toward meeting the Douglas County Recovery Zone criteria. The following criteria come from the Recovery Outline for *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's lupine) dated March 2006:

- Conserve a minimum of 5,000 m^2 (1.25 acres) total cover of occupied Kincaid's lupine habitat within the Recovery Zone in Douglas County including any Kincaid's lupine populations outside of metapopulations.

- Conserve a minimum of two Kincaid's lupine metapopulations within the Recovery Zone in Douglas County.
  i. The minimum size of each metapopulation will be 1,000 m^2 (0.25 acre) total cover.
  ii. A minimum of two local populations shall comprise each metapopulation. The minimum Kincaid's lupine local population size within a metapopulation will be 60 m^2 total cover.
  iii. Local Kincaid's lupine populations in a metapopulation should not be more than 9,000 meters (5.6 miles) apart.
  iv. Number of occupied square meters in a metapopulation shall be stable or increasing for a minimum of 10 years. Local populations must show evidence of reproduction, such as flowering, seed set, or presence of seedlings.

Objective 1.2. Manage existing habitat to maintain suitable plant community structure.

Objective 1.3. Enhance genetic diversity within populations as needed.

Goal 2. Reduce threats to the species to assure that viable populations of Kincaid's lupine in Douglas County will be maintained on BLM and Forest managed lands.

Objective 2.1. Control noxious and other non-native invasive species.

Objective 2.2. Manage competing native understory vegetation.

Objective 2.3. Reduce canopy cover where excessive shading negatively affects viability of populations.

Objective 2.4. Manage fire fuels within populations to prevent fire intensities which result in sterile soil.

Objective 2.5. Limit adverse impacts to the populations from other land management activities.

Goal 3. Promote larger functioning metapopulations of Kincaid's lupine, with increased population sizes and genetic diversity, which in turn will promote long-term population viability and species conservation, and reduce the risk of local extirpation.

Objective 3.1. Create new populations of Kincaid's lupine within suitable habitat that occurs near existing populations.

Objective 3.2. Manage habitat adjacent to existing populations to promote conditions suitable for the expansion of the Kincaid's lupine population.

B. GENERAL MANAGEMENT ACTIONS

The following management actions apply to populations and habitat managed by the District and Forest. The corresponding management objective follows each management action in parentheses.

1. Monitor the status of extant populations. Monitoring will conform to the standardized population monitoring protocol developed by the Willamette Prairie Species recovery team. The abundance of Kincaid's lupine will be measured by the total amount of cover (square meters of ground area covered by the species). (Objective 1.1)

2. Monitor and assess habitat quality at all Kincaid's lupine populations. (Objective 1.2)

3. Design and implement a long-term monitoring plan or demographic study to determine the natural reproductive processes of the species, and the effects of threats to the reproductive success of the species. (Objective 1.1)

4. Survey suitable habitat for new populations. (Objective 1.1)

5. Document where previous surveys have been conducted to date. (Objective 1.1)

6. Evaluate the availability of pollinators. If pollinators are apparently lacking, manage habitat to attract suitable pollinating insects. (Objective 1.2)

7. Plant native forbs and shrubs adjacent to Kincaid's lupine populations as necessary to encourage a variety of pollinating insects. (Objective 1.2)

8. Collect Kincaid's lupine seeds from all populations on BLM and Forest Service land and transfer them to a certified seed repository for long-term storage and for use in establishing transplants (i.e. the Berry Botanic Garden Seed Bank for Rare and Endangered Plants of the Pacific Northwest located in Portland, Oregon). (Objectives 1.3)

9. Evaluate population genetic diversity. (Objective 1.3)

10. Augment populations as necessary to enhance genetic diversity. (Objective 1.3)

11. Use Integrated Weed Management to control existing noxious weed infestations and prevent new infestations within and adjacent to Kincaid's lupine habitat. (Objective 2.1)
    Noxious weed prevention and control management actions include:
    - Hand pulling and cutting of noxious weed species.
    - Cut stump herbicide treatment of woody noxious weeds.
    - Foliar herbicide treatment of noxious weeds when Kincaid's lupine is dormant.
    - Clean all mechanical equipment and inspect to ensure no noxious weed plant parts are present prior to using within Kincaid's lupine habitat.
    - Flaming (e.g. propane burners) or hot water treatment of herbaceous noxious weeds.
    - Plant desirable grasses, forbs, and shrubs to prevent invasion of noxious weeds and invasive non-native species.

12. Conduct prescribed burning, thinning, or other vegetation treatment to manage competing understory vegetation. (Objectives 2.2 and 2.4)

13. Investigate the effects of shading from increased canopy cover on Kincaid's lupine population dynamics. Determine a management threshold for canopy cover. (Objective 2.3)

14. When the canopy cover threshold level occurs within the population, initiate prescriptive actions, such as burning or thinning, to reduce the level of canopy cover. (Objective 2.3)

15. Avoid constructing fuel breaks or using ground-based fire suppression equipment within occupied habitat for Kincaid's lupine. (Objective 2.5)

16. Coordinate with Douglas County Fire Protection to incorporate protections for Kincaid's lupine as provisions of their State Responsibility Area agreement (Objective 2.5)

17. Sign and/or construct physical barriers to prevent OHV use in Kincaid's lupine habitat where OHV use has been observed. (Objective 2.5)

18. Avoid construction of new roads within occupied and suitable adjacent habitat. (Objective 2.5)

19. Coordinate with road maintenance crews to minimize surface disturbance within population areas. (Objective 2.5)

20. Identify suitable habitat for potential introduction sites. (Objective 3.1)

21. Produce and establish transplants for use in new introduction sites. (Objective 3.1)

22. Develop and implement out-planting protocol. (Objectives 1.3, 3.1)

23. Reintroduce new populations to suitable habitat that may have been previously occupied by Kincaid's lupine. (Objective 3.1)

24. Conduct vegetation treatments in habitat adjacent to known populations to allow for the expansion of the Kincaid's lupine population (Objective 3.2)

25. Plant expanded habitat with seed and/or seedlings produced from the local population or other genetically appropriate population as necessary. (Objective 3.2)

26. Design and implement effectiveness monitoring to determine if management actions are having a beneficial effect (Objectives 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2)

27. Analyze, summarize, and publish the results of the monitoring program. Review monitoring protocols to determine whether or not there is a need for revision. (Objectives 1.1, 1.2)

28. Agency partners will coordinate to review and document activities in a Monitoring Report. (Objectives 1.1, 1.2)

29. Agency partners will actively seek outside sources of funding. (Objectives 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2)

C. SITE SPECIFIC MANAGEMENT ACTIONS

In addition to the General Management Actions listed above site specific management actions will be conducted at the sites indicated below.

CALLAHAN MEADOWS

a. Increase genetic diversity within these occurrences to facilitate viable seed production. Pollen and/or seed and/or transplants from another population will be transferred into the Callahan Meadows population. (Objective 1.3)
b. Maintain BLM fence that surrounds the BLM parcel to exclude livestock. (Objective 2.4)

CALLAHAN RIDGE

a. Evaluate the potential for removing the conifers from the former oak community immediately adjacent to the Kincaid's lupine site.
b. Following conifer removal, replant the area to native species including Kincaid's lupine and other native forbs to promote pollinator visitation.

CHINA DITCH

a. Move any soil that erodes from the road cut-bank within the Kincaid's lupine sites and blocks the road or drainage ditch to an area within the vicinity of the population that is currently unoccupied by Kincaid's lupine. (Objectives 2.5)

LOOSE LACES

a. Block access into the old skid roads to prevent illegal dumping and OHV activity. (Objectives 2.5)

D. MANAGEMENT PLAN DURATION AND REVIEW SCHEDULE

The life of this Management Plan will be ten years, after which time the objectives and management actions included in the plan will be reevaluated and if necessary extended. At three year intervals the participating parties will review progress achieved at each managed population.

Appendix A. Implementation Schedule

Implementation of the General and Specific Management Actions outlined in this schedule is subject to available funding and staff.

Action Number[i]	Action Description	Date Action Initiated	Date Action Completed	Frequency	Population[ii]	Responsible Agency[iii]
1	Monitor the status of extant populations	2004	Ongoing	Annually	All	BLM, UNF
2	Monitor and assess habitat quality at all populations	2004	Ongoing	As Needed	All	BLM, UNF
3	Design and implement a long-term monitoring plan or demographic study to determine the natural reproductive processes of the species, and the effects of threats to the reproductive success of the species	2008	2018	Once	All	BLM FWS UNF
4	Survey suitable habitat for new populations	2004	Ongoing	As Needed	All	BLM, UNF
5	Document where previous surveys have been conducted to date	2007	2008	Once	All	BLM UNF
6	Evaluate the availability of pollinators. If pollinators are apparently lacking, manage habitat to attract suitable pollinating insects	2008	Ongoing	As Needed	All	BLM, UNF
7	Plant native forbs and shrubs adjacent to Kincaid's lupine populations as necessary to encourage a variety of pollinating insects	2009	Ongoing	As Needed	All	BLM, UNF
8	Collect seeds from each population for long-term storage and for population augmentation	2004	Ongoing	As Needed	All	BLM, UNF
9	Evaluate population genetic diversity	2007	2009	Once	All	BLM, FWS
10	Augment populations as necessary to enhance genetic diversity	2009	Ongoing	As Needed	All	BLM, UNF
11	Use integrated weed management to control noxious weeds within and adjacent to populations	2004	Ongoing	As Needed	All	BLM, UNF
12	Conduct prescribed burning, thinning, or other vegetation treatment to manage competing understory vegetation	2009	Ongoing	As Needed	CD, DH, LC, LL, SC	BLM
13	Investigate the effects of shading from increased canopy cover on Kincaid's lupine population dynamics. Determine a management	2009	2012	Once	All	BLM, UNF, FWS

Action Number[i]	Action Description	Date Action Initiated	Date Action Completed	Frequency	Population[ii]	Responsible Agency[iii]
	threshold for canopy cover.					
14	When the canopy cover threshold level occurs within a population, initiate prescriptive actions, such as burning or thinning, to reduce the level of canopy cover.	2009	Ongoing	As Needed	All	BLM, UNF
15	Avoid constructing fuel breaks or using ground-based equipment within occupied habitat	2006	Ongoing	As Needed	All	BLM, UNF
16	Coordinate with Douglas Fire Protection to incorporate protections for Kincaid's lupine as provisions of their State Responsibility Area agreement.	2006	Ongoing	Annually	CD, DH, LC, LL, SC	BLM
17	Sign and/or construct physical barriers to prevent OHV use in Kincaid's lupine habitat where OHV use has been observed	2008	2010	As Needed	Where Needed	BLM, UNF
18	Avoid construction of new roads within occupied and suitable adjacent habitat	2006	Ongoing	As Needed	CD, DH, LC, LL, SC	BLM
19	Coordinate with road maintenance crews to minimize surface disturbance within population areas	2005	Ongoing	As Needed	CD, DH, LC, LL, SC	BLM
20	Identify suitable habitat for potential introduction sites	2008	Ongoing	Once	All	BLM, UNF, FWS
21	Produce and establish transplants for use in new introduction sites	2009	Ongoing	As Needed	All	BLM, UNF, FWS
22	Develop and implement out-planting protocol	2009	2010	Once	All	BLM, UNF, FWS
23	Reintroduce new populations to suitable habitat that may have been previously occupied by Kincaid's lupine	2009	Ongoing	As needed	All	BLM UNF
24	Conduct vegetation treatments in habitat adjacent to known populations to allow for the expansion of the Kincaid's lupine population	2008	Ongoing	As Needed	All	BLM, UNF
25	Plant expanded habitat with seed and/or seedlings produced from the local population or other genetically appropriate population as necessary	2008	Ongoing	As Needed	All	BLM, UNF
26	Design and implement effectiveness monitoring to determine if management actions are having a beneficial	2008	Ongoing	Every 5 years	All	BLM FWS UNF

Action Number[i]	Action Description	Date Action Initiated	Date Action Completed	Frequency	Population[ii]	Responsible Agency[iii]
	effect					
27	Analyze, summarize, and publish the results of the monitoring program. Review monitoring protocols to determine whether or not there is a need for revision	2010	Ongoing	Every 5 years	All	BLM FWS UNF
28	Coordinate to review and document activities in a Monitoring Report	2003	Ongoing	Annually	All	BLM FWS UNF
29	Actively seek outside sources of funding	2005	Ongoing	Annually	All	BLM FWS UNF
CM(a)	Increase genetic diversity within the Callahan Meadows population	2008	Ongoing	As Needed	CM	BLM
CM(b)	Maintain fence to exclude cattle around Callahan Meadows site	2005	Ongoing	Annually	CM	BLM
CD(a)	Move eroded soil that blocks access road or drainage ditch to an unoccupied site within the vicinity of the population	2007	Ongoing	As Needed	CD	BLM
LL(a)	Block access into old skid roads within the population to prevent illegal dumping and OHV activity	2007	Ongoing	As Needed	LL	BLM

[i] Action Number correlates to Management Actions listed in Section V of this document.

[ii] CD – China Ditch; CM – Callahan Meadows; CR – Callahan Ridge; DH – Dickerson Heights; LC – Letitia Creek; LL – Loose Laces; SC – Stout's Creek

[iii] BLM – Bureau of Land Management, Roseburg District; FWS – U.S. Fish and Wildlife Service; UNF – Umpqua National Forest

Literature Cited

Barnes, M. 2004. Habitat variation and experimental management of Kincaid's lupine. Bulletin of the Native Plant Society of Oregon: Vol. 37, No. 9. October 2004.

Bureau of Land Management, U.S. Fish and Wildlife Service, and U.S. Forest Service. 2006. Programmatic conservation agreement for Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) in Douglas County. USDI, Bureau of Land Management, Roseburg District Office.

Husband, B.C. and S.C.H. Barrett. 1996. A metapopulation perspective in plant population biology. Journal of Ecology 84: 461-469.

Kaye, T.N. 1999. Obligate insect pollination of a rare plant: *Lupinus sulphureus* ssp. *kincaidii*. Northwest Science 73:50-52.

Menke, C. and T.N. Kaye. 2003. Population monitoring and survey for *Lupinus sulphureus* ssp. *kincaidii* on the BLM Roseburg District.

_____. 2006. Population monitoring for *Lupinus sulphureus* ssp. *kincaidii* on the BLM Roseburg District. 2006 Progress Report.

Severns, P.M. and B.S. Lewis. 2007. Is it appropriate to rely on seed set to assess candidate plant populations for genetic rescue? A case study with a threatened species. Natural Areas Journal 27:313-319.

USFWS (U.S. Fish and Wildlife Service). 2006a. Endangered and threatened wildlife and plants; designation of critical habitat for the Fender's blue butterfly (*Icaricia icarioides fenderi*), *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's Lupine), and *Erigeron decumbens* var. *decumbens* (Willamette Daisy). Final Rule. Federal register 71:63832-63977.

_____. 2006b. Recovery outline for *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's lupine).

Wilson, M.V., T. Erhart, P.C. Hammond, T.N. Kaye, K. Kuykendall, A. Liston, A.F. Robinson, Jr., C.B. Schultz, and P.M. Serverns. 2003. Biology of Kincaid's lupine (Lupinus sulphureus ssp. kincaidii [Smith] Phillips), a threatened species of western Oregon native prairies, USA. Natural Areas Journal 23:72-8