



## I. Introduction

The purpose of this document is to evaluate the Preferred Alternative of the Mt. Ashland LSR Habitat Restoration and Fuels Reduction Project in sufficient detail to determine its effects on Endangered, Threatened, Proposed, or Sensitive plant species. This document is an addendum to the Biological Assessment/Evaluation (BA/BE) dated April 9, 2007 (USDA 2007). This document will not repeat the original report, but will refer to the information available in the original BA/BE. In addition, this document includes sections titled Changes in Original Report to include any significant revisions to the original BA/BE. This Biological Assessment/Evaluation (BA/BE) is prepared in accordance with the legal requirements set forth under Section 7 of the Endangered Species Act [19 U.S.C. 1536 (c)], and follows the standards established in the Forest Service Manual direction (FSM 2672.42).

### A. Location Information

See the original BA/BE (USDA 2007).

For a map of the proposed project area, including the Preferred Alternative, see the *Mt. Ashland LSR Habitat Restoration and Fuels Reduction Project FEIS* (USDA 2008).

### B. Species Of Concern

#### Endangered

See the original BA/BE (USDA 2007). This Addendum addresses *Arabis macdonaldiana*, *Astragalus applegatei*, *Phlox hirsuta*, and *Fritillaria gentneri*. The Preferred Alternative is not within range or habitat of these species. No federally listed threatened, endangered, or proposed plant species will be affected by this project.

#### Sensitive

See the original BA/BE (USDA 2007). This Addendum analyzes the effects of the Preferred Alternative upon the Klamath National Forest list of Sensitive Plant species (USDA 2006b).

### C. Preliminary Botanical Review

See the Pre-field Review (USDA 2006e).

The Preferred Alternative contains documented occurrences or suitable habitat for the following species:

SPECIES	CODE	STATUS	FIELD SURVEY RECOMMENDED
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<i>Fritillaria gentneri</i>	FRGE	Endangered - vascular	No – surveys complete, no populations or habitat present within areas of ground disturbance
<i>Horkelia hendersonii</i>	HOHE2	Sensitive - vascular	
<i>Lupinus lepidus ssp. ashlandensis</i>	LULEA	Sensitive - vascular	
<i>Tauschia howellii</i>	TAHO2	Sensitive - vascular	
<i>Cypripedium fasciculatum</i>	CYFA	Sensitive - vascular	No – effects can be evaluated based on existing surveys.
<i>Cypripedium montanum</i>	CYMO2	Sensitive – vascular	
<i>Ptilidium californicum</i>	PTCA5	Sensitive - bryophyte	No – surveys complete.
<i>Boletus pulcherrimus</i>	BOPU4	Sensitive – fungi	Fungi species, habitat evaluation only, no surveys required.
<i>Cudonia monticola</i>	CUMO2	Sensitive – fungi	
<i>Dendrocollybia racemosa</i> (= <i>Collybia</i> )	DERA5	Sensitive - fungi	
<i>Phaeocollybia olivacea</i>	PHOL	Sensitive – fungi	Habitat evaluation only
<i>Sowerbyella rhenana</i>	SORH	Sensitive – fungi	
<i>Buxbaumia viridis</i>	BUVI2	Sensitive - bryophyte	

## II. Current Management Direction

See the original BA/BE (USDA 2007).

### Consultation to Date

No consultation required

## III. Description Of Proposed Action

### A. Preferred Alternative

The Preferred Alternative was developed after issuance of the Draft EIS to respond to comments and input from the public. Public input was provided during the 45-day comment period and during nine public field trips that occurred during the 2007 field season. Modifications were made to the existing proposal to further respond to concerns over spur road construction, concerns about effects along the Pacific Crest Trail, concerns about the economics of the project, and to respond to a general support of underburning as a fuels reduction treatment. The Preferred Alternative has the following changes from Alternative 2:

- Stands 250, 312, 313, and 314 along the PCT have been dropped.
- Stand 703 has been dropped to avoid road re-construction on roads 40S20.1 and 1A.
- Stands 235 and 339 have been dropped due to the dropping of spur road T235.
- Stand 440 has been dropped due to infeasibility of underburning that stand.
- There are 13 fewer spur roads than Alternative 2; remaining spurs are only located on ridges tops or upper slopes in this alternative.
- Spur road mileage has been reduced from 6.72 to 1.70 miles; spur roads T206A, T206B, T228A, T228B, T235, T254, T264, T277A, T317A, T320A, T320B, T320C, T380, T383, and T401 have been dropped and ridgetop road 40S02.1 has been extended approximately 1/10<sup>th</sup> of a mile.
- There is reduced helicopter yarding (from 1071 to 935 acres).
- There is reduced ground based equipment yarding (tractor, tractor end-line, mechanical harvester) (from 1202 to 1056 acres).
- There is increased cable yarding (from 1602 to 1610).
- There are more new landings proposed to facilitate yarding but less acreage affected due to smaller skyline landings on system roads (43 new landings, 22 acres).
- There are fewer acres treated with timber harvest (from 3875 to 3601).
- There is more underburning to reduce fine fuels and ladder fuels outside of thinning stands (from 120 to 1,453 acres); the additional underburning consists of six “batched” underburn areas as displayed on Map X.
- There will be 208 less acres of mastication and mastication will occur only on slopes  $\leq 35\%$ .
- In true fir stands, as part of the prescription, red fir will be favored in stands that are dominated by white fir to increase diversity.

Many features of the Preferred Alternative are similar to the other action alternatives; such as thinning prescriptions. The specific components of the Preferred Alternative, that are different from the other action alternatives, are displayed below in the description (refer to Appendix X for information specific to each unit). For treatment stands, spur location, and landing locations, refer to Maps x and x.

The Preferred Alternative will treat 4,468 acres in 247 stands and 1297 acres in six underburn areas. Activity and natural fuels will be treated in all stands. Silvicultural and fuels prescriptions are the same as those described for Alternative 2 (see prescriptions below) but the acres treated are different. Road actions are the same as those displayed for Alternative 2 except that three fewer existing roads will be used and 1.7 miles of temporary spur roads will be constructed (5.01 fewer miles than Alternative 2). It is estimated that the number of landings constructed will increase but less acreage will be

affected (43 landings and 22 acres potentially disturbed) than under the other action alternatives. Refer to Appendix X for specific treatment information.

## **Restoration Silvicultural Treatments**

- Variable density thinning of trees >9" DBH on 2,543 acres in 154 stands
- Small diameter thinning of trees ≤9" DBH and below on 408 acres in 16 stands; hand-piling (253 acres), underburning (97 acres) and mastication (58 acres) will be used to treat resultant fuels.

## **Defensible Fuel Profile Zone**

- Variable density thinning of trees larger than 9" DBH on 1,058 acres in 42 stands as part of DFPZs along upper slopes and ridges

## **Associated Activities**

- Small diameter thinning of understory trees in a subset of the 3,601 acres and 196 stands identified for variable density thinning above (thinning will occur as needed on a stand by stand basis).

## **Restoration Support Actions**

- Helicopter yarding systems to remove trees on 935 acres in 53 stands
- Skyline systems to remove trees on 1,610 acres in 79 stands
- Ground-based equipment systems to remove trees on 1,056 acres in 64 stands
- An estimated 35 existing landings will be used and small material or brush may be cleared to accommodate yarder swing or processing of small trees for bio-mass utilization.
- An estimated 43 new landings will be constructed. No new landings will be constructed within RRs. Ground-based and skyline landings will be between 0.25 and 0.5 acres in size, helicopter landings will be up to 1 acre in size. The total acreage disturbed by landing construction will not exceed 22 acres.
- In addition to constructed landings and existing landings, logs will be landed on the existing road bed during cable yarding ("continuous landing" along roads) on

roads 41S09, 41S10, 40S06.2, 40S06, 48N28, 41S15, and 40S14. Minor clearing of small material and brush may occur where needed and roads may be closed to public access during operation.

- Landings will be hydrologically restored post-project. If it is determined by an earth scientist that special erosion control measures are needed, they will be implemented on a site by site basis.

## **Fuels Reduction Treatments**

- Whole tree removal in stands treated by ground-based yarding systems on 1,056 acres in 64 stands
- Yard tops-attached in skyline and helicopter stands to minimize activity fuels.
- Mastication to reduce activity and natural fuels on 202 acres in 15 stands; mastication combined with underburning on 735 acres in 43 stands; mastication combined with hand-piling on 42 acres in 3 stands.
- Hand-pile and burn to reduce activity and natural fuels on 566 acres in 34 stands; hand-pile and burn followed by underburning on 55 acres in 1 stand.
- Underburning within thinning stands to reduce activity and natural fuels on 1,916 acres in 95 stands.
- Underburning combined with hand-piling within thinning stands adjacent to private land on 85 acres in one stand.
- Underburning as a stand-alone treatment to reduce natural fuel build-up in two stands on 156 acres
- Underburning outside of thinning stands to reduce fine ground fuels and ladder fuels in “batched” burn areas on 1,297 acres.
- Thinning small trees and burning material to reduce ladder and surface fuels within RRs on 303 acres in 31 stands

## **Restoration Support Road Actions**

Roads changed from open to year-round closure, roads decommissioned, and roads put on the system are the same as displayed for Alternatives 2, 4 and 5.

**Table xx. Preferred Alternative Restoration Support Road Actions**

Management Activity	Road Segment	Miles
Existing Unauthorized roads used for the Project: opened, used, hydrologically stabilized and closed	40S09.1A	0.77
	40S09.1A1	0.11
	40S09.2	0.18
	40S12.1	0.15
	40S13.1	0.42
	40S13.2	0.08
	40S14.1	0.12
	40S14.2	1.14
	40S16.1 segment	0.10
	40S16.5 segment	0.04
	40S16.5B	0.17
	40S20.1	0.47
	40S20.1A	0.76
	41S07.3	0.80
	41S09A.1	0.21
	41S10.2	0.07
	41S10.3	0.14
	41S15.1 segment	0.19
	41S15.3	0.73
	41S15.3A	0.53
	48N30A.1	0.18
	48N37.1	0.64
	41S13 to Stand 381	~0.38
40S06.2 to Stand 253	~0.25	
New Temporary Spur Road Construction: construct, use, decommission	T207	0.43
	T216	0.14
	T232	0.06
	T266	0.14
	T300	0.12
	T317	0.47
	T380A	0.16
	T206C	0.19

**B. Resource Protection Measures (Conservation Measures)**

Known Sites:

Mitigation for plant species of concern has been designed into the proposed action. One population of *Ptilidium californicum* (PTCA5) was previously known within the project area. It is located within a Thin & Handpile <9” unit (#465) which is surrounded by a larger Commercial Thin >9” unit (#300). One new population of *Ptilidium californicum* (PTCA5) was discovered during project surveys. It is located within a Commercial Thin >9” unit (#284). Based upon the recommendations of the botanist, site-specific habitat protection areas will be laid out on the ground around the Sensitive plant populations.

The sites have been evaluated on the ground to determine the buffer widths. Factors considered include overstory trees available for shading, the need to thin dense stands to prevent deterioration of the stand within the buffer, protection from prescribed fire or the need to apply prescribed fire within the buffer to prevent catastrophic wildfire, and other habitat protection needs.

Population	Location	Treatment	Buffer
PTCA5-5-61	Unit #300	Thinning >9"; skyline. Underburn.	No timber harvest, one site tree distance around population.
	Unit #465	Thinning <9"; handpile/burn; underburn w/U#300.	No thin/handpile/burn/underburn 25 ft. around population.
PTCA5-5-92	Unit #284	Thinning >9"; skyline. underburn.	No timber harvest, one site tree distance around population. No underburn 25 ft. around population.

The buffer width for timber harvest is equivalent to one site tree height in distance. This buffer, a strip outside of the actual population area, is an area in which no timber harvest ground-disturbing activities will occur. Within this buffer, small diameter trees will be thinned/handpiled/burned/underburned (U#465) or underburned (U#284) to within 25 ft. of the population. There will be no ground disturbing activities of any kind within 25 ft. of the population.

Changes in Original Report:

Unit #465 is located within, and surrounded by, U#300. The timber harvest buffer in U#300 is measured as one site tree diameter outside of the population boundary. This distance encompasses a portion of U#465, which is not a commercial thin unit, and will not have overstory trees removed, and a portion of U#300, which is a commercial thin unit. This is a clarification, and does not change the substance of the effects analysis in the original BA/BE.

Sensitive Fungi and Bryophytes:

See the original BA/BE (USDA 2007).

**IV. Existing Environment**

**A. Field Survey**

See the original BA/BE (USDA 2007). Project specific surveys have been conducted in October 2003, July, August and September 2004, May, June, July, and August 2005, and October, November, and December 2006. All areas within the project area boundary which were proposed for ground disturbing activities in the Draft Environmental Impact

Statement (USDA 2007a) have been surveyed for the 7 target species for which surveys were recommended (*Cypripedium fasciculatum* (CYFA), *Cypripedium montanum* (CYMO2), *Fritillaria gentneri* (FRGE), *Horkelia hendersonii* (HOHE2), *Lupinus lepidus* var. *ashlandensis* (LULEA), *Tauschia howellii* (TAHO2), and *Ptilidium californicum* (PTCA5)). All areas of proposed ground disturbance within the new Preferred Alternative have been surveyed for these species with the exception of the 1297 acres of additional unburning outside of treatment stands. These areas have been partially surveyed.

Of the 7 target species, habitat is present only for CYFA, CYMO2, and PTCA5 within the new 1297 acres proposed for underburning. Surveys for PTCA5 were conducted within all suitable habitat within the Project Area boundary, including the new proposed underburning acres, in October, November, and December of 2006. Surveys for CYFA, and CYMO2 were conducted from 2003 to 2005 within approximately 600 acres of the 1297 new proposed underburning acres. Of the approximately 700 remaining unsurveyed acres, there are approximately 100 acres of suitable habitat for CYFA and CYMO2. The potential for finding new populations within these areas is low. There is no habitat present for the remaining target species (FRGE, HOHE2, LULEA, and TAHO2) within the new areas proposed for underburning.

Sensitive Plant Survey Reports, dated: 2003, 2004, 2005, 2006 (USDA 2006g)

Sensitive Plant Population Reports, dated: 6-19-02, 7-22-04 10-27-06 (USDA 2006f)

Field surveys have not been conducted for the five sensitive fungi species and one bryophyte (BOPU4, CUMO2, DERA5, PHOL, SORH, and BUVI2) for which suitable habitat may occur within the project area. These species are also listed as Survey and Manage Category B, Pre-Disturbance Surveys Not Practical (BOPU4, CUMO2, DERA5, and SORH) and Category E, Status Undetermined (PHOL and BUVI2). Pre-disturbance surveys are not required for these species under Survey and Manage guidelines either because surveys were determined not to be practical due to seasonal timing, difficulty in identification, or habitat non-specificity, or because there was not adequate information available to conduct targeted field surveys. In the 2004 Final Supplemental Environmental Impact Statement (FSEIS), since superceded by later direction, the assumption was made that field surveys would not be necessary for these species in order to determine effects to sensitive species (USDA 2004c). In this BE, an evaluation of species-habitat associations, presence of suitable or potential habitat, and a review of the literature on the effects to the species group of concern is used to determine effects.

See the original BA/BE (USDA 2007) for a list of populations known within the project area.

## **B. Species Accounts – Vascular plants**

- *Cypripedium fasciculatum* – clustered lady-slipper orchid – CYFA:

This orchid species occurs in widely disjunct locations from the northern Cascades of Washington south to the central California coast and Sierra Nevada mountains, and east to the mountains of Idaho, Montana, Colorado, Wyoming, and Utah. Within this range, population locations are infrequent and widely scattered. On the Klamath National Forest, populations are present on all districts except the Goosenest. There are currently 105 populations known on the Klamath N.F.

*Cypripedium fasciculatum* occurs in a variety of habitats throughout its range that vary greatly in soils, elevation, aspect, and plant communities. CYFA is found on all parent materials, and sites vary from dry to damp, rocky to loamy. Elevations range from 1,000-5300 ft. Populations are usually found in areas with 60 to 100 percent shade provided by many forest plant communities, including mixed evergreen, mixed conifer, Douglas-fir, pine and black oak forest. On the Klamath N.F., the species is found in conifer forests with a hardwood tree element present. The aspect is most often northerly. Within the Douglas-fir series, sites occur in several plant associations that include a large component of hardwoods.

Although soil and topography have a definite influence upon terrestrial orchid species, there is little doubt that temperature and moisture are the most essential factors that control distribution and survival of all orchids (Correll 1950). CYFA usually grows in filtered light to shady areas and is rarely found growing in the open. On the Klamath N.F., *Cypripedium fasciculatum* is most often found in areas with 60 to 100 percent shade provided by tree canopy cover (Barker 1984). Populations on KNF have occasionally been found where the canopy cover is low, from 10-50% (USDA 2006f).

*Cypripedium fasciculatum* is a relatively long-lived perennial from an underground rhizome, living at least 30 years (Harrod 1994). Populations tend to be very small with relatively few plants. Plants in this genus have a complex ecology in which they have underground fungal relationships with other plant species. The orchid requires a fungal partner for seed germination and development and probably long-term maintenance (Wells 1981). These biological and ecological factors are believed to account for their rarity and are the limiting factors in their reproductive success.

#### Specific Populations Within Project Area

There are no populations currently known within the project area. Suitable habitat is found within approximately 100 acres of the area proposed for underburning outside of treatment units. Based on the number of acres that have been surveyed and the number of known population sites the potential for undiscovered populations to occur is low. If present, the species would most likely occur on north facing shady slopes, near the toe of the slope, and near creeks.

- *Cypripedium montanum* – mountain lady's slipper orchid – CYMO2:

This orchid species occurs in widely disjunct locations from southern Alaska, British Columbia, and western Alberta south to Montana, Idaho, Wyoming, Washington, Oregon, and northern California. Within this range, population locations are infrequent and widely

scattered. On the Klamath National Forest, populations are present on all districts. There are currently 91 populations known on the Klamath N.F.

*Cypripedium montanum* occurs in a broad range of habitats throughout its range that vary greatly in soils, elevation, aspect, and plant communities. CYMO2 is found on all parent materials, and sites vary from dry to damp, rocky to loamy. Elevations range from 1,500-6,500 ft. Aspect is mainly northerly. Populations are usually found in areas with 60 to 80 percent shade provided by many forest plant communities, including mixed evergreen, mixed conifer, Douglas fir, pine and black oak forest. On the Klamath N.F., the species is found in conifer forests with a hardwood tree element present. Sites occur in several plant associations within the Douglas-fir series. Although soil and topography have a definite influence upon terrestrial orchid species, there is little doubt that temperature and moisture are the most essential factors that control distribution and survival of all orchids (Correll 1950). CYMO2 usually grows in filtered light to shady areas and is rarely found growing in the open. On the Klamath N.F., *Cypripedium montanum* is most often found in areas with 60 to 100 percent shade provided by tree canopy cover (Barker 1984).

Very few studies have been done on the reproductive biology of *Cypripedium montanum*. However, studies of other *Cypripedium* species and other genera can provide some insight into the biology of this species. *Cypripedium fasciculatum* is a relatively long-lived perennial from an underground rhizome, living at least 30 years (Harrod 1994). *Cypripedium montanum* is a perennial from an underground rhizome that is likely to be as long lived. Populations tend to be very small with relatively few plants. Plants in this genus have a complex ecology in which they have underground fungal relationships with other plant species. The orchid requires a fungal partner for seed germination and development and probably long-term maintenance (Wells 1981). These biological and ecological factors are believed to account for their rarity and are the limiting factors in their reproductive success.

#### Specific Populations Within Project Area

One population of this species is known within the lower Grouse Creek drainage. This population is not within or adjacent to any area proposed for ground disturbing activities. It is approximately ¼ mile from the closest project activity area. Suitable habitat is found within approximately 100 acres of the area proposed for underburning outside of treatment units. Based on the number of acres that have been surveyed and the number of known population sites the potential for undiscovered populations to occur is low. If present, the species would most likely occur on north facing shady slopes, near the toe of the slope, and near creeks.

- *Horkelia hendersonii* – Henderson’s horkelia – HOHE2; *Lupinus lepidus* var. *ashlandensis* – Mt. Ashland lupine – LULEA; *Tauschia howellii* – Howell’s tauschia– TAHO2:

See the original BA/BE (USDA 2007). There is no habitat for these species located within areas that will be impacted by the Preferred Alternative.

## C. Species Accounts – Fungi

See the original BA/BE (USDA 2007).

### Mycorrhizal fungi species:

- *Boletus pulcherrimus* – BOPU4:
- *Phaeocollybia olivacea* – PHOL:

See the original BA/BE (USDA 2007).

### Saprophytic fungi species:

- *Dendrocollybia racemosa* – DERA5:
- *Cudonia monticola* – CUMO2:
- *Sowerbyella rhenana* - SORH:

See the original BA/BE (USDA 2007).

### Specific Habitat Areas Within Project Area

See the original BA/BE (USDA 2007). Suitable habitat is present for these species within a narrow strip adjacent to perennial watercourses, and within the areas proposed for underburning outside the treatment units. The potential for finding new populations of these species is low.

## D. Species Accounts – Bryophytes

See the original BA/BE (USDA 2007).

- *Buxbaumia viridis* – BUVI2:

See the original BA/BE (USDA 2007).

### Specific Habitat Areas Within Project Area

Suitable habitat may occur within the areas proposed for underburning outside the treatment units. The potential for finding new populations of these species is low.

- *Ptilidium californicum* Pacific fuzzwort – PTCA5:

See the original BA/BE (USDA 2007).

### Specific Populations Within Project Area

See the original BA/BE (USDA 2007). All areas of suitable habitat have been surveyed, including within the 1297 acres of additional burning outside of treatment stands.

## V. Effects Of The Alternatives

### A. Interactions Important to Analysis - General

See the original BA/BE (USDA 2007).

## **B. Interactions Important to Analysis - Species Specific**

### **1) Vascular plants**

- *Cypripedium fasciculatum* – clustered lady-slipper orchid – CYFA:

Canopy removal: The degree to which CYFA, a long lived perennial orchid, may be impacted depends largely on the nature of the disturbance and how it affects elements of the species' life cycle. KNF data indicates that this species is sometimes found in stands that have been thinned or selectively cut, or near roads or trails (Barker 1984, USDA 2006f). Other data suggests that populations in Oregon and Washington show decline when canopy removal and soil disturbance occur (Urban, 1981). On the Klamath National Forest, many sites have been found in mid-seral sites within conifer forests, such as 2<sup>nd</sup> growth railroad logged areas, old slumps along ditches, low-level fire intensity areas, old railroad beds, and young 30-50 year old conifer plantations that were clear-cut and burned as long as adequate canopy closure is present (USDA 2006f). It is likely that the difference in these observations is due to the different effects of clearcuts compared to partial cuts. Timber harvest prescriptions which leave adequate tree canopy cover would show reduced effects upon CYFA.

Forest structure appears to provide important microclimatic conditions for CYFA sites. Modification of forest structure (for example, canopy removal) has a profound effect on microclimate characteristics such as air temperature, relative humidity, soil temperature, and moisture, which could adversely impact *Cypripedium fasciculatum* (Chen 1995). Because so many sites on KNF have been documented to have survived low-intensity wildfires, it can be presumed that the removal of some understory shrubs and small trees does not have an adverse effect on the species. Orchid plants growing under tree and shrub canopies that restrict direct sunlight from reaching the plant cease flowering and develop long and weak stems susceptible to breakage (Vance 2007).

Soil disturbance: Certain features of *Cypripedium fasciculatum* biology and ecology have important habitat and viability implications. Harrod (1994) and Knecht (1996) found that activity that exposes or damages the rhizome appears to kill the plant. Physical disturbance of the site may affect the mycorrhizal fungus upon which the species is dependent.

Fire: The role of fire as a component of CYFA habitat is not clearly understood, but the shallow rhizome may exacerbate the deleterious effects of fire. Low intensity fire that does not eliminate the duff layer or destroy the canopy appears to have no adverse impact on *Cypripedium fasciculatum* (Harrod et al. 1996). In some cases on the Klamath NF it appears to have benefited the species (Knorr and Martin 2003). High-intensity fire that eliminates the duff layer also destroys CYFA rhizomes (Harrod et al. 1996). However, fire also opens up the tree and herbaceous canopies that compete with the orchid for light,

nutrients, and moisture, which may result in a positive increase in numbers and flowering of orchids as well as greater reproductive success (Vance 2007). Activities that reduce the risk of high-intensity wildfires would reduce the risk of extirpating local populations. Because the project area is located within the Klamath Region in an area that has historically experienced frequent, low-intensity fires, CYFA has evolved in the presence of fire. A prescribed fire that attempts to replicate the natural fire patterns and to return the forested stands to a condition prior to the advent of fire suppression is likely to have a beneficial overall effect upon the species and its habitat.

Spring season burns and fall season burns can have different effects. Spring growth of orchids arises from overwintering buds produced the preceding growing season. However, if a spring burn destroys new spring growth, the root system will remain, but the plant will suffer a major setback and it may die (Sheviak 1990). The same effect is not seen in a fall burn. If a low-intensity burn is conducted in the fall, when the plant's resources have already been stored in the roots, the individual will still be able to resprout the next spring, and is unlikely to die. Recent experiments to measure the effects of seasonality of burning have found different effects, however. When a drier fall burn is compared to a moister spring burn, fire's effects on understory vegetation appear to depend more on the amount of fuel consumed and the resulting fire intensity than the plant phenological stage (Knapp et al. 2007). It is likely that burns conducted in the spring will have less intense effects upon CYFA root systems if the soil and fuels are moist, and that plants can regenerate the following spring.

- ***Cypripedium montanum*** - mountain lady's slipper orchid – CYMO2

Canopy removal: Little specific information is available on this species. Losses due to timber harvest have been documented in Oregon (Urban 1981). Data from Klamath National Forest indicates similar response to management as *C. fasciculatum*, a related species (Barker, 1984). Populations are extirpated when clear-cut harvest systems are used, but can remain viable when partial cut harvest systems retain at least 60% canopy cover, especially if there is no ground disturbance within the population.

Some information on *C. fasciculatum*, a closely related species that occurs in the same habitats, is likely to apply to CYMO2 also. The degree to which CYMO2, a long lived perennial orchid, may be adversely impacted depends largely on the nature of the disturbance and how it affects elements of the species' life cycle. KNF data indicates that this species is sometimes found in stands that have been thinned or selectively cut, or near roads or trails (Barker, 1984). On the Klamath National Forest, many sites have been found in mid-seral sites within conifer forests, such as 2<sup>nd</sup> growth railroad logged areas and low-level fire intensity areas, as long as adequate canopy closure is present (USDA 2006f). Populations have also been located on the Klamath within 40 year-old conifer plantations that were clear-cut and burned. It is unknown if these populations survived the disturbance or moved into the units afterwards. Other data suggests that populations in Oregon and Washington show decline when canopy removal and soil disturbance occur (Urban, 1981). These effects are likely to be seen in CYMO2 also. On the other hand, orchid plants growing under tree and shrub canopies that restrict direct sunlight from

reaching the plant cease flowering and develop long and weak stems susceptible to breakage (Vance 2007).

Soil disturbance: Biological information on the effects of management activities upon *Cypripedium fasciculatum* is likely to be similar to the effects upon *C. montanum*. It is likely that activity that exposes or damages the rhizome will kill the plant. Physical disturbance of the site may affect the mycorrhizal fungus upon which the species is dependent.

Fire: The role of fire as a component of *Cypripedium montanum* habitat is not clearly understood, but the shallow rhizome may exacerbate the deleterious effects of fire. Low intensity fire that does not eliminate the duff layer or destroy the canopy appears to have no adverse impact on the related species, *Cypripedium fasciculatum* (Harrod et al. 1996). In some cases on the Klamath NF it appears to have benefited the species. Fire also opens up the tree and herbaceous canopies that compete with the orchid for light, nutrients, and moisture, which may result in a positive increase in numbers and flowering of orchids as well as greater reproductive success (Vance 2007). High-intensity fire that eliminates the duff layer also destroys *C. fasciculatum* rhizomes, and is likely to have the same effect on CYMO2 (Harrod et al. 1996).

The FSEIS (USDA 1994b) suggests that historic fire suppression is an important factor in the overall decline of *C. montanum*. On the other hand Harrod et al. (1996) found that *C. fasciculatum* is fire intolerant, and *C. montanum* may also be. The differences in findings may reflect different levels of burn intensity. High-intensity fires are likely to destroy *Cypripedium montanum* populations and their habitat. Fuel reduction activities such as thinning and underburning that reduce the risk of high-intensity wildfires would likely reduce the risk of extirpating local populations. Populations of *Cypripedium montanum* on KNF have been documented to have survived the 1987 wildfires where the fire intensity was low. Because the project area is located within the Klamath Region in an area that has historically experienced frequent, low-intensity fires, CYMO2 has evolved in the presence of fire. A prescribed fire that attempts to replicate the natural fire patterns and to return the forested stands to a condition prior to the advent of fire suppression is likely to have a beneficial overall effect upon the species and its habitat.

Spring season burns and fall season burns can have different effects, which are likely to be similar to those effects seen in *Cypripedium fasciculatum* above. Spring burns may destroy individuals, while fall burns are unlikely to do so, although recent research indicates that the lower soil temperatures present in moist spring burns may actually have less effects upon CYMO2 plants than fall burns do (Knapp et al. 2007).

- *Horkelia hendersonii*, *Lupinus lepidus* var. *ashlandensis*, and *Tauschia howellii*: Each of these species is located at least ¼ mile from the closest project activity area. There are no habitat elements that these species depend upon that can be affected by such a large distance from the areas in which project activities will occur.

## 2) Fungi

See the original BA/BE (USDA 2007).

### **Mycorrhizal fungi species**

See the original BA/BE (USDA 2007).

- *Boletus pulcherrimus, Phaeocollybia olivacea:*  
See the original BA/BE (USDA 2007).

### **Saprophytic fungi species**

See the original BA/BE (USDA 2007).

- *Dendrocollybia racemosa, Cudonia monticola, Sowerbyella rhenana:*  
See the original BA/BE (USDA 2007).

### **3) Bryophytes**

- *Buxbaumia viridis:*  
See the original BA/BE (USDA 2007).

- *Ptilidium californicum:*  
See the original BA/BE (USDA 2007).

## **C. Effects of the No Action Alternative** **Changes in Original Report**

- *Cypripedium fasciculatum* and *Cypripedium montanum:*  
Based on the number of acres that have been surveyed and the number of known population sites, the potential for undiscovered populations to occur is low. If present, the species would most likely occur on north facing shady slopes, near the toe of the slope, and near creeks. Wildfire in these areas would be generally of low to moderate intensity due to the higher moisture levels present. There is potential that a population could be affected if a portion is burned in a wildfire. This would be a direct effect to individuals. A low-intensity wildfire would retain adequate mature live overstory and understory trees, adequate substrate recruitment trees, and coarse and fine woody debris. The retention of these habitat elements would ensure that potential populations of these species would be maintained. There is a moderate risk that these areas would be impacted by a high intensity stand replacing wildfire. There may be an indirect effect to these species from the elimination of suitable habitat. There is not likely to be a cumulative effect, and no change to the species' viability within the project area, on the Klamath National Forest, or throughout the species' ranges, because all known populations have been protected. There are approximately 100 populations of each species present on the Klamath National Forest, well distributed across the Forest, and the low risk of loss of undiscovered populations would not affect the species viability of these uncommon, but not rare species.

## **D. Effects of the Preferred Alternative**

## 1) Vascular plants

- *Cypripedium fasciculatum* and *Cypripedium montanum*:

Because these species exhibit similar responses to natural and man-made processes, they will be discussed together.

Timber harvest effects: In this alternative, there will be no effects to CYFA and CYMO2 from timber harvest. All areas proposed for timber harvest treatments have been surveyed for these species, and no populations have been found.

Fuel treatment effects: Approximately 100 acres of suitable habitat for CYFA/CYMO2 area located within areas proposed for underburning. Because there is an overall low probability that these species of concern are present within the proposed project activity areas, there is also a low potential for an effect to individual populations from fuel treatment effects. If present, the species would most likely occur on north facing shady slopes, near the toe of the slope, and near creeks. The only activity that will occur within these areas is underburning. The fire intensities will be very low within these moister areas. The prescribed fire will be allowed to back into the Riparian Reserve down to the riparian area. The fuel treatments will be designed to reduce smaller diameter ground fuels and a portion of the ladder fuels and will affect mainly the understory vegetation. Prescribed fires of this type burn in a patchy mosaic that does not consume all of the understory trees and shrubs.

Within the CYFA/CYMO2 habitat, the prescribed fire is likely to burn at intensities that are low enough that belowground rhizomes will not be killed. Within potential population sites, adverse effects to individuals may occur. Aboveground plant parts may be damaged or killed by prescribed fire activities. This is likely to be a short-term effect to the population. There is not likely to be a long-term effect to the population. *Cypripedium fasciculatum* and *Cypripedium montanum* populations on the Klamath have been documented to be able to resprout the following year after a low-intensity underburn when the population's habitat is maintained intact.

The underburn prescriptions for the areas of suitable CYFA/CYMO2 habitat are designed maintain adequate overstory and ground cover to prevent erosion, while still reducing some of the excessive fuels. This will prevent indirect effects to potential populations from loss of overstory by maintaining existing shade levels. Habitat elements such as shading, moisture, air and soil temperatures, duff layers, down woody material, and associated species including mycorrhizal fungi will be maintained. The habitat will still retain approximately 70-80 percent canopy cover from large diameter conifer and hardwood species. There is not expected to be any indirect effect to the population because the habitat will be maintained in a condition that will continue to support the species.

The reduction of excessive fuel levels within the underburn areas is expected to protect the suitable CYFA/CYMO2 habitat by reducing fuel levels, thereby reducing the risk of catastrophic fire. There may be a short-term reduction in shading by loss of minimal

amounts of shading from within and adjacent to the habitat. Because larger canopy elements will be maintained, this will not reduce the shading to the habitat significantly. There is expected to be a long-term benefit to the potential *Cypripedium fasciculatum* and *Cypripedium montanum* populations by reducing the threat of catastrophic wildfire.

There may be a direct effect to individual CYFA/CYMO2 plants, and the prescribed fire may kill some. Local populations are likely to survive, however, since the fire prescriptions are designed to be of low-intensity. These effects are not likely to adversely affect the viability of the species within the project area, within the watersheds, and within the species range. There are approximately 100 populations of each species on the KNF that are well distributed across the Forest and within the Beaver Creek drainage. There are currently adequate numbers of individuals and populations to ensure the viability of the species. Short-term adverse effects to individuals within this project are likely to be offset by the long-term beneficial effects to the populations and their habitat by the reduction of the threat of catastrophic wildfire. There is not expected to be an indirect effect to any populations because the habitat will be maintained in a condition that will continue to support the species. Because potential populations would be maintained, there would not be a cumulative effect from this and other project activities occurring in the project area boundary. There may be a long-term beneficial effect to the fungi species habitat through the reduction of the risk of stand replacing wildfire due to fuel reduction activities.

Associated activities effects: Small diameter thinning of trees, weeding and cleaning of understory trees, pre-commercial thinning, other fuel treatment activities, restoration support road actions and all other proposed actions in this alternative would have no effects on CYFA/CYMO2. These activities are proposed in areas that are not suitable habitat for these species.

Summary – CYFA, CYMO2: In this alternative, there may be direct effects to individuals, but there will not be indirect or cumulative effects to populations or their habitat. There will be no change to the species' viability within the project area, on the Klamath National Forest or throughout the species' range. One population of CYMO3 is known within the lower Grouse Creek drainage. This population is not within or adjacent to any area proposed for ground disturbing activities. It is approximately ¼ mile from the closest project activity area.

- *Horkelia hendersonii*, *Lupinus lepidus* var. *ashlandensis* and *Tauschia howellii*:  
In this alternative, all three species are located more than ¼ mile from the closest proposed project activity area. There will be no direct effect to individuals or populations and existing habitat conditions would be maintained at each population site. The distance from the closest activity area is great enough that there would be no indirect effects from any of the project activities. There will be no direct, indirect, or cumulative effects to these species and no change to the species' viability within the project area, on the Klamath National Forest or throughout the species' range.

## 2) Fungi

- *Boletus pulcherrimus*, *Phaeocollybia olivacea*, *Dendrocollybia racemosa*, *Cudonia monticola*, and *Sowerbyella rhenana*:

Timber harvest effects: In this alternative, there will be no effects to fungi from timber harvest due to the location of the fungi habitat, which is outside of the timber harvest units and within the Riparian Reserves. The wetter environments and shadier stands adjacent to riparian areas along perennial streams provide habitat for the fungi species of concern. These areas are protected from timber harvest activities with a buffer of 340 ft. Within this buffer, commercial thinning activities will occur only within the outer 170 ft. distance from the perennial streams. There will be no commercial thinning within the 170 ft. buffer adjacent to the perennial streams. This distance is adequate to prevent edge effects to the habitat adjacent to the streams. There would be no direct effect to the species from mechanical damage to potential fungi populations. The 170 ft. buffer adjacent to the streams would retain all habitat elements necessary to support mycorrhizal and saprophytic species. Adequate live trees would be retained and would provide shade to the site to retain moisture, and there would not be an indirect effect through the long-term loss of habitat. A diversity of conifer, hardwood and shrub species would be retained within the stands and would provide host trees for mycorrhizal fungi species. Coarse woody debris and duff would be maintained which would provide substrate for saprophytic species. There would not be a cumulative effect from this action and others occurring within the project area because populations and their habitat would be maintained.

Fuel treatment effects: Because there is an overall low probability that these fungi species of concern are present within the proposed project activity areas, there is also a low potential for an effect to individual fungi populations from fuel treatment effects. The suitable habitat for these species is located along the main stems of Grouse and Long John Creeks where wet, north facing riparian areas within 25 ft. of a perennial stream occur, at the lower to mid-elevations, and within mature timber stands. The only activity that will occur within these areas is underburning. The fire intensities will be very low within the wet areas of fungi habitat. The prescribed fire will be allowed to back into the Riparian Reserve down to the riparian area. The fuel treatments will be designed to reduce smaller diameter ground fuels and a portion of the ladder fuels and will affect mainly the understory vegetation. Prescribed fires of this type burn in a patchy mosaic that does not consume all of the understory trees and shrubs. A diverse mix of species in these layers will be maintained within the fungi habitat. This prescription will retain an adequate percentage of the live tree overstory that will ensure the preservation of shade and a diverse mix of tree species to support underground ECM linkages, and will maintain mycorrhizal species. Understory trees, shrubs, and coarse woody debris will be reduced, but maintained at adequate levels to support the fungi that depend upon these vascular plant species. Saprophytic fungi species will be maintained by underburn prescriptions that ensure a low-intensity burn that will retain adequate woody debris. Best Management Practices (BMP) are being applied to provide adequate soil cover to prevent erosion, which will retain additional coarse woody debris and duff as a substrate for saprophytic fungi.

There may be a direct effect to a portion of individual fungi populations. Because mycorrhizal and saprophytic fungi have large underground systems, this is not likely to affect a population in its entirety. Fungi species readily regenerate after impacts to a portion of the population as long as adequate vegetative cover, species diversity, soil cover and coarse woody debris is maintained. There will be no indirect or cumulative effects to the species. The habitat would not be affected to the extent that it would no longer be suitable for the species of concern (indirect effect). Because potential populations would be maintained, there would not be a cumulative effect from this and other project activities occurring in the project area boundary. There may be a long-term beneficial effect to the fungi species habitat through the reduction of the risk of stand replacing wildfire due to fuel reduction activities.

Associated activities effects: Small diameter thinning of trees, weeding and cleaning of understory trees, pre-commercial thinning, other fuel treatment activities, restoration support road actions and all other proposed actions in this alternative would have no effects on the fungi species of concern. These activities are proposed in areas that are not suitable habitat for the fungi species. Areas of riparian vegetation and the timber stand within 25 ft. of perennial streams will be protected from these project activities.

Summary – fungi species: In this alternative, there may be direct effects to individuals, but there will not be indirect or cumulative effects to populations or their habitat. There will be no change to the species' viability within the project area, on the Klamath National Forest or throughout the species' range.

### 3) Bryophytes

- *Buxbaumia viridis:*

Timber harvest effects: In this alternative, there will be no effects to the species from timber harvest due to the location of the habitat, which is outside of the timber harvest units and within the Riparian Reserves. The wetter environments and shadier stands within riparian areas along perennial streams are the most likely locations for potential populations of the species. These areas are protected from timber harvest activities with a buffer of 340 ft. Within this buffer, commercial thinning activities will occur only within the outer 170 ft. distance from the perennial streams. There will be no commercial thinning within the 170 ft. buffer adjacent to the perennial streams. There would be no direct effect to the species from mechanical damage to potential populations. The 170 ft. buffer adjacent to the streams would retain all habitat elements necessary to the species. Adequate live trees would be retained and would provide shade to the site to retain moisture, and there would not be an indirect effect through the long-term loss of habitat. Coarse woody debris within and immediately adjacent to the perennial streams would be retained. Large diameter standing trees will remain to provide a future source of substrate for the species. There would not be a cumulative effect to the species from this action and others occurring within the project area because potential populations and their habitat would be maintained.

Fuel treatment effects: Because there is an overall low probability for this species to occur within the proposed project activity areas, there is also a low potential for an effect to individual populations from fuel treatment effects. The suitable habitat for this species is located along the main stems of Grouse and Long John Creeks where wet, north facing riparian areas along a perennial stream occur, at the lower to mid-elevations, and within mature timber stands. The only activity that will occur within these areas is underburning. Underburns within these areas will be allowed to back down into the creeks, which will ensure a low-intensity underburn. Substrate for the species, which is large diameter logs within the actual creek bed, are not likely to be consumed in a low-intensity underburn of this type. There may be some loss of shading from shrub and understory trees that are killed as the fire backs down the slope into the riparian areas. This is not likely to significantly affect the overall shading to the potential sites. Large diameter standing trees will be retained to provide recruitment trees for BUVI2 substrate. There will be no direct, indirect, or cumulative effects to this species.

Associated activities effects: Small diameter thinning of trees, weeding and cleaning of understory trees, pre-commercial thinning, other fuel treatment activities, restoration support road actions and all other proposed actions in this alternative would have no effects *Buxbaumia viridis*. These activities are proposed in areas that are not suitable habitat for this species. Areas of riparian vegetation and the timber stand within and immediately adjacent to perennial streams will be protected from these project activities.

Summary – BUVI2: In this alternative, there will be no, direct, indirect or cumulative effects to populations or their habitat. There will be no change to the species' viability within the project area, on the Klamath National Forest or throughout the species' range.

- *Ptilidium californicum:*

Timber harvest effects: In this alternative, there will be no timber harvest related ground disturbing activities within or adjacent to the *Ptilidium californicum* populations present. A protection buffer of one site tree (approximately 150 ft.) will be designated on the ground. Within this buffer, no timber harvest will occur, and no trees >9 inches will be removed. This will retain all existing shade and cover provided by the moderate to large sized trees. A buffer of this size will preserve existing moisture levels at the PTCA5 sites, and will provide for additional large diameter recruitment trees to serve as substrate for the species. There will be no heavy equipment operated within the buffer, and this will protect the PTCA5 plants from mechanical damage. There will be no direct effect to individuals and no indirect effect to the species habitat quality because all habitat elements will be retained. Because these populations will be maintained, there will be no cumulative effect from this and other project activities occurring within the project area boundary.

Fuel treatment effects: In this alternative, fuels within the units will be treated by thinning small diameter trees <9 inches, hand piling, and burning piles, or underburning. The PTCA5 populations will be protected from these activities with a fuel treatment buffer of 25 ft. Retention of all existing small diameter trees within this buffer will provide additional shading and moisture retention adjacent to the population. No handpiles will be

constructed or burned, and no underburning will be conducted within this buffer. This buffer will protect the populations from direct mechanical damage from thinning and the heat and radiation effects of pile burning.

Small diameter trees outside this buffer do not provide additional shading and contribute to increased fuel loading and wildfire risk levels. These small diameter trees outside the 25 ft. buffer will be thinned and burned. This is likely to provide a beneficial effect to the population and habitat through the reduction of fuel loading and wildfire risk.

Associated activities effects: Pre-commercial thinning, other fuel treatment activities, restoration support road actions and all other proposed actions in this alternative would have no effects the *Ptilidium californicum* populations. These activities are proposed in areas that are not within or adjacent to the populations or their buffer area.

Summary – PTCA5: Because these population will be protected, there will be no direct, indirect, or cumulative effects to the *Ptilidium californicum* populations. There will be no change to the species' viability within the project area, on the Klamath National Forest or throughout the species' range.

## **VI. Determination Of Effects**

Adequate botanical assessment has been completed for this Biological Assessment/Evaluation. This was based on recommendations in the Botanical Review for this project, and this botanist's professional judgment.

### **No Action Alternative:**

#### **Changes in Original Report:**

For the sensitive plant species *Cypripedium fasciculatum* and *Cypripedium montanum*, it is my determination that the Mt. Ashland LSR Habitat Restoration and Fuels Reduction Project **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability.**

### **Preferred Alternative:**

No federally listed threatened, endangered, or proposed, plant species will be affected by this project.

For the sensitive plant species *Horkelia hendersonii*, *Lupinus lepidus* var. *ashlandensis*, *Tauschia howellii*, *Buxbaumia viridis* and *Ptilidium californicum*, it is my determination that the Mt. Ashland LSR Habitat Restoration and Fuels Reduction Project will cause **no impacts.**

For the sensitive plant species *Cypripedium fasciculatum*, *Cypripedium montanum*, *Boletus pulcherrimus*, *Phaeocollybia olivacea*, *Dendrocollybia racemosa*, *Cudonia monticola*, and *Sowerbyella rhenana*, it is my determination that the Mt. Ashland LSR

Habitat Restoration and Fuels Reduction Project **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability.**

## VII. Mitigation Measures

No additional mitigation required beyond measures discussed in Section III above.

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